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EIGHT NEW RECORDS FOR THE ERIOPHYID (TROMBIDIFORMES ERIOPHYOIDEA ERIOPHYIDAE) MITE FAUNA OF IRAN

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Lotfollahi P., Haddad Irani-Nejad K., de Lillo E. – Eight new records for the Eriophyid (Trombidiformes Eriophyoidea Eriophyidae) mite fauna of Iran.

Trees from Juglandaceae, Ulmaceae, Salicaceae, Leguminosae and Betulaceae were sampled during two growing seasons, 2010 and 2011, in the southwest region of East Azerbaijan province, Iran, in order to survey their eriophyid mite fauna. Among identified taxa, eight species appeared to be new for the Iranian eriophyid fauna: *Coptophylla lamimani* (Keifer, 1939b), *Stenacis palomaris* Keifer, 1970, *Shevtchenkella juglandis* (Keifer, 1951), *Anthocoptes striatus* Ponomareva, 1978, *Aculus mogeri* (Farkas, 1960), *Aculops unguiculatus* (Nalepa, 1897), *Aculops allotrichus* (Nalepa, 1894) and *Tegolophus califraxini* (Keifer, 1938). Supplementary descriptions were given for *Sh. ulmi* (Farkas, 1960), *A. striatus*, *A. mogeri*, *A. unguiculatus* and *A. allotrichus*. In this study, *Alhagi maurorum* Medik (Leguminosae) and *Fraxinus angustifolia* Vahl. subsp. *angustifolia* (Oleaceae) were reported as new host plants for *A. allotrichus* and *T. califraxini*, respectively. Remarks on the eriophyid distribution in East Azerbaijan were also given.

KEY WORDS: distribution, East Azerbaijan province, faunistic survey.

INTRODUCTION

Tree species belonging to the families Juglandaceae, Ulmaceae, Salicaceae, Leguminosae and Betulaceae have large economic importance in Iran mainly as ornamental plants. Summarizing the updated literature, few eriophyid species (about 144) have been found in Iran until now and 18 of them were collected from plant species belonging to these families and in particular: *Aceria brachytarsa* (Keifer, 1939a), *A. erinea* (Nalepa, 1891) and *A. tristriata* (Nalepa, 1890) on *Juglans regia* L. (KAMALI *et al.*, 2001), *A. hippophaena* (Nalepa, 1898) on *Juglans* sp. (KHANJANI & HADDAD, 2006) for Juglandaceae; *Aceria brevipunctata* (Nalepa, 1889) on *Ulmus* sp. (KAMALI *et al.*, 2001), *A. campestricola* (Frauenfeld, 1865) and *Shevtchenkella ulmi* (Farkas, 1960) on *Ulmus* sp. (HAJIZADEH & HOSSEINI, 2004), and *Tetra ferdowsiensis* Xue, Sadeghi & Hong, 2009 on *U. minor* (XUE *et al.*, 2009) for Ulmaceae; *Aceria parapopuli* (Keifer, 1940) on *Populus alba* L. (KAMALI *et al.*, 2001), *A. zanjani* Flechtmann, Tarasi & Saboori, 2003 on *P. nigra* (FLETCHMANN *et al.*, 2003), *A. ambix* (Keifer, 1979), *Acaphyllisa distasa* (Keifer, 1961) and *Aculops rhodensis* (Keifer, 1957) on *Salix* sp. (HAJIZADEH & HOSSEINI, 2004), *Aculus tetanothrix* (Nalepa, 1889) on *Salix* sp. (KAMALI *et al.*, 2001) and *Anthocoptes salicis* (Nalepa, 1894) on *Salix babylonica* L. (TARASI & TAGHADDOSI, 2005) for Salicaceae; *Aculops semenovi* (Shevtchenko, Marikovski & Shamsutdinova, 1973) on *Sophora alopecuroides* L. (BARADARAN *et al.*, 2008) for Leguminosae; *Acalitus alnusae* Hong, Xue & Hajizadeh, 2005 on *Alnus glutinosa* (L.) Guertin. and *A. subcordata* (L.) C.A. Meyer (HONG *et al.*, 2005) and *Phytoptus avellanae* Nalepa, 1889 on *Corylus avellana* L. (KAMALI *et al.*, 2001) for Betulaceae.

Considering the scientific importance of evaluating the mite fauna (DE LILLO & SKORACKA, 2010), a survey on trees of the above reported families was carried out and new records for the associated eriophyid mite fauna in Iran are reported here. A supplementary description and illustration were given for a few new reports considering the incomplete or doubtful descriptions available in literature for the related mite species.

MATERIALS AND METHODS

The eriophyid mite fauna was surveyed in the South-western region of East Azerbaijan province, Iran, during 2010 and 2011. Plant samples were collected at random and based on observed symptoms. Eriophyid specimens were recovered from plant samples according to the modified washing method based on the protocol developed by MONFREDA *et al.* (2007). Some specimens were slide mounted according to the method reported by BAKER *et al.* (1996) and other specimens were preserved in Oudemans' fluid (WALTER & KRANTZ, 2009). The terminology and setal notation adopted for the morphological descriptions of the eriophyid mites follow mainly LINDQUIST (1996). The number of measured specimens (n) is given within parentheses in the description. All measurements were made using a phase contrast microscope (Olympus BX50) according to the procedures suggested by AMRINE and MANSON (1996) and DE LILLO *et al.* (2010), and are given in micrometers. Range values of the measurements are rounded off to the nearest integer when required and refer to the length of morphological characters unless specified otherwise. Drawings were made according to DE LILLO *et al.* (2010)

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and the abbreviations applied follow AMRINE *et al.* (2003). The genus classification follows AMRINE *et al.* (2003) and comparisons were also made with new genera described since that publication. Host plant names and their synonymies are in accordance with The Plant List on-line database (2010). Slides are deposited in the reference collections of the Acarology Laboratory, Department of Plant Protection, Faculty of Agriculture, University of Tabriz, Tabriz, Iran.

RESULTS

Coptophylla lamimani (Keifer, 1939b)
(Fig. I, 1)

TYPE DATA - *Corylus avellana* L. (Betulaceae); Paradise, Butte Co., California, USA.

RELATION TO THE HOST - Vagrant along the veins on the lower surface of the leaf lamina, without causing any damage.

LOCALITY AND HOST PLANT - 23 females and 7 males, from *C. avellana* in Azarshahr (37°46'24"N, 45°57'20"E), 1,353 m above sea level; late July, 2011; coll. P. Lotfollahi.

PREVIOUS PROVINCIAL RECORDS FOR IRAN - This is the first report for this species and for the genus *Coptophylla* in Iran.

REMARKS - Opisthosomal setae *d* are a bit longer in the Iranian specimens in respect to those of the original description given by KEIFER (1939b).

Stenacis palomaris (Keifer, 1970)
(Fig. I, 2)

TYPE DATA - *Salix lasiolepis* Benth. (Salicaceae); Top of Palomar Mountain, San Diego Co., California, USA.

