

Three New *Aceria* Species (Acari: Prostigmata: Eriophyoidea) from Hungary on *Limonium gmelinii* ssp. *hungaricum* (Plumbaginaceae), *Petrorhagia prolifera* (Caryophyllaceae) and *Gypsophila paniculata* (Caryophyllaceae)

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Three new species of eriophyoid mite, *Aceria cumanorum* n. sp., associated with *Limonium gmelinii* ssp. *hungaricum* (Plumbaginaceae), *Aceria feketestvani* n. sp. associated with *Petrorhagia prolifera* (Caryophyllaceae) and *Aceria belarexi* n. sp. on *Gypsophila paniculata* (Caryophyllaceae) are described and illustrated from Hungary. Morphological differences distinguishing these new species from similar *Aceria* species are discussed. In addition, new date-locality-host records for 9 eriophyoid species are given.

Keywords: Eriophyidae, *Aceria*, Hungarian staticae, Plumbaginaceae, proliferous pink, baby's breath, Caryophyllaceae, Hungary.

In the Hungarian flora, the plant family Plumbaginaceae is represented only by two indigenous species in two genera, viz. *Armeria elongata* (Hoffm.) K. Koch and *Limonium gmelinii* (Willd.) Kuntze subsp. *hungaricum* (Klokov) Soó (Király, 2009). Based on current information, *Eriophyes adairi* Dębski (Acari: Trombidiformes: Eriophyidae) is known from Egypt causing abnormal growth of *Statice pruinosa* (Plumbaginaceae) (Dębski, 1918). The host plant was mentioned as *Armeria pruinosa* by Amrine and Stasny (1994). In the Hungarian flora, the plant family Caryophyllaceae is represented by 92 indigenous species in 24 genera. The genus *Aceria* Keifer (Acari: Trombidiformes: Eriophyidae) is the largest genus represented by more than 900 species worldwide and found on many plant families (Amrine and Stasny, 1994, 1996; Oldfield, 1996). Majority of *Aceria* spp. are host-specific and restricted to a single species of host plant. Some species are known to feed on multiple species within the same plant genus, and some species live on related plant genera (Oldfield, 1996). In Europe, this genus currently includes approximately 270 described species, mostly being on host plants of several dicotyle-

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donous families (de Lillo, 2012). In Hungary, 111 *Aceria* species have been reported to date comprising 30% of the 372 eriophyoid mite species (Ripka, 2007, 2008; Ripka et al., 2015). No eriophyoid mite species occupies plumbaginaceous plants in Hungary (Ripka, 2007, 2008), and no *Aceria* species have hitherto been found on *Limonium* spp. (Davis et al., 1982; Amrine and Stasny, 1994, 1996; de Lillo, 2012). Summarizing the updated literature, 13 eriophyoid species have been known from caryophyllaceous plants, viz. *Aceria ankarensis* Denizhan, Monfreda, Cobanoglu et de Lillo, *Aceria cerastii* (Nalepa), *Aceria colocense* Ripka, *Aceria dianthi* (Lindroth), *Aceria georghioui* Keifer, *Aceria gypsophilae* Roivainen, *Aceria moehringiae* (Lindroth), *Aceria paradianthi* Keifer, *Aceria silenens* (Liro), *Aculus parvensis* Manson, *Cecidophyopsis atrichus* (Nalepa), *Epitrimerus silenisnutantis* Roivainen and *Phyllocoptes cazioti* (Cotte) (Davis et al., 1982; Lindroth, 1899; Amrine and Stasny, 1994, 1996; Denizhan et al., 2006; Ripka, 2013a). In Hungary, one eriophyoid mite species, *Aceria colocense* Ripka inhabits caryophyllaceous host plant (Ripka, 2013a). No *Aceria* species have hitherto been found on *Petrorhagia* spp. (Davis et al., 1982; Amrine and Stasny, 1994, 1996; de Lillo, 2012).

Materials and Methods

The eriophyoid mite fauna of Hungarian statice, *Limonium gmelinii* (Willd.) Kuntze subsp. *hungaricum* (Klokov) Soó, was studied from plant samples collected near Apaj and Farnos villages, both localities in Pest County, Central Hungary, in July and early August 2014. The plant samples of proliferous pink, *Petrorhagia prolifera* (L.) P.W. Ball et Heywood and baby's breath, *Gypsophila paniculata* L., were collected in Budapest XXIII, Soroksár, Central Hungary, in June 2014. In other localities eriophyoid mites were also collected from different host plants which showed damage symptoms. The plant material (including leaves, petioles, stems, buds and flowers) was collected and placed in plastic bags, then returned to the laboratory and examined under a stereo dissecting microscope (Zeiss Stemi 2000-C). Eriophyoid mites found were placed directly into 88% lactic acid with the aid of a bent pin. After clearing the specimens in lactic acid for about 4–6 weeks at room temperature to obtain the desired extent of clearing, the mites were placed into Keifer's F-medium with sorbitol on microscope slides (Keifer, 1975). The slide-preparations were dried for about four weeks at room temperature and then sealed with commercial nail varnish (Upton, 1991). Specimens were examined with the aid of a research phase contrast compound microscope (Nikon Eclipse E600) equipped with a drawing tube (Nikon Y-IDT).

Mite morphology (e.g. coxigenital region of female, genital region of male) of *Aceria cumanorum* n. sp. was also investigated with the aid of scanning electron microscopy (SEM) (Zeiss EVO 40 XVP) at the Research Centre for Natural Sciences, Hungarian Academy of Sciences, Budapest. Live mites were collected individually with a fine entomological needle from fresh plant parts under a stereomicroscope and placed directly on the SEM holder without fixation, dehydration and coating.

The generic classification follows Amrine et al. (2003). The terminology and setal notation used in the morphological description follows Lindquist (1996). The number of

measured specimens (n) is given within parentheses in the description. All measurements of mites were made according to Amrine and Manson (1996) using an ocular micrometre eyepiece and are given in micrometres (μm). Measurements and means are rounded off to the nearest integer, when necessary. All measurements, unless specified otherwise, are lengths. In the description of the female, each measurement of the holotype precedes the corresponding range for the paratypes. Because some measurements of the holotype specimen could not be taken due to the mounting position, mean measurements are reported. Range values are given in parentheses except in cases of constant value. For males and immature stages, only the ranges are given.

The names of the plant taxa are used according to Király (2009); Király et al. (2011) and African Plants Database (Anonymous, 2015).

Abbreviations in drawings follow Amrine et al. (2003): **AD**. Prodorsal shield; **AL**. Lateral view of anterior body region; **CG**. Female coxigenital region; **em**. Empodium; **GM**. Genital region of male; **IG**. Internal female genitalia; **LO**. Lateral view of annuli; **L1**. Leg I (foreleg); **PM**. Lateral view of posterior opisthosoma.