RELATION TO THE HOST - The mites inhabit buds, petiole bases and leaves on witches' brooms.

LOCALITY AND HOST PLANT - 5 females and 1 nymph, late July, 2011; 5 females, late September, 2011; from *Salix alba* L. (Salicaceae) in Amir Dizaj village (Azarshahr) (37°40'17"N, 46°01'58"E), 1,950 m above sea level; coll. P. Lotfollahi.

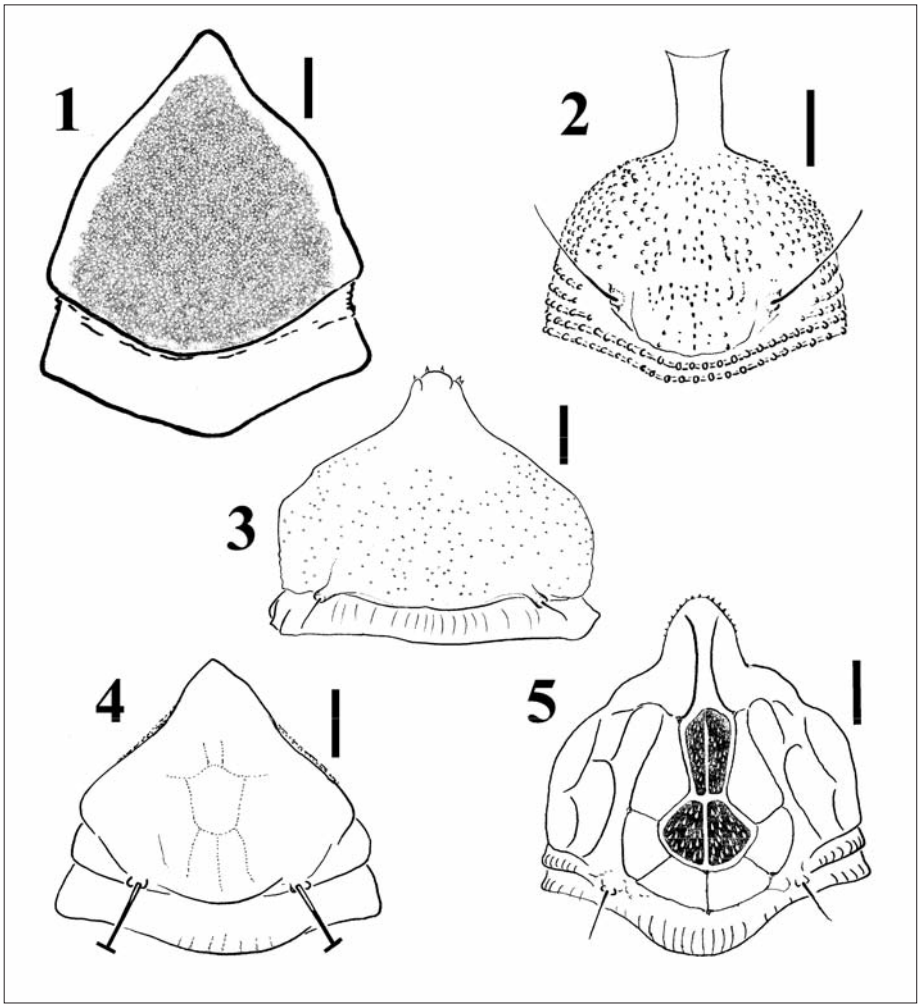

Fig. I – Schematic drawings of the prodorsal shield of several species found on trees in Iran (original drawings): 1. *Coptophylla lamimani* (Keifer, 1939); 2. *Stenacis palomaris* (Keifer, 1970); 3. *Shevtchenkella juglandis* (Keifer, 1951); 4. *Anthocoptes salicis* (Nalepa, 1894); 5. *Tegolophus califraxini* (Keifer, 1938). Scale bar: 10 μm.

PREVIOUS PROVINCIAL RECORDS FOR IRAN - This is the first report for this species in Iran.

REMARKS - The morphometry of the females largely corresponds to that of the original description (KEIFER, 1970). However, in the Iranian specimens setae *sc* are a bit shorter than those reported by KEIFER (1970), while the dorsal and ventral semiannuli are more numerous in the Iranian population in respect to the original description. A certain difference is also in the frontal lobe outline.

Shevtchenkella ulmi (Farkas, 1960)
(Fig. II)

DESCRIPTION - FEMALE (n=3). Body spindle shaped, 185-190 (from anterior edge of the frontal lobe to the anal lobe end), 61 thick, 65-67 wide. Gnathosoma 25 projecting obliquely downwards, chelicerae 20-21, palp genual setae *d* 5-6, unbranched. Prodorsal shield 44-50 included the frontal lobe, 63-65 wide, sub-circular in its anterior shape, with a relatively broad based frontal lobe, 9-11, over gnathosomal base. Shield pattern faint and composed of admedian lines extending on the posterior 2/3 of the prodorsal shield. Tubercles *sc* on the rear shield margin 27 apart, setae *sc* 10-11, directed backwards. Leg I 31-32, femur 11-12, genu 5, tibia 6, tarsus 8, ω 7, distally knobbed, empodium simple, 5-6, 4-rayed; femoral setea *bv* 12-14, genual setae *l″* 17-20, tibial setae *l′* 4-5, tarsal setae *ft′* 18-19, setae *ft″* 23-25. Leg II 28-32, femur 11, genu 4-5, tibia 5-6, tarsus 8-9, ω 8-7, distally tapered, empodium simple, 6, 4-rayed; femoral setae *bv* 12, genual setae *l″* 5-7, tarsal setae *ft′* 6, setae *ft″* 20-24. Coxae I-II with granules; setae *1b* 12-13, tubercles *1b* 12-14 apart, setae *1a* 32-36,