Taxonomy

Family Eriophyidae Nalepa Genus *Aceria* Keifer

Aceria cumanorum n. sp. (Figs 1, 2, 3, 4, 5)

Description. Female (n = 10). Body whitish yellow, ochre, vermiform, 270 (228–350), 68 (51–77) wide, 69 (67–70) thick. Gnathosoma 18 (18–24), projecting obliquely downwards; chelicerae 17 (17–21), dorsal palp genual setae *d* 7 (5–8), simple. Prodorsal shield 28 (28–30), 48 (38–50) wide, half circle, with a very short frontal lobe 1.5 (1.5–2) over base of chelicerae; shield pattern composed of a short, faint, incomplete median line and two faint, incomplete admedian lines beginning at posterior margin on rear fifth. In a few specimens there are only slight indications or traces of median and admedian lines. Tubercles of scapular setae *sc* on rear shield margin, in small depression, 28 (28–30) apart, diverging, scapular setae *sc* 22 (19–23), directed backwards. Legs with all usual segments and setae present. Leg I 35 (33–38), femur 10 (8–10), basiventral femoral setae *bv* 13 (10–13), genu 6 (6–7), antaxial genual setae *l''* 33 (27–33), tibia 7 (6–7), paraxial tibial setae *l'* located at $\frac{1}{3}$ ($\frac{1}{3}$ – $\frac{3}{8}$) from dorsal base, 7 (5–8), very fine, tarsus 9 (8–9), solenidion ω 10 (8–10), blunt, slightly curved, empodium simple, bilaterally symmetrical, 10 (8–10), with 5 paired rays. Leg II (hind leg) 33 (30–35), femur 9 (8–10), basiventral femoral setae *bv* 13 (10–14), genu 5 (5–5), antaxial genual setae *l''* 8 (6–8) very fine, tibia 6 (5–6), tarsus 8 (7–8), solenidion ω 9 (8–9) subequal with solenidion ω on leg I, blunt, slightly curved, empodium simple, bilaterally symmetrical, 8 (7–8), with 5 paired rays. Minute spinules distally on femora, genua and tibiae on both leg pairs. Coxisternae I and II smooth; setae *Ib* 9 (8–10), tubercles *Ib* 18 (15–18) apart; setae *Ia* 20 (20–35), tubercles *Ia* 8 (8–10) apart, setae *2a* 42 (38–48), tubercles *2a* 24 (23–28) apart. Subcapitular plate subhexagonal, anteriorly rounded, smooth, without granules. Prosternal apodeme 10

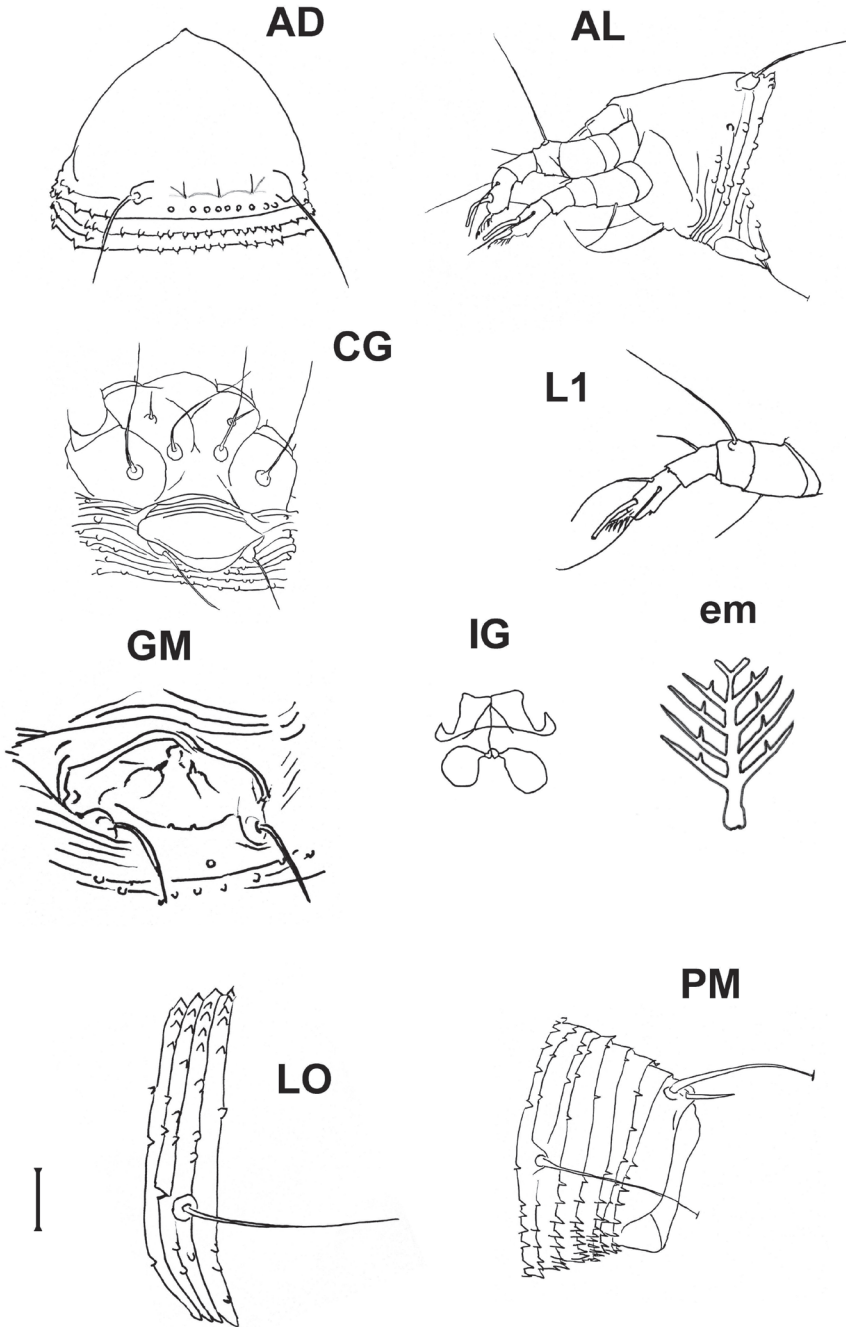


Fig. 1. *Aceria cumanorum* n. sp., semischematic drawings

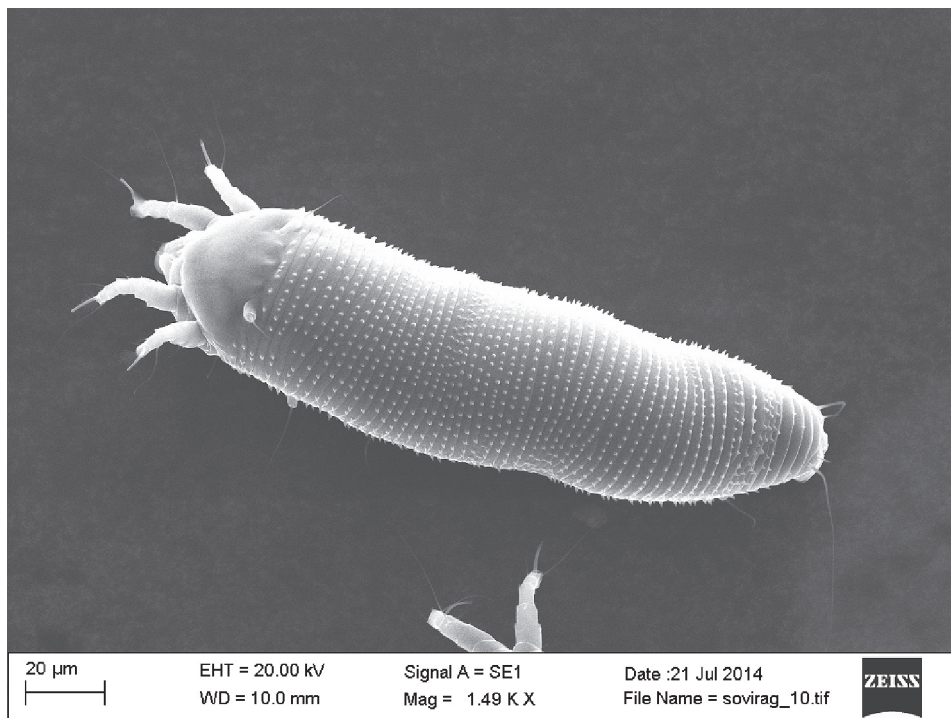


Fig. 2. SEM micrograph of *Aceria cumanorum* n. sp., dorsal view of probably a female

(8–10), forked. Coxigenital area with 4–6 smooth semiannuli. Opisthosoma with 56 (53–57) dorsal annuli, 59 (56–59) ventral annuli. Dorsal and ventral annuli microtuberculate. Microtubercles irregularly wide-spaced laterally and ventrally. Posterior 4 dorsal annuli with only a few microtubercles, almost smooth. On ventral annuli anteriorly from setae *c2* only a few microtubercles present. In between imaginary lines of setae *3a* more dense microtubercles ventrally. Microtubercles pointed close to rear annular margin, except for 4–5 ventral annuli near anal lobes, which are elongate, linear and pointed. Setae *c2* 64 (53–65), on ventral annulus 9 (8–10), 53 (48–58) apart; one paratype with double setae *c2* on right side. Setae *d* 60 (58–68), on ventral annulus 20 (18–20), 39 (34–45) apart; setae *e* 10 (10–15), on ventral annulus 32 (30–32), 24 (19–26) apart; setae *f* 39 (35–40), on ventral annulus 54 (51–54), or 5 (5–6) from rear, 34 (30–35) apart, all very fine towards apex. Setae *h2* 103 (93–105), 13 (10–14) apart; setae *h1* 6 (6–7), 10 (7–10) apart. Genital plate 18 (15–23), 24 (23–25) wide, genital coverflap smooth, some specimens with 6–9 very faint and large granules; they can be seen on SEM micrographs. Setae *3a* 37 (35–45), 16 (16–19) apart.

MALE (n=4). Similar to female, 213–278, 75 wide, 65 thick. Gnathosoma 15–21, projecting obliquely downwards; dorsal palp genual setae *d* 5–6, simple. Prodorsal shield 29–30, 48–50 wide, with a very short frontal lobe 1.5–2, half circle, shape and ornamentation similar to female. Tubercles of scapular setae *sc* on rear shield margin, in small de-

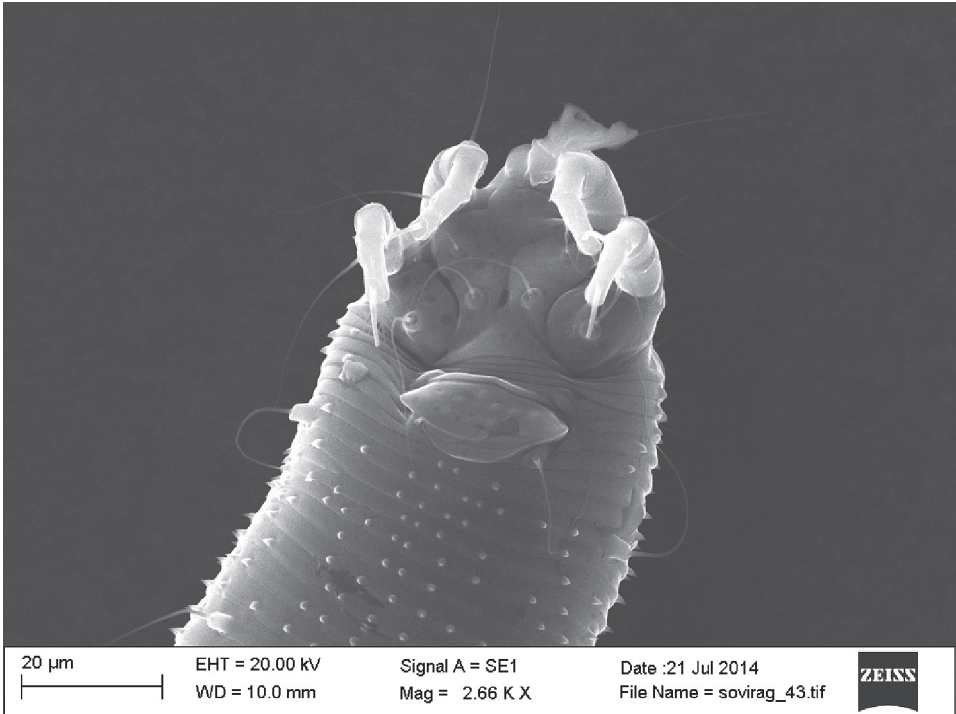


Fig. 3. SEM micrograph of *Aceria cumanorum* n. sp., ventral anterior region of female: gnathosoma and coxigenital region

pression, 29–32 apart, diverging, scapular setae *sc* 15–16, directed to the rear. Legs with all usual segments and setae present. Leg I 29–30, femur 8–9, basiventral femoral setae *bv* 10, very fine, genu 5, antaxial genual setae *l''* 25–28, tibia 5–6, paraxial tibial setae *l'* located at $\frac{3}{8}$ from dorsal base, 5–6, very fine, tarsus 7–8, solenidion ω 7–8, slightly curved, blunt, empodium simple, bilaterally symmetrical, 7–8, with 5 paired rays. Leg II 26–28, femur 7–8, basiventral femoral setae *bv* 10, very fine, genu 4–5, antaxial genual setae *l''* 5, very fine, tibia 5, tarsus 6–7, solenidion ω 7–8, subequal with solenidion ω on leg I, slightly curved, blunt, empodium simple, bilaterally symmetrical, 7–8, with 5 paired rays. Minute spinules distally on femora, genua and tibiae on both leg pairs. Coxisternae I and II smooth; anterolateral setae on coxisternum I, setae *lb* 5, tubercles setae *lb* 16–18 apart, proximal setae on coxisternum I, setae *la* 20–23, tubercles setae *la* 10 apart, proximal setae on coxisternum II, setae *2a* 35, very fine, tubercles setae *2a* 26–28 apart. Subcapitular plate subhexagonal, anteriorly rounded, smooth, without granules. Prosternal apodeme 8–10, forked. Coxigenital area with 4–5 smooth semiannuli. Opisthosoma with 53–56 dorsal, 55–56 ventral annuli. Microtuberculate dorsal and ventral annuli. Microtubercles irregularly wide-spaced laterally and ventrally. Posterior 4 dorsal annuli with only a few microtubercles, almost smooth. On ventral annuli anteriorly from setae *c2* only a few microtubercles present. In between imaginary lines of setae *3a* more dense microtubercles ventrally. Microtubercles