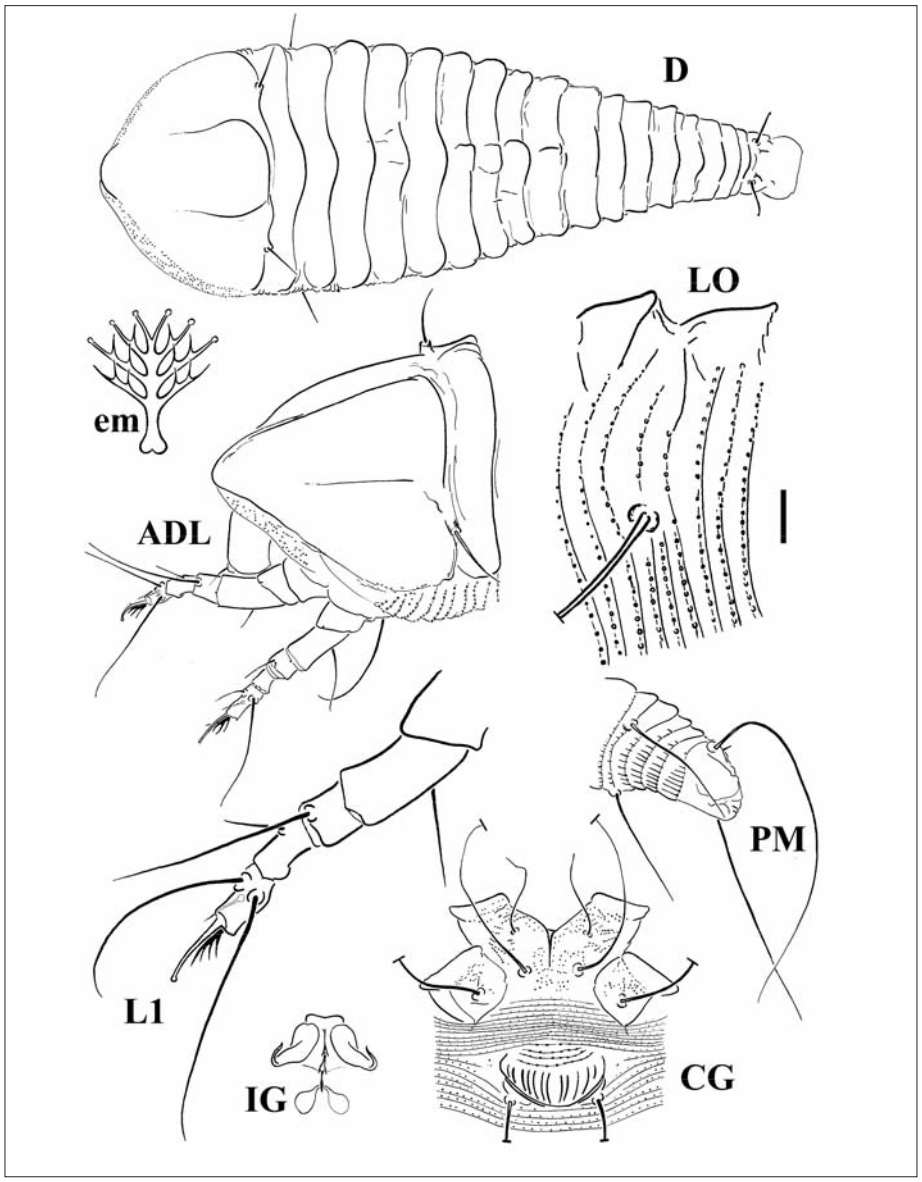

Fig. II – Schematic drawings of *Shevtchenkella ulmi* (Farkas, 1960) ADL. Dorso-lateral view of anterior body region; CG. Female coxigenital region; D. Dorsal view; em. Empodium; IG. Internal female genitalia; LO. Lateral view of annuli; L1. Leg I (a bit rounded on its longitudinal axis); PM. Lateral view of posterior opisthosoma. Scale bar: 10.5 μm for D;10 μm for ADL, CG, IG, PM; 5 μm for LO, L1; 2.5 μm for em.

tubercles *1a* 9-11 apart, setae *2a* 41-50, tubercles *2a* 25-27 apart. Prosternal apodeme 7. Opisthosoma dorsally flattened and with one central ridge extended over the whole body length, with 17 smooth and broad dorsal semiannuli, 61 narrow ventral semiannuli (counted from the first annulus after coxae II) and 11-12 semiannuli between coxae and coverflap plus 3-4 transversal rows of lined granules at the base of the coverflap. Microtubercles circular and tiny set on the posterior margin of ventral semiannuli. Last 4 ventral semiannuli with elongated and linear microtubercles on lateral-ventral side. Opisthosomal setae *c2* 19-22 on ventral semiannuli 11-12, setae *d* 57-65 on ventral semiannuli 24-25; setae *e* 10-13 on ventral semiannuli 38-39; setae *f* 23-27 on ventral semiannuli 57-58. Setae *h2* 70 very thin at the apex, *h1* 2-3. Female genital coverflap 12, 21 wide, with 10-12 striae; setae *3a* 17-19 apart, 33-43.

TYPE DATA - *Ulmus glabra* Huds., originally reported as *Ulmus campestris* L. (Ulmaceae); Nógrádveroce, Hungary.

RELATION TO THE HOST - Vagrant on leaf surface.

LOCALITY AND HOST PLANT - 13 females, 1 male and 1 nymph, from *Ulmus minor* Mill. in Osku (37°54'44"N, 46°09'00"E), 1,570 m above sea level; late May, 2011; coll. P. Lotfollahi.

PREVIOUS PROVINCIAL RECORDS FOR IRAN - This species was reported from *Ulmus procera* Salisb. and *U. minor* in Guilan Province (HAJIZADEH & HOSSEINI, 2004). This is the first record for a species of this tribe in East Azerbaijan province.

REMARKS - The morphometry of the female is consistent with the original description (FARKAS, 1960) except for the setae which are shorter in Farkas' description, possibly resulting from differences in microscope quality. FARKAS (1965) indicated this species was present also in North America, but this record has never been proven.

Shevtchenkella juglandis (Keifer, 1951)
(Fig. I, 3)

TYPE DATA - *Juglans regia* L. (Juglandaceae); San Jose district, Santa Clara Co., California, USA.

RELATION TO THE HOST - Leaf vagrant.

LOCALITIES AND HOST PLANT - 20 females, 8 males and 1 nymph, Azarshahr (37°46'24"N, 45°57'20"E), 1,353 m above sea level; 13 females, 4 males and 1 nymph, Kandovan village (Osku) (37°47'31"N, 46°14'57"E), 2,243 m above sea level; 1 male and 1 nymph, Amir Dizaj village (Azarshahr) (37°40'17"N, 46°01'58"E), 1,950 m above sea level; 4 females and 1 male, Alavian (Maragheh) (37°25'35"N, 46°14'38"E), 1,536 m above sea level; 5 females and 1 male, Malekan (37°09'25"N, 46°07'23"E), 1,301 m above sea level; 2 females, Sardrood (38°02'02"N, 46°08'24"E), 1,350 m above sea level; 2 females and 1 male, Akhijahan (Gogan) (37°47'14"N, 45°57'03"E), 1,346 m above sea level; from *J. regia*; late July 2011; coll. P. Lotfollahi.

PREVIOUS PROVINCIAL RECORDS FOR IRAN – This is the first record for this species in Iran.

REMARKS - The morphometry of the female was compared with the original description (KEIFER, 1951). Prodorsal shield of Iranian specimens has 4-6 small apical spines on frontal lobe, sparse faint and small pits and lateral lines and granules; the original description indicates 2 small apical spines on frontal lobe and lateral lines and granules on prodorsal shield. This is the first report for this species in Iran.