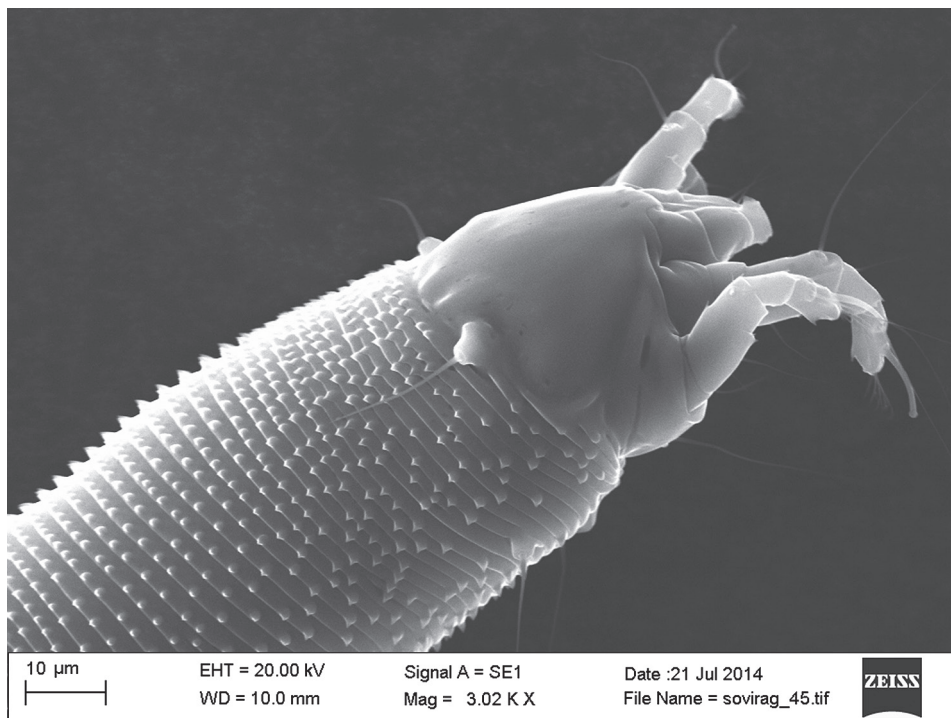


Fig. 4. SEM micrograph of *Aceria cumanorum* n. sp., dorsolateral view of anterior region of female

on rear annular margin minute, pointed, except for 5–6 ventral annuli of anal lobes, which are elongate, linear and pointed. Setae *c2* 28–32, on ventral annulus 9–10, 57–63 apart; setae *d* 46–52, on ventral annulus 16–19, 40–43 apart; setae *e* 6–9, on ventral annulus 29, 23–27 apart; setae *f* 30–49, on ventral annulus 49–50, or 6–7 from rear, 34–38 apart. Setae *h2* 68–85, 12–15 apart; setae *h1* 6–7, 9–10 apart. Genitalia 16–20, 22–23 wide, almost smooth, posteriorly few minute granules, setae *3a* 19–23, 17–20 apart.

NYMPH (n = 2). White, vermiform, 213–220, 45–65 wide. Prodorsal shield 25–26, 35 wide, half circle. Tubercles of scapular setae *sc* on rear shield margin, 23–26 apart, diverging, scapular setae *sc* 9–13, directed to up. Opisthosoma with 50–54 dorsal, 46–49 ventral annuli. Dorsal annuli with sparsely minute microtubercles like dots. Laterally and ventrally the annuli almost smooth. Setae *3a* 9–11, 8–9 apart. First nymph with scapular setae *sc* pointing up and forward.

Host plant. Hungarian statice, sea lavender, *Limonium gmelinii* (Willd.) Kuntze subsp. *hungaricum* (Klokov) Soó (Plumbaginaceae); a distributed halophytic salt-secreting perennial herb in Hungary. It is a characteristic endemic species of dry alkali steppes.

Relation to the host plant. The mite was found in all stages of development in the rolled leaf edges, among salt particles. Definite reddish leaf edge roll symptom was observed. Inside the leaf roll the epidermis was necrotized by the mite feeding.

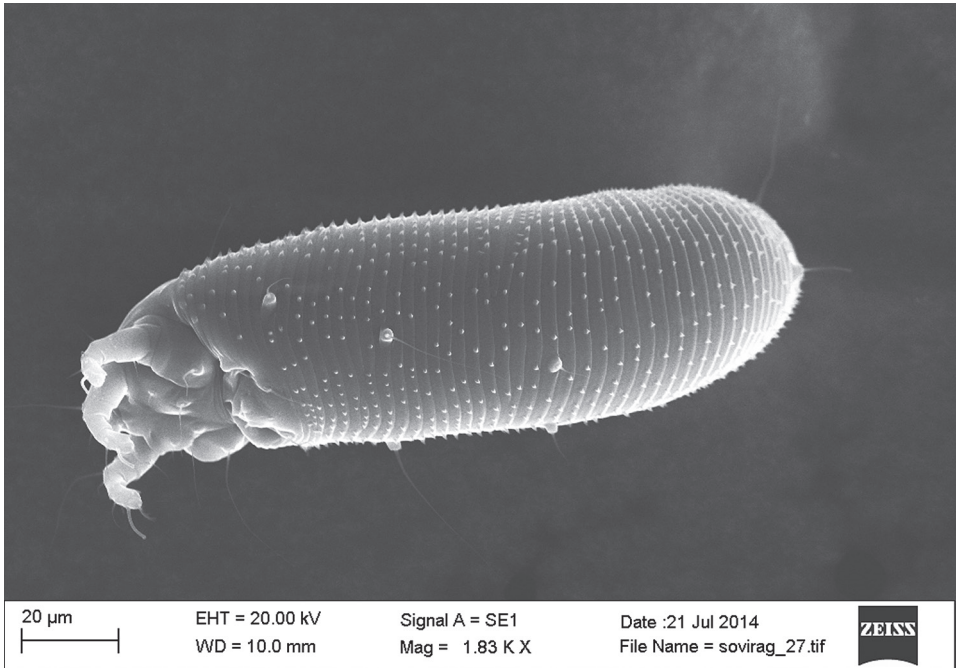


Fig. 5. SEM micrograph of *Aceria cumanorum* n. sp., ventrolateral view of anterior region of male

Type locality. Near Apaj village, Pest County, Central Hungary, in Kiskunság National Park, 47°07'05.3" N, 19°06'33.0" E, 100 m elev. The host plant species, *L. gmelinii* ssp. *hungaricum*, grows in a saline affected plain of the Danube valley, in a typical inland alkali vegetation of the region belonging to the alliance *Festucion pseudovinae* Soó 1933, Pannonian dry alkaline grasslands. In Hungarian this dry alkaline grasslands habitat type or in other words Pannonic salt steppe developed on saline soil is called Szikespuszta-gyepek (Borhidi, 2003).