Anthocoptes striatus Ponomareva, 1978
(Fig. III)

DESCRIPTION - FEMALE (n=3). Body spindle shaped, 97-131 (from anterior edge of the frontal lobe to the anal lobe end), 46-50 thick, 38-41 wide. Gnathosoma 30 projecting obliquely downwards, chelicerae 25-27, palp genual setae *d* 4-5, unbranched. Prodorsal shield 35-46 including the frontal lobe, 36-38 wide, triangular with a relatively broad based frontal lobe, 9-11, over gnathosomal base. Shield pattern composed of distinct bumps including complete admedian lines gradually diverging up to anterior 2/5, then gradually converging, connected each other with 2 transverse lines, one close to posterior margin and other one close to anterior margin of admedian lines; first submedian lines relatively complete, starting from behind tubercles *sc*, curving around them and extending to anterior margin of prodorsal shield, connected to admedian lines with transverse line at about anterior 2/5 of prodorsal shield; second submedian lines arcuate, with a sort of denticular process on the near posterior end, connected to first submedian lines at about anterior 2/5 of prodorsal shield. Tubercles *sc* 3-4 anterior to rear shield margin, 19-22 apart, setae *sc* 14-20, directed upwards divergently, distally lightly knobbed. Leg I 25-28, femur 7-9, genu 4, tibia 5, tarsus 7-8, ω 10, distally tapered, empodium simple, 7, 6-rayed, basal rays smaller; femoral setae *bv* 9-14, genual setae *l″* 10-16, tibial setae *l″* 4, tarsal setae *ft′* 20, setae *ft″* 23-24. Leg II 20-23, femur 6-8, genu 2-3, tibia 3, tarsus 5-7, ω 10, distally knobbed, empodium simple, 7-8, 6-rayed, basal rays smaller; femoral setae *bv* 17, genual setae *l″* 5, tarsal setae *ft′* 5-6, setae *ft″* 18-24. Coxae I with lined dashes and some sparse granules; coxae II with lined dashes; setae *1b* 8-14, tubercles *1b* 7-8 apart, setae *1a* 20-24, tubercles *1a* 7 apart, setae *2a* 44-45, tubercles *2a* 19 apart. Prosternal apodeme 4-5. Opisthosoma dorsally arched, with 13 dorsal semiannuli, one anterior and five posterior dorsal semiannuli are distinctly narrower, 54-58 narrow ventral semiannuli (counted from the first annulus after the coxae II) and 3 semiannuli between coxae and coverflap plus some longitudinal rows of lined granules at the base of the coverflap. Microtubercles triangular set on the posterior margin of dorsal and ventral semiannuli. Elongated and linear microtubercles on the last 4 ventral semiannuli, ending in small spines set on rear margin. Setae *c2* 10-14 on ventral semiannulus 8, setae *d* 57-60 on ventral semiannuli 18-19; setae *e* 6-10 on ventral semiannuli 31-33; setae *f* 10-13 on ventral semiannuli 50-54; 4 annuli before anal lobe. Setae *h2* 45-46 very thin at the apex, *h1* minute, 1-2. Female genital coverflap 10-12, 19-20 wide, with 9 striae; setae *3a* 15-19, 12-13 apart.

TYPE DATA - *Juglans regia* L. (Juglandaceae); Vicinity of Ak-Terek, Oshskoi Region, Kirgizia.

RELATION TO THE HOST - Leaf vagrant; wintering sites on the surface of buds, groups of 100-150 mites.

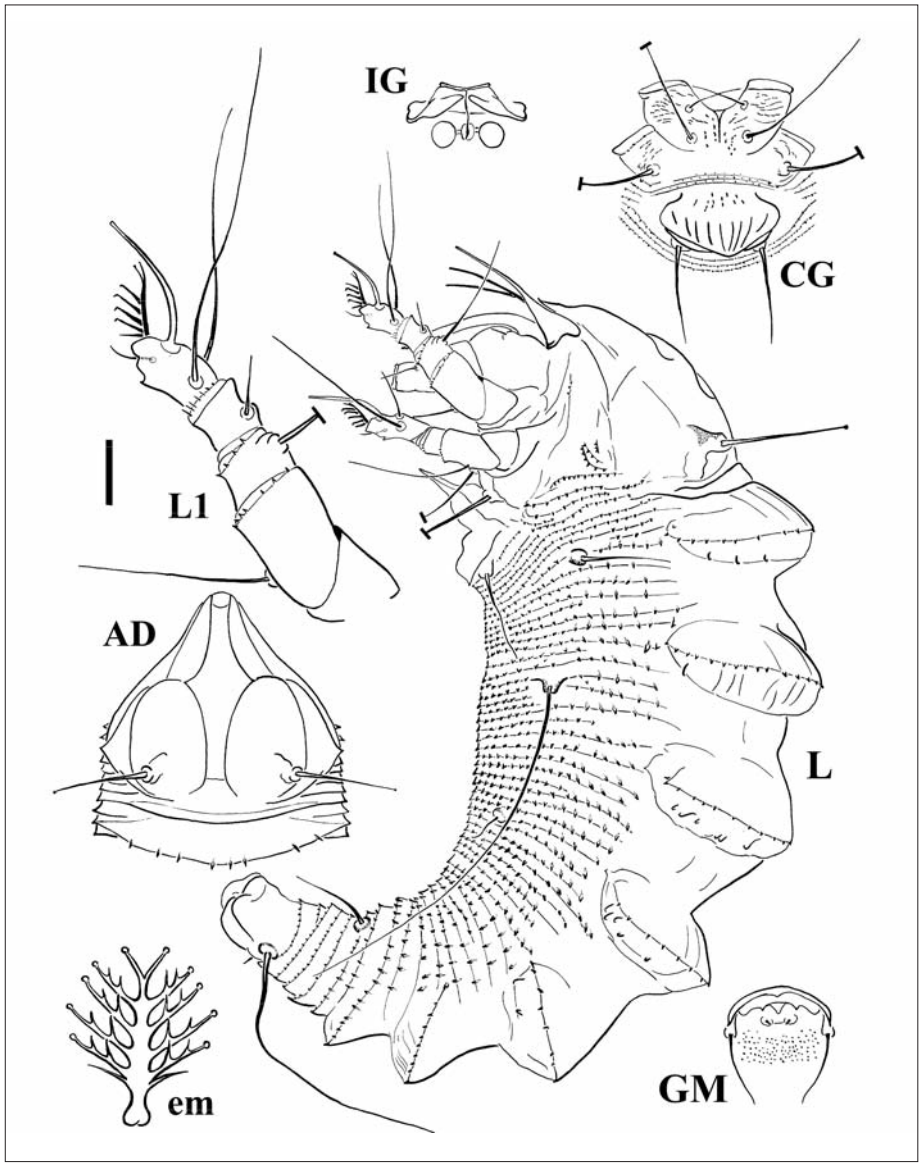

Fig. III – Schematic drawings of *Anthocoptes striatus* Panomareva, 1978. AD. Prodorsal shield; CG. Female coxigenital region; em. Empodium; GM. Genital region, Male; IG. Internal female genitalia; L. Lateral view; L1. Leg I. Scale bar: 10 μm for AD, CG, IG, GM, L; 5 m for L1; 2.5 μm for em.

LOCALITIES AND HOST PLANT - 2 females and 1 male, Kandovan village (Osku) (37°47'31"N, 46°14'57"E), 2,243 m above sea level, 5 females and 2 males, Azarshahr (37°46'24"N, 45°57'20"E), 1,353 m above sea level; from *J. regia*; late July, 2011; coll. P. Lotfollahi.

PREVIOUS PROVINCIAL RECORDS FOR IRAN - This is the first record for this species in Iran.

REMARKS - Unfortunately, the drawings published for this species by PONOMAREVA (1978) and FLECHTMANN *et al*. (2002) are not consistent with the required standards (DE LILLO *et al*., 2010) and a comparison of the Iranian species with them cannot be perfectly made. In addition, a mislabelling occurred in FLECHTMANN *et al*. (2002) where *A. striatus* drawings were erroneously attributed to another species under fig. 6. Moreover, further confusion came by the hypothesis that this mite was the deutogyne form of *Aculops unguiculatus* (BAGDASARIAN, 1981).

Based on the morphometric data, the Iranian population is quite similar to the description given by PONOMAREVA (1978) and FLECHTMANN *et al*. (2002) with a few differences observed (the most evident regards the shape of the end of setae *sc*: Iranian populations have a small terminal knob which is absent in other descriptions). On the contrary, this latter character is in common with *Anthocoptes juglandis* Domes, 1998, which shows a different prodorsal shield design (two further submedian lines), more numerous semiannuli between coxae and female genital coverflap, more numerous striae on the female genital coverflap, longer opisthosomal setae *e* and *f*, and longer spermathecal tubes in respect to the Iranian specimens. In addition, *A. juglandis* displays crenate lateral lobe outlines on the dorsal semiannuli and rounded microtubercles.

Anthocoptes salicis Nalepa, 1894
(Fig. I, 4)

TYPE DATA - *Salix purpurea* L. (Salicaceae); type locality not stated by the author, and AMRINE & STASNY (1994) listed Austria followed by a question mark.

RELATION TO THE HOST - Vagrant.

LOCALITY AND HOST PLANT - 17 females and 3 males, from *Salix alba* L. (Salicaceae) in Amir Dizaj village (Azarshahr) (37°40'17"N, 46°01'58"E), 1,950 m above sea level; late July, 2011; coll. P. Lotfollahi.

PREVIOUS PROVINCIAL RECORDS FOR IRAN - This species was reported from flower galls of weeping willow, *Salix babylonica* L., in Zanjan (TARASI & TAGHADDOSI, 2005). This is the first record for this species in East Azerbaijan province.

REMARKS - The morphometry of the female matches almost completely the description given by DE LILLO (1988), except for minor differences in prodorsal shield pattern and frontal lobe shape.

Aculus mogeri (Farkas, 1960)
(Fig. IV)

DESCRIPTION - FEMALE (n=3). Body spindle shaped, 182-215 (from anterior edge of the frontal lobe to the anal lobe end), 63-65 thick, 67-68 wide. Gnathosoma 27-28 projecting obliquely downwards, chelicerae 20-25, palp genual setae *d* 9-10 unbranched. Prodorsal shield 43-46 including the frontal lobe, 67-69 wide, trapezoidal with a long, relatively broad based frontal lobe, anteriorly rounded with about 10 spines, 10-13, over gnathosomal base. Shield pattern is relatively faint, composed of many granules that form a short median line on the posterior 1/3 of the prodorsal shield, relatively complete admedian lines on the posterior 3/4 of the prodorsal shield, relatively complete first submedian lines equal in length and parallel to admedian lines, short second submedian lines and lateral lines on the posterior 1/3 of the prodorsal shield, 7 transverse lines between the previously mentioned lines, 3 cells in median area of prodorsal shield, some broad foveae on lateral sides; tubercles *sc* on the rear shield margin 30-35 apart, setae *sc* 19-20, directed backwards divergently. Leg I 37, femur 10-11, genu 6-7, tibia 10-11, tarsus 9-10, ω 6, distally funnel-shaped, empodium simple, 6, 4-rayed; femoral setae *bv* 13-14, genual setae *l''* 20-23, tibial setae *l'* 6-7, tarsal setea *ft'* 17-21, setea *ft''* 21-23. Leg II 37, femur 11-12, genu 6, tibia 9, tarsus 10, ω 5-6, distally funnel-shaped, empodium simple, 6-8, 4-rayed; femoral setae *bv* 16-17, genual setae *l''* 10-11, tarsal setae *ft'* 6-8, setae *ft''* 20-22. Coxae I-II with lined and sparse granules; setae *1b* 10-12, tubercles *1b* 10-12 apart, setae *1a* 32-34, tubercles *1a* 9 apart, setae *2a* 45-55, tubercles *2a* 24-25 apart. Prosternal apodeme 8-9. Opisthosoma dorsally arched, with 30-32 relatively broad dorsal semiannuli, 66-70 narrow ventral semiannuli (counted from the first annulus after coxae II) and 10-11 semiannuli between coxae and genital coverflap plus 3 transversal rows of lined granules at the base of the coverflap. Elongated microtubercles on the posterior part of dorsal semiannuli; microtubercles of ventral semiannuli pointed posteriorly with a circular base. Last 3 dorsal semiannuli with spinules on rear margin and last 5 ventral semiannuli with elongated linear microtubercles. Setae *c2* 40-52 on ventral semiannuli 13-15, setae *d* 55-90 on ventral semiannulus 28; setae *e* 27-28 on ventral semiannuli 46-48; setae *f* 37-40 on ventral semiannuli 61-65; 5 annuli before anal lobe. Setae *h2* 97-120 very thin at the apex, *h1* 3-4. Female genital coverflap 13, 22-25 wide, genital coverflap with 13-14 striae; setae *3a* 24-27, 17-19 apart.

TYPE DATA - *Populus alba* L. (Salicaceae); Szentendre, Hungary.

RELATION TO THE HOST - Vagrant. Mites inhabit the lower surface of the leaves. At high population density mites cause discolouration of leaves.

LOCALITIES AND HOST PLANT - 8 females, 6 males and 3 nymphs, Malekan (37°09'25"N, 46°07'23"E), 1,301 m above sea level; 16 females and 4 males, Kandovan village (Osku), 37°47'31"N, 46°14'57"E, 2,243 m above sea level; from *Populus nigra* L. (Salicaceae); late July, 2011; coll. P. Lotfollahi.

PREVIOUS PROVINCIAL RECORDS FOR IRAN - This is the first report of this species in Iran.

REMARKS - The morphometry of the female closely corresponds to the original description (FARKAS, 1960), apart from differences in the ornamentation of the prodorsal shield and coxal plates. In addition, no spinules were indicated at the anterior margin of the frontal lobe by FARKAS (1960) while about 10 spinules were detected at the margin of the frontal lobe in Iranian specimens. These light differences and the fact that Iranian mite was collected on *P. nigra* whereas the Hungarian one was described from specimens coming from *P. alba* might lead to suspect that they are two different and close species. The Hungarian species needs to be described carefully and compared with the Iranian one, such as also specimens previously reported on *P. nigra* in Hungary (FARKAS, 1960; RIPKA & DE LILLO, 1997).