Type material. Holotype: female (circled with black ink) among 5 females, 3 males and 2 nymphs paratypes on the same slide (slide # 1352a), coll. G. Ripka, 17 July 2014. Paratypes: 6 females, 1 male and 4 nymphs (slide # 1352b), 6 females and 3 males (slide # 1352c), data same as for holotype. Deposited in the Department of Pest Management Development and Coordination, Directorate of Plant Protection, Soil Conservation and Agri-environment, National Food Chain Safety Office, Budapest, Hungary, 2 females, 4 males and 4 nymphs (slide # 1354a) coll. G. Ripka, same host near Farnos village, Pest County, Central Hungary, in Nature Conservation Area of Tápió-Hajta Region, 47°22'09.4" N, 19°50'34.0" E, 100 m elev. 2 August 2014, alkaline grassland habitat, deposited in the Hungarian Natural History Museum, Budapest, Hungary.

Etymology. The species is named after the Latin *Cumani*, *Comani* or *Cuni* in Hungarian *kun*, meaning cumans. Cumans were a nomadic tribe in the Middle Ages who arrived and settled in Hungary. They have lived in the Great Hungarian Plain, in the histor-

ical and geographical regions named as Little Cumania and Greater Cumania where the host plant grows. The gender is feminine.

Differential diagnosis. Until now, there were no *Aceria* species recorded on the European representatives of the genus *Limonium*. In Egypt, *Eriophyes adairi* Dębski was described from *Statice pruinosa* (Plumbaginaceae) (Dębski, 1918), however the valid name of this host is now recognised as *Limonium pruinosum* (L.) Chaz. (Anonymous, 2015). In Dębski's article only the symptoms caused by the mite on the host plant were described without morphological characteristics or figure of the mite itself. *Eriophyes adairi* is probably a valid species, and needs to be found and described. The new species described herein resembles three European nominal *Aceria* species living on perennial dicotyledonous hosts: *Aceria squalida* (Nalepa), *Aceria eutricha* (Nalepa) and *Aceria peucedani* (Canestrini). The new species described is close to *A. squalida* but the latter has 4-rayed empodium, 6–8 ridges on genital coverflap and 19–24 long antaxial genual setae *l'* on leg I (Farkas, 1966; Ripka, 2013b). *Aceria squalida* has been recorded on *Scabiosa columbaria* L., *Cephalaria transsylvanica* (L.) Schrad. and *Knautia arvensis* (L.) Coult. (all in the family Dipsacaceae) (Nalepa, 1892b; Ripka, 2013b). The relevant morphological characteristics of *A. eutricha* are as follows: completely smooth prodorsal shield, 4-rayed empodium and ridges on genital coverflap (Nalepa, 1895; Farkas, 1966). Its host plants are *Lappula squarrosa* (Retz.) Dumort. (as *Echinosperrum lappula*) and *Lycopsis arvensis* L. (both in the family Boraginaceae) (Farkas, 1966). *A. peucedani* has also 4-rayed empodium and ridges on genital coverflap living on several apiaceous hosts, viz. *Seseli annuum* L., *Seseli osseum* Crantz em. Simonk. (as *S. devenyense*), *Pastinaca sativa* L., *Orlaya grandiflora* (L.) Hoffm. and *Peucedanum arenarium* Waldst. et Kit. (all in the family Apiaceae) (Farkas, 1966). *Aceria cumanorum* n. sp. can be clearly differentiated as follows: empodium 5-rayed, smooth female genital coverflap or with 6–9 indistinct large granules, somehow irregular appearance of the microtubercles laterally and on ventral semiannuli; smooth coxae; blunt tip of the solenidia, considerably long (27–33) antaxial genual setae *l'* on leg I and its host plant species, *Limonium gmelinii* subsp. *hungaricum*. *Aceria cumanorum* n. sp. is the first *Aceria* species to be found inhabiting a herbaceous plumbaginaceous host in Europe.

Aceria feketeistvani n. sp. (Fig. 6)

Description. Female (n = 12). Body whitish yellow, ochre, vermiform, 222 (190–250), 54 (47–60) wide, 57 (41–62) thick. Gnathosoma 20 (19–25), projecting obliquely downwards; chelicerae 17 (15–18), dorsal palp genual setae *d* 10 (6–10), simple; pedipalp coxal setae *ep* 7 (7–8). Prodorsal shield 38 (32–42), 43 (35–43) wide, half circle, with anteriorly shallowly emarginate short frontal lobe 2 (1–2), over base of chelicerae; shield pattern composed of a short, incomplete median line on rear third ($\frac{1}{3}$ – $\frac{3}{8}$) and two complete admedian lines beginning close to posterior margin of the shield, slightly diverging to rear margin; one complete and one incomplete submedian lines on each side. First submedian lines subparallel to admedian lines on anterior three quarters, then curving out ahead of scapular tubercles toward outer side of tubercles setae *sc*. Second submedian lines on rear half–two thirds of the shield, subparallel to lateral margin of shield and