Aculops unguiculatus (Nalepa, 1897)
(Fig. V)

DESCRIPTION - FEMALE (n=3). Body spindle-shaped, 183-195 (from anterior edge of the frontal lobe to the anal lobe end), 50-57 thick, 52-53 wide. Gnathosoma 18-26 projecting obliquely downwards, chelicerae 15-19, palp genual setae *d* 4-5, unbranched. Prodorsal shield 36-37 including the frontal lobe, 36-44 wide, semicircular in anterior shape with a long, relatively broad based, distally pointed frontal lobe, 6-7, over gnathosomal base. Shield pattern composed of bumps including one V-shaped bump on mediobasal prodorsal shield; complete admedian lines starting from inner side of tubercles *sc*, converging and connecting to each other with a transverse line at about 1/3 posterior of shield, then diverging from each other at about 1/3 anterior of shield, then converging to each other at about the base of the frontal lobe; relatively complete first submedian lines that connect to admedian lines at about anterior 1/3 of prodorsal shield; second submedian lines arcuate, connecting to first submedian lines at 1/2 of prodorsal shield; some lateral lines connected to many crenulations on lateral prodorsal shield. Tubercles *sc* 3-4 anterior to the rear shield margin,

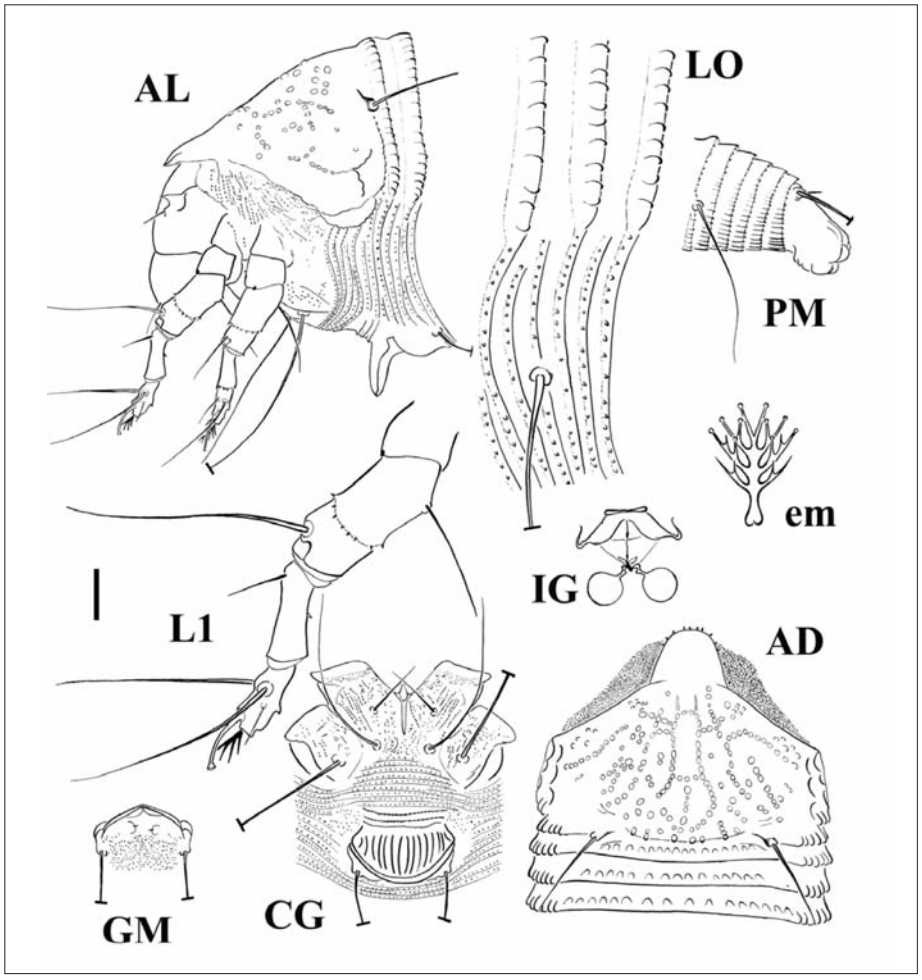

Fig. IV – Schematic drawings of *Aculus mogeri* (Farkas, 1960) AD. Prodorsal shield; AL. Lateral view of anterior body region; CG. Female coxigenital region; em. Empodium; GM. Genital region, Male; IG. Internal female genitalia; LO. Lateral view of annuli; L1. Leg I; PM. Lateral view of posterior opisthosoma. Scale bar: 10 m for AD, AL, CG, IG, GM, PM; 5 m for LO, L1; 2.5 μm for em.

15-17 apart, setae *sc* 20-21, directed up and posteriorly, distally knobbed. Leg I 27-29, femur 9, genu 5, tibia 6, tarsus 7-9, ω 9 distally with a small knob, empodium simple, 6-7, 6-rayed; femoral setae *bv* 11-15, genual setae *l″* 12-16, tibia setae *l′* 3-5, tarsal setae *ft′* 10-14, setae *ft″* 20-24. Leg II 25-27, femur 9-10, genu 4, tibia 4, tarsus 8, *ω* 11-12 distally rounded, empodium simple, 6, 6-rayed; femoral setae *bv* 11-13, genual setae *l″* 7-9, tarsal setae *ft′* 6, setae *ft″* 22-23. Coxae I-II with sparse granules; setae *1b* 9-10, tubercles *1b* 8 apart, setae *1a* 25-30, tubercles *1a* 8-9 apart, setae *2a* 43-50, tubercles *2a* 20 apart. Prosternal apodeme 4. Opisthosoma dorsally arched, with 25-27 broad dorsal semiannuli, 62-69 narrow ventral semiannuli (counted from the first annulus after coxae II) and 8-12 semiannuli between coxae and coverflap plus 1-2 transversal rows of lined granules at the base of the genital coverflap. Elongated microtubercles ending in spinules on the posterior edge of dorsal semiannuli; pointed microtubercles with a circular base, set on the central part of ventral semiannuli. Last 4 dorsal semiannuli with spinules on rear margin and last 5 ventral semiannuli with elongated linear microtubercles. Setae *c2* 16 on ventral semiannuli 11-13, setae *d* 60-64 on ventral semiannuli 22-24; setae *e* 21-24 on ventral semiannuli 37-41; setae *f* 17-18 on ventral semiannuli 57-64; 5 annuli before anal lobe. Setae *h2* 53-62 very thin at the apex, *h1* minute, 2. Female genital coverflap 11-14, 20-22 wide, with 10-12 striae; setae *3a* 19-24, 15 apart.

TYPE DATA - *Juglans regia* L. (Juglandaceae); St. Goar am Rhein, Germany.

RELATION TO THE HOST - Rust (no apparent damage in this study).

LOCALITIES AND HOST PLANT - 25 females and 4 males, Kandovan village (Osku) (37°47’31”N, 46°14’57”E), 2,243 m above sea level and 3 females, Amir Dizaj village (Azarshahr) (37°40’17”N, 46°01’58”E), 1,950 m above sea level; late July; 2 females and 1 male, Azarshahr (37°46’24”N, 45°57’20”E), 1,353 m above sea level; late September, 2011; from *J. regia*; coll. P. Lotfollahi.

PREVIOUS PROVINCIAL RECORDS FOR IRAN - This is the first record for this species in Iran.

REMARKS - Unfortunately, the current description cannot be compared completely with those by NALEPA (1897), who did not draw the mite, FARKAS (1965) and

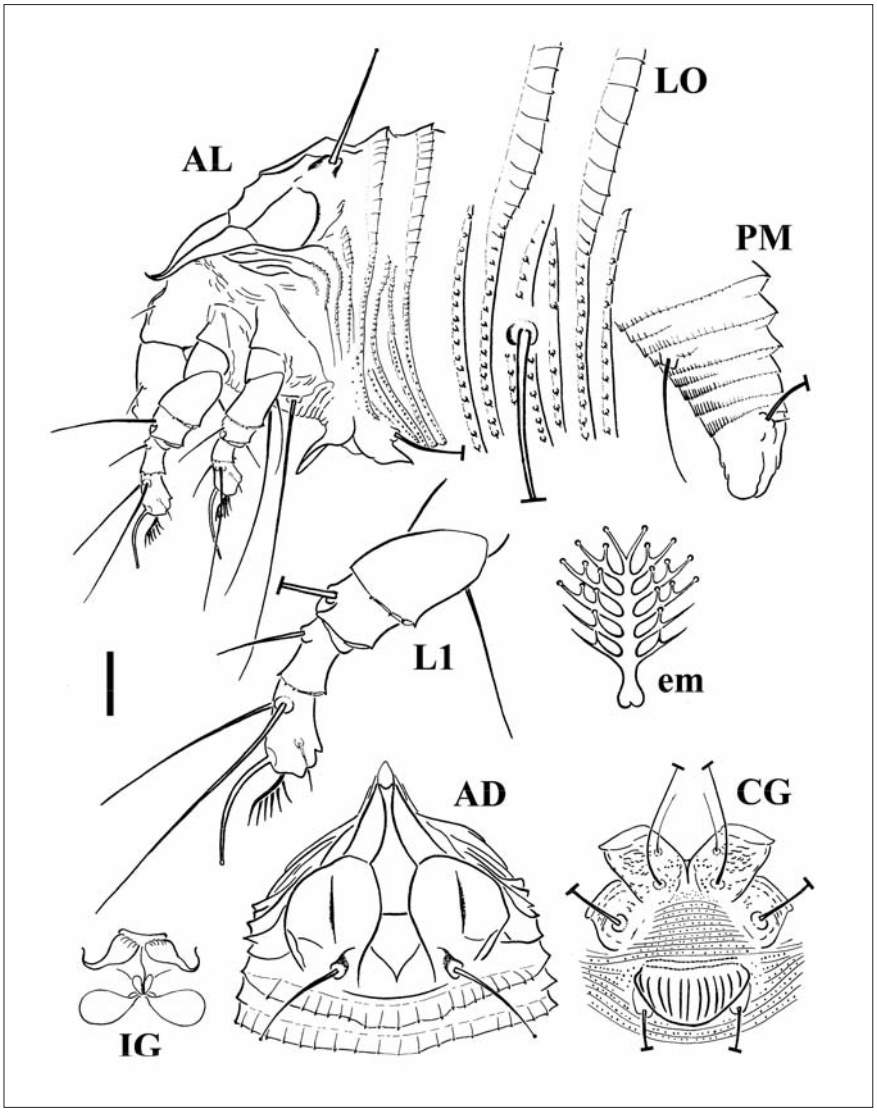

Fig. V – Schematic drawings of *Aculops unguiculatus* (Nalepa, 1897) AD. Prodorsal shield; AL. Lateral view of anterior body region; CG. Female coxigenital region; em. Empodium; IG. Internal female genitalia; LO. Lateral view of annuli; L1. Leg I; PM. Lateral view of posterior opisthosoma. Scale bar: 10 m for AD, AL, CG, IG, PM; 5 μm for LO, L1; 2.5 μm for em.

BAGDASARIAN (1981), who gave drawings of some traits. Actually, the protogyne form described by Bagdasarian (1981) displays smooth dorsal semiannuli (*versus* microtuberculated ones for the Iranian population), relatively longer setae *1a* (35 *versus* 25-30 of the Iranian population), the empodium had less rays (5 *versus* 6 of the Iranian population), and setae *h1* was absent (present in the Iranian population). Also Farkas (1965) showed smooth or slightly microtuberculated dorsal semiannuli, 5 rays of the empodium and setae *h1* absent; in addition, FARKAS (1965) did not draw a transverse line connecting the admedian line on the posterior 1/3 of the prodorsal shield which is present on the Iranian population. The Iranian mites correspond most closely to the description given by FLECHTMANN *et al.* (2002), taking into account that their figures were mislabelled and *A. unguiculatus* drawings were erroneously attributed to another species in Fig. IV.

Aculops allotrichus (Nalepa, 1894)
(Fig. VI)

DESCRIPTION - FEMALE (n=5). Body spindle shaped, 163-175 (from anterior edge of the frontal lobe to the anal lobe end), 38-45 thick, 52-56 wide. Gnathosoma 26-30 projecting obliquely downwards, chelicerae 21-25, palp genual setae *d* 6-7, unbranched. Prodorsal shield 39-45 including the frontal lobe, 45-50 wide, sub-triangular in anterior shape with a long, relatively broad based, distally pointed frontal lobe, 11-13, over gnathosomal base. Shield pattern is completely distinct and composed of reticulation including 26 cells. Tubercles *sc* on the rear shield margin 24-28 apart, setae *sc* 18-22, directed posterior divergently. Leg I 31-32, femur 10-11, genu 5-6, tibia 8-9, tarsus 6-9, ω 7 distally tapered, empodium simple, 5-6, 8-rayed; femoral setae *bv* 10-12, genual setae *l″* 15-20, tibial setae *l′* 5, tarsal setae *ft′* 17, setae *ft* 20-23. Leg II 31, femur 9-10, genu 5, tibia 6-7, tarsus 7-8, ω 7 distally tapered, empodium