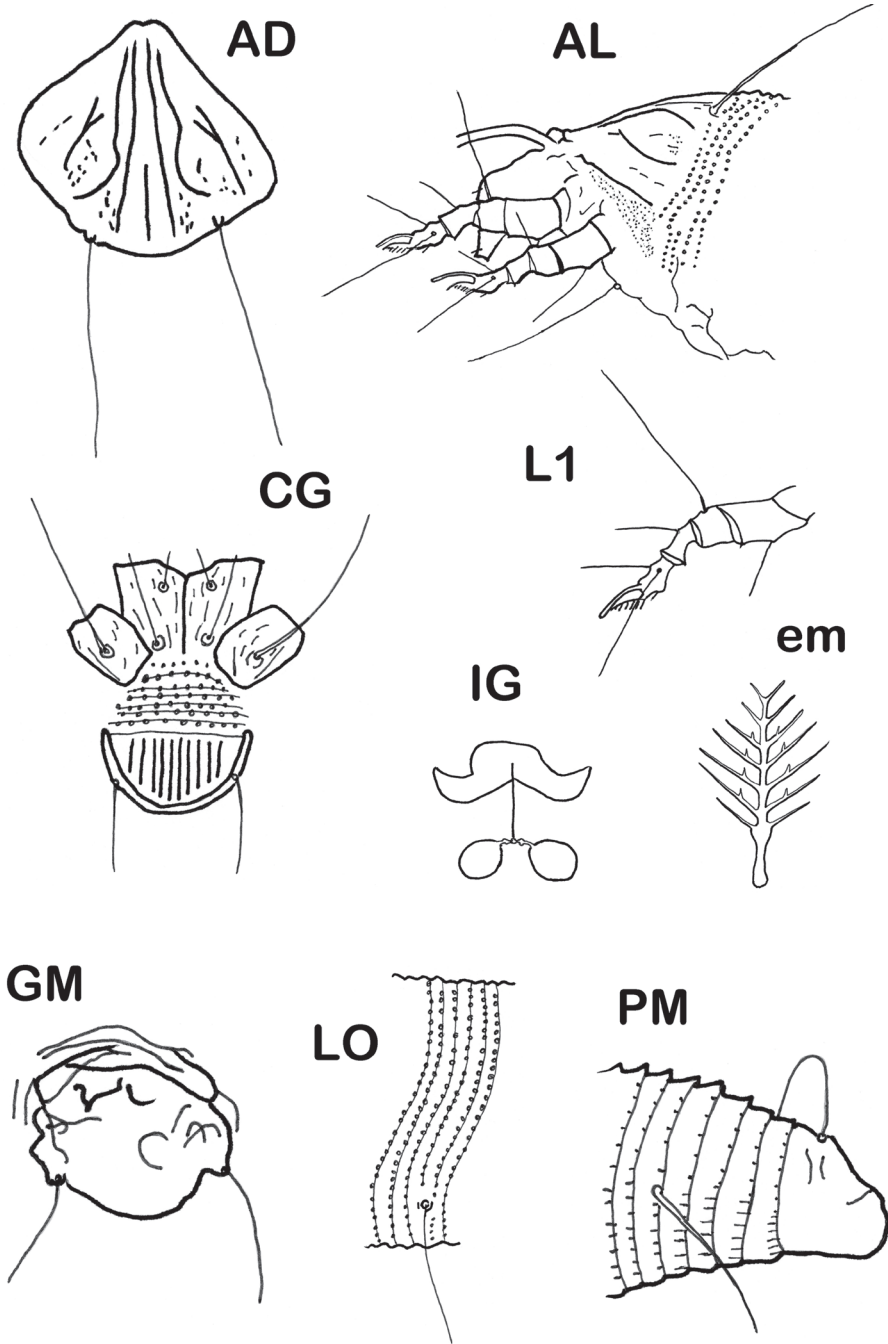


Fig. 6. *Aceria fekeiteistvani* n. sp., semischematic drawings

approaching the first submedian. Submedian lines broken in some paratypes. Posteriorly few dashes between admedian and first submedian lines, few dashes and granules between submedian lines, few dashes and granules between second submedian lines and shield margin. Tubercles of scapular setae *sc* on rear shield margin, 23 (21–25) apart, diverging, scapular setae *sc* 54 (45–70), directed backwards. Fine granules laterally in rows between shield margin and dorsal coxae of legs I and II. Legs with all usual segments and setae present. Leg I 37 (29–39), femur 10 (7–12), basiventral femoral setae *bv* 11 (11–13), genu 7 (5–7), antaxial genual setae *l'* 27 (25–30), tibia 7 (5–8), paraxial tibial setae *l'* located at $\frac{3}{8}$ ($\frac{1}{3}$ – $\frac{1}{2}$) from dorsal base, 10 (6–15), very fine, tarsus 7 (5–8), paraxial, unguinal tarsal setae *u'* 5 (5–6), solenidion ω 9 (7–10), slightly tapering and curved, distally rounded, empodium simple, bilaterally symmetrical, 8 (6–10), with 7 paired rays. Leg II 32 (25–35), femur 11 (7–11), basiventral femoral setae *bv* 16 (13–17), genu 5 (4–6), antaxial genual setae *l'* 12 (7–13) very fine, tibia 6 (5–7), tarsus 7 (5–8), paraxial, unguinal tarsal setae *u'* 5 (4–6), solenidion ω 9 (7–10) subequal with solenidion ω on leg I, slightly tapering and curved, distally rounded, empodium simple, bilaterally symmetrical, 9 (7–10), with 7 paired rays. Minute spinules distally on femora and tibiae on both leg pairs. Coxae I and II with several longitudinal lines and dashes; setae *lb* 8 (8–13), tubercles *lb* 13 (12–13) apart; setae *la* 22 (20–25), tubercles *la* 9 (8–10) apart, setae *2a* 40 (30–46), tubercles *2a* 23 (22–24) apart. Prosternal apodeme distinct 13 (10–13), forked. Coxigenital area with 6–9 microtuberculate semiannuli. Opisthosoma with 74 (73–87) dorsal semiannuli, 73 (73–81) ventral semiannuli. Dorsal and ventral semiannuli microtuberculate. Round and pointed microtubercles close to rear annular margin, except for 4–5 ventral semiannuli near anal lobes, which are elongate and linear. Setae *c2* 45 (34–48), on ventral annulus 12 (9–12), 47 (45–55) apart. Setae *d* 62 (49–62), on ventral annulus 25 (23–28), 31 (27–35) apart; setae *e* 47 (37–52), on ventral annulus 41 (41–49), 17 (14–20) apart; setae *f* 28 (25–29), on ventral annulus 69 (69–77), or 5 (5–6) from rear, 18 (17–22) apart, all very fine towards apex. Setae *h2* 74 (58–80), 9 (7–9) apart; setae *hl* 5 (3–5), 5 (5–6) apart. Genital plate 16 (16–18), 20 (20–23) wide, genital coverflap with 10 (9–12) longitudinal parallel ridges. Setae *3a* 15 (12–23), 16 (16–17) apart. Two paratype females with a nymph in their opisthosoma. One nymph leaving the body of female through genital opening.

MALE (n=4). Similar to female, 195–230, 45–56 wide, 55 thick. Gnathosoma 20–22, projecting obliquely downwards; dorsal palp genual setae *d* 6–8, simple, pedipalp coxal setae *ep* 4–5. Prodorsal shield 32–40, 32–40 wide, with anteriorly shallowly emarginate short frontal lobe (1–2), half circle, shape and ornamentation similar to female. Tubercles of scapular setae *sc* on rear shield margin, 22–23 apart, scapular setae *sc* 39–48, directed to the rear. Legs with all usual segments and setae present. Fine granules laterally in rows between shield margin and dorsal coxae of legs I and II. Leg I 30–33, femur 9, basiventral femoral setae *bv* 9, very fine, genu 5, antaxial genual setae *l'* 27, tibia 6, paraxial tibial setae *l'* located at $\frac{3}{8}$ from dorsal base, 8, very fine, tarsus 7, solenidion ω 8, slightly curved and tapering, distally rounded, empodium simple, bilaterally symmetrical, 7, with 6 paired rays. Leg II 28–30, femur 8, basiventral femoral setae *bv* 15, very fine, genu 5, antaxial genual setae *l'* 12, very fine, tibia 5, tarsus 7, solenidion ω 9, slightly curved, tapering, distally rounded, empodium simple, bilaterally symmetrical, 7, with 6 paired rays. Minute spinules distally on femora and tibiae on both leg pairs. Coxae I and II with

several longitudinal lines and dashes; anterolateral setae on coxa I, setae *lb* 6–7, tubercles setae *lb* 12–13 apart, proximal setae on coxa I, setae *la* 18–24, tubercles setae *la* 7–9 apart, proximal setae on coxa II, setae *2a* 25–34, very fine, tubercles setae *2a* 23–24 apart. Prosternal apodeme 8–12, forked. Coxigenital area with 7–8 microtuberculate semiannuli. Opisthosoma with 67–77 dorsal, 72–75 ventral semiannuli. Microtuberculate dorsal and ventral semiannuli. Minute, round and pointed microtubercles set on rear annular margin, except for 4–5 ventral semiannuli of anal lobes, which are elongate and linear. Setae *c2* 35–46, on ventral annulus 10–11; setae *d* 37–40, on ventral annulus 21–23; setae *e* 44, on ventral annulus 39–41; setae *f* 22–26, on ventral annulus 67–70, or 5 from rear. Setae *h2* 48–49; setae *h1* 3. Genitalia 17–18, 17–22 wide, with minute granules, setae *3a* 15–24, 16–18 apart.

NYMPH (n = 4). White, vermiform, 112–152, 32–45 thick. Prodorsal shield 20–28. Tubercles of scapular setae *sc* on rear shield margin, scapular setae *sc* 37, pointing up. Leg I 20–28. Leg II 19–25. Opisthosoma with 46–65 dorsal, 35–60 ventral semiannuli. Dorsal and ventral semiannuli with minute microtubercles like dots. Setae *3a* 6.

Host plant. Proliferous pink, *Petrorhagia prolifera* (L.) P.W. Ball et Heywood (Caryophyllaceae); an annual herb in Hungary. It is a characteristic species of dry sand vegetation.

Relation to the host plant. The mite was found in all stages of development in the leaf sheaths. No damage was caused.

Type locality. In Budapest XXIII, Soroksár, Szamaránszki dűlő, Central Hungary, in a private plot, 47°24'17.4" N, 19°07'39.9" E, 110–115 m above sea level. The host plant species, *P. prolifera*, grows in a sand plain of the Danube valley, in an inland dry grassland vegetation of the region developed on calcareous sandy soil (Borhidi, 2003).

Type material. Holotype: female (circled with black ink) with 1 nymph paratype on the same slide (slide # 1338a), coll. G. Ripka, 16 June 2014. Paratypes: 5 females, 1 male, 1 nymph, and 1 unidentified female (Acariformes: Eriophyoidea) (slide # 1338b), 1 female, 3 males (slide # 1338e), data same as for holotype; 2 females, 1 nymph (slide # 1341a) coll. G. Ripka, same locality, 22 June 2014, Deposited in the Department of Pest Management Development and Coordination, Directorate of Plant Protection, Soil Conservation and Agri-environment, National Food Chain Safety Office, Budapest, Hungary, 3 females and 2 nymphs (slide # 1343a) coll. G. Ripka, same host, Budapest XXIII, Soroksár, Orbánhegyi dűlő, in a private plot, 47°22'59.4" N, 19°06'49.5" E, 22 June 2014, grassland habitat, deposited in the Hungarian Natural History Museum, Budapest, Hungary.

Etymology. The species is named after István Fekete (1900–1970), one of the most widely-read Hungarian writers. In Hungary he established the forestry-hunting literature, wrote several animal stories and books for the young. The gender is feminine.

Differential diagnosis. So far, no *Aceria* species have been recorded on the representatives of the genus *Petrorhagia*. The new species described herein shows similarities with some European nominal *Aceria* species living on caryophyllaceous hosts: *Aceria cerastii* (Nalepa), *Aceria colocense* Ripka, *Aceria dianthi* (Lindroth), *Aceria gypsophilae* Roivainen and *Aceria silenens* Liro (Nalepa, 1892b; Lindroth, 1904; Liro, 1940; Roivainen, 1950; Liro and Roivainen, 1951; Ripka, 2013a). The new species described is

close to *Aceria gypsophilae* Roivainen, however, the latter has 5-rayed empodium, short and unforked sternal line, 57–58 annuli, 15 and 30 long setae *e* and setae *3a*, respectively. It lives on *Gypsophila fastigiata* L. (Roivainen, 1950). Whereas *Aceria feketestivani* **n. sp.** has 7-rayed empodium, distinct and forked prosternal apodeme (10–13), more numerous, 73–87 annuli, significantly longer setae *e* (37–52) and considerably shorter setae *3a* (12–23). The relevant morphological characteristics of *A. cerastii* are as follows: complex pattern on prodorsal shield, tarsus 1.5 times longer than tibia (apparently the length of tarsus is the same as the tibia in *Aceria feketestivani* **n. sp.**) and empodium 4-rayed (Nalepa, 1892b) (whereas 7-rayed in *A. feketestivani* **n. sp.**). Its host plant is *Cerastium triviale* L. *Aceria dianthi* has 5-rayed empodium (*versus* 7-rayed in *A. feketestivani* **n. sp.**), 14–16 ridges on genital coverflap (apparently 9–12 ridges in *A. feketestivani* **n. sp.**), 8–13 long setae *d* and *e* (whereas 49–62 and 37–52, resp., in *A. feketestivani* **n. sp.**), and its host is *Dianthus deltooides* L. (Lindroth, 1904; Liro and Roivainen, 1951). Characteristics of *Aceria colocense* Ripka living on *Silene borysthonica* (Gruner) Walters are as follows: prodorsal shield subtriangular (apparently half circle in *Aceria feketestivani* **n. sp.**), 22–27 long scapular setae *sc* (apparently 45–70 in *A. feketestivani* **n. sp.**), coxae with small granules (coxae with longitudinal lines and dashes in *A. feketestivani* **n. sp.**), genital coverflap with 11–13 uneven ridges (whereas 9–12 in *A. feketestivani* **n. sp.**), empodium 5-rayed (*versus* 7-rayed in *A. feketestivani* **n. sp.**). *Aceria feketestivani* **n. sp.** differs from *Aceria silenens* (Liro) by the shape and especially the pattern of prodorsal shield (prodorsal shield apparently without lines in *A. silenens*); in the length of scapular setae *sc* which are longer than prodorsal shield (apparently setae *sc* shorter than prodorsal shield in *A. silenens*), in the number of annuli, 73–87 (whereas *A. silenens* has 69); in the number of empodial rays, 7 (apparently 5 in *A. silenens*), in the width of genital plate, 20 (whereas 28 in *A. silenens*) (Liro, 1940). *Aceria feketestivani* **n. sp.** can be clearly differentiated as follows: empodium 7-rayed, female genital coverflap with 9–12 ridges, coxae with several longitudinal lines and dashes; slightly tapering, distally rounded solenidia, considerably long (45–70) scapular setae *sc*, and its host plant species, *Petrorrhagia prolifera*. *Aceria ankarensis* Denizhan, Monfreda, Cobanoglu et de Lillo was described from *Dianthus chinensis* L. in Turkey (Denizhan et al., 2006). The new species differs from *A. ankarensis* in having distinct and forked prosternal apodeme (whereas prosternal apodeme not well defined in *A. ankarensis*), the length of scapular setae *sc* 45–70 (apparently 20–21 in *A. ankarensis*), number of ridges on genital coverflap 9–12 (apparently 13–15 in *A. ankarensis*) and length of setae *3a*, 21–23 (*versus* 54–60 in *A. ankarensis*).