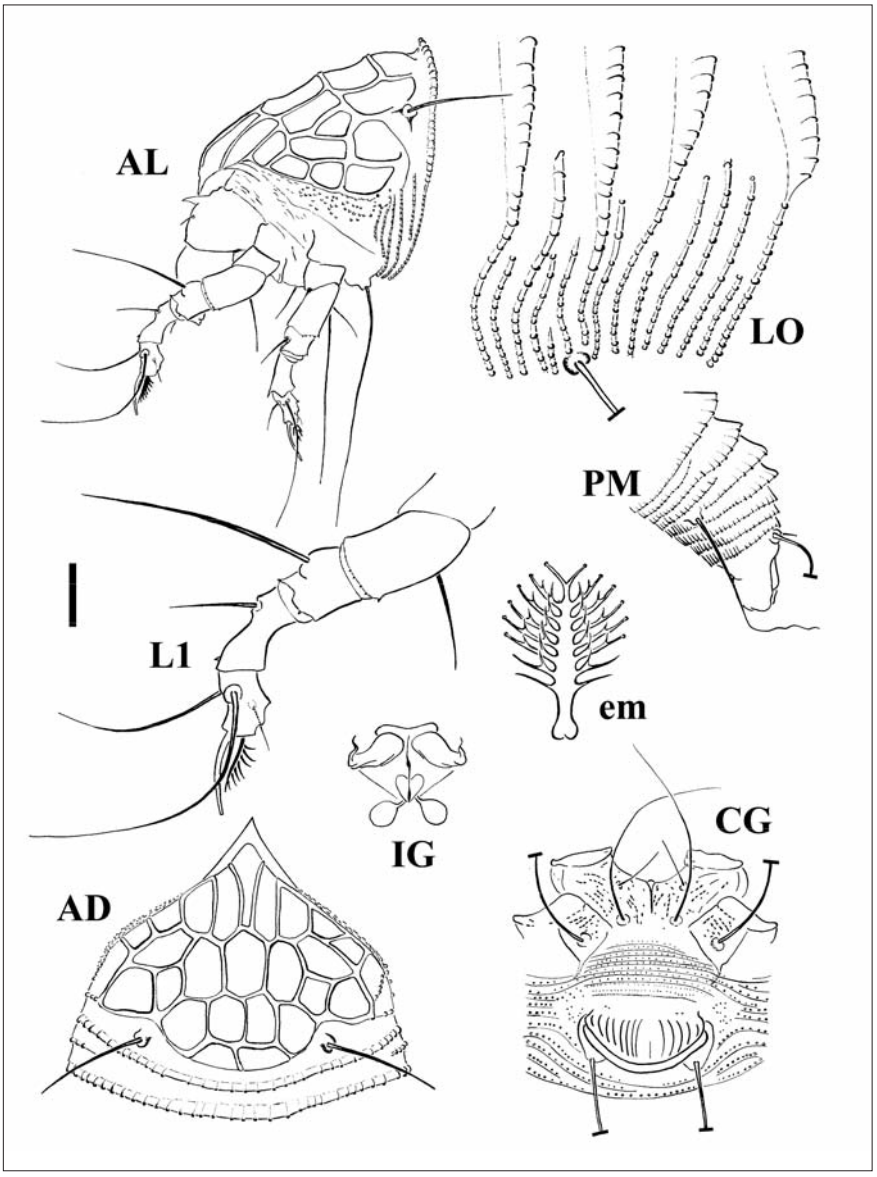

Fig. VI – Schematic drawings of *Aculops allotrichus* (Nalepa, 1894) AD. Prodorsal shield; AL. Lateral view of anterior body region; CG. Female coxigenital region; em. Empodium; IG. Internal female genitalia; LO. Lateral view of annuli; L1. Leg I; PM. Lateral view of posterior opisthosoma. Scale bar: 10 μm for AD, AL, CG, IG, PM; 5 m for LO, L1; 2.5 μm for em.

simple, 5, 8-rayed; femoral setae *bv* 10, genual setae *l''* 9, tarsal setae *ft'* 4, setae *ft''* 21. Coxae I-II with lined granules; setae *1b* 6, tubercles *1b* 10 apart, setae *1a* 31-38, tubercles *1a* 8 apart, setae *2a* 35-40, tubercles *2a* 21-23 apart. Prosternal apodeme 5-6. Opisthosoma dorsally arched, with 27-29 broad dorsal semiannuli, 71-81 narrow ventral semiannuli (counted from the first annulus after the coxae II) and 9-10 semiannuli between coxae and genital coverflap plus 1 transversal row of lined granules at the base of the coverflap. Microtubercles faint, set on the posterior margin of dorsal semiannuli, and circular, set on the posterior part of ventral semiannuli. Last 4 annuli with spinules on dorsal side and elongated linear microtubercles on ventral side. Setae *c2* 34-40 on ventral semiannuli 15-16, setae *d* 55-58 on ventral semiannuli 27-30; setae *e* 19-25 on ventral semiannuli 46-53; setae *f* 33 on ventral semiannuli 67-77; 4 annuli before anal lobe. Setae *h2* 65-102 very thin at the apex, *h1* 3. Female genital coverflap 11-12, 21-23 wide, with 15-16 striae; setae *3a* 40-62, 17 apart.

TYPE DATA - *Robinia pseudoacacia* L. (Fabaceae); Pottendorf (Northwest), Austria.

RELATION TO THE HOST - Mites are vagrants on the underside of the leaves, causing chlorosis and deformations when the population has a high density.

LOCALITY AND HOST PLANT - 2 females and 1 male from *Alhagi maurorum* Medik. (Leguminosae), Khosroshahr (37°56'55"N, 46°02'09"E), 1,341 m above sea level; late July, 2010; coll. P. Lotfollahi.

PREVIOUS PROVINCIAL RECORDS FOR IRAN - This is the first report of this species in Iran and it is the first report on the host, *Alhagi maurorum* Medik.

REMARKS - The morphometry of the female corresponds to the scanty original description (NALEPA, 1894) and is close to the description given by CASTAGNOLI and LAFFI (1985). This latter description displayed a mite with longer *sc* setae (30 m *versus* 18-22 of the Iranian population) and more empodia rays (6-7 *versus* 8 of the Iranian population). In regards to the new host plant species, collections of more mites are needed followed by careful morphometric study to determine whether the mites may be potential sister species, and to verify that the host association is not an accidental occurrence.

Tegolophus califraxini (Keifer, 1938)
(Fig. I, 5)

TYPE DATA - *Fraxinus* sp. (possibly *dipetala* Hook. & Arn) (Oleaceae); Webber Creek at Missouri Flat, near Placerville, El Dorado Co., California, USA.

RELATION TO THE HOST - The mites are common on the lower leaf surfaces and are associated with leaf deformation and stunted growth.

LOCALITY AND HOST PLANT - 5 females and 2 males from *Fraxinus angustifolia* Vahl. subsp. *angustifolia* (Oleaceae), Osku (37°54'44"N, 46°09'00"E) 1,570 m above sea level; late July, 2011; coll. P. Lotfollahi.

PREVIOUS PROVINCIAL RECORDS FOR IRAN - This is the first report of this species in Iran.

REMARKS - The morphometry of the female was compared with the original description (KEIFER 1938). The median line of Iranian specimens is longer than in the original description. Four median cells seemed to be filled by dashes in Iranian specimens while they were drawn smooth in Keifer's description (1938). This is the first report of this species on the host, *F. angustifolia* subsp. *angustifolia*.

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