Aceria feketestivani **n. sp.** is the first *Aceria* species to be found inhabiting a *Petrorrhagia* species in Europe.

Aceria belarexi **n. sp.** (Fig. 7)

Description. Female (n = 10). Body pale yellow, vermiform, 192 (145–192), 58 (58–65) wide, 62 (57–67) thick. Gnathosoma 18 (18–25), projecting obliquely downwards; chelicerae 17 (15–20), dorsal palp genual setae *d* 7 (6–8), simple; pedipalp coxal setae *ep* 4 (3–4). Prodorsal shield 30 (30–35), 47 (42–47) wide, half circle, without frontal lobe over base of chelicerae; shield ornamentation weak and composed of an indistinct, in-

complete median line on rear two third, and two faint complete admedian lines beginning close to posterior margin of the shield, diverging to rear margin. Lines fading anteriorly. Close to the rear shield margin, arched transverse line between median and admedian line on each side. Tubercles of scapular setae *sc* on rear shield margin, 25 (24–27) apart, diverging, scapular setae *sc* 16 (15–20), directed backwards. Fine granules laterally in rows between shield margin and dorsal coxae of legs I and II. Legs with all usual segments and setae present. Leg I 30 (29–32), femur 10 (8–10), basiventral femoral setae *bv* 10 (10–12), genu 5 (4–6), antaxial genual setae *l''* 24 (24–27), tibia 5 (5–7), paraxial tibial setae *l'* located at $\frac{1}{3}$ ($\frac{1}{3}$ – $\frac{1}{4}$) from dorsal base, 9 (8–10), very fine, tarsus 7 (7–8), paraxial, unguinal tarsal setae *u'* 5 (5–6), solenidion ω 9 (8–10), curved, distally rounded, empodium simple, bilaterally symmetrical, 7 (7–8), with 5 paired rays. Leg II 27 (27–30), femur 9 (8–10), basiventral femoral setae *bv* 12 (10–12), genu 5 (4–5), antaxial genual setae *l''* 12 (12–15) very fine, tibia 5 (5–6), tarsus 7 (7–8), paraxial, unguinal tarsal setae *u'* 5 (5–6), solenidion ω 8 (8–10) subequal with solenidion ω on leg I, curved, distally rounded, empodium simple, bilaterally symmetrical, 7 (7–8), with 5 paired rays. Minute spinules distally on femora and tibiae on both leg pairs. Coxa I with longitudinal line and several faint dashes, coxa II with faint dashes; setae *lb* 7 (6–8), tubercles *lb* 12 (12–13) apart; setae *la* 17 (15–20), tubercles *la* 11 (10–12) apart, setae *2a* 52 (38–52), tubercles *2a* 26 (25–27) apart. Coxae I narrowly separated, sternal line absent. Coxigenital area with 5–8 microtuberculate semiannuli. Opisthosoma with 52 (49–59) dorsal semiannuli, 59 (59–66) ventral semiannuli. Dorsal and ventral semiannuli microtuberculate. Round microtubercles pointed on rear annular margin, except for 5–6 ventral semiannuli near anal lobes, which are elongate and linear. Setae *c2* 44 (42–50), on ventral annulus 9 (9–11), 53 (53–60) apart. Setae *d* 63 (63–82), on ventral annulus 20 (20–23), 39 (37–40) apart; setae *e* 28 (18–28), on ventral annulus 35 (35–39), 22 (20–22) apart; setae *f* 32 (32–37), on ventral annulus 54 (54–60), or 5 (5–6) from rear, 27 (27–29) apart, all very fine towards apex. Setae *h2* 97 (81–105), 10 (10–12) apart; setae *h1* 4 (3–5), 6 (6–7) apart. Caudal lobes normal in size and shape. Genital plate 15 (15–17), 25 (23–26) wide, genital coverflap with 11 (11–14) longitudinal parallel ridges. Setae *3a* 28 (25–30), 19 (19–22) apart.

MALE (n = 4). Similar to female, 150–190, 52–55 wide, 57 thick. Gnathosoma 17–22, projecting obliquely downwards; dorsal palp genual setae *d* 5–8, simple. Prodorsal shield 29–31, 42–45 wide, without frontal lobe, shape and ornamentation similar to female. Tubercles of scapular setae *sc* on rear shield margin, 24–25 apart, scapular setae *sc* 12–15, directed to the rear. Legs with all usual segments and setae present. Fine granules laterally in rows between shield margin and dorsal coxae of legs I and II. Leg I 25–30, femur 7–10, basiventral femoral setae *bv* 7–8, very fine, genu 5, antaxial genual setae *l''* 22, tibia 5, paraxial tibial setae *l'* located at $\frac{1}{3}$ – $\frac{3}{8}$ from dorsal base, 7–8, very fine, tarsus 6–7, unguinal tarsal setae *u'* 3–4, solenidion ω 7–8, slightly curved and distally rounded, empodium simple, bilaterally symmetrical, 5–7, with 5 paired rays. Leg II 23–25, femur 7–8, basiventral femoral setae *bv* 9–10, very fine, genu 4–5, antaxial genual setae *l'* 5–10, very fine, tibia 4–5, tarsus 5–6, paraxial, unguinal tarsal setae *u'* 3, solenidion ω 8, slightly curved, distally rounded, empodium simple, bilaterally symmetrical, 6, with 5 paired rays. Minute spinules distally on femora and tibiae on both leg pairs. Coxa I with longitudinal line and several faint dashes, coxa II with faint dashes; anterolateral setae on coxa I, setae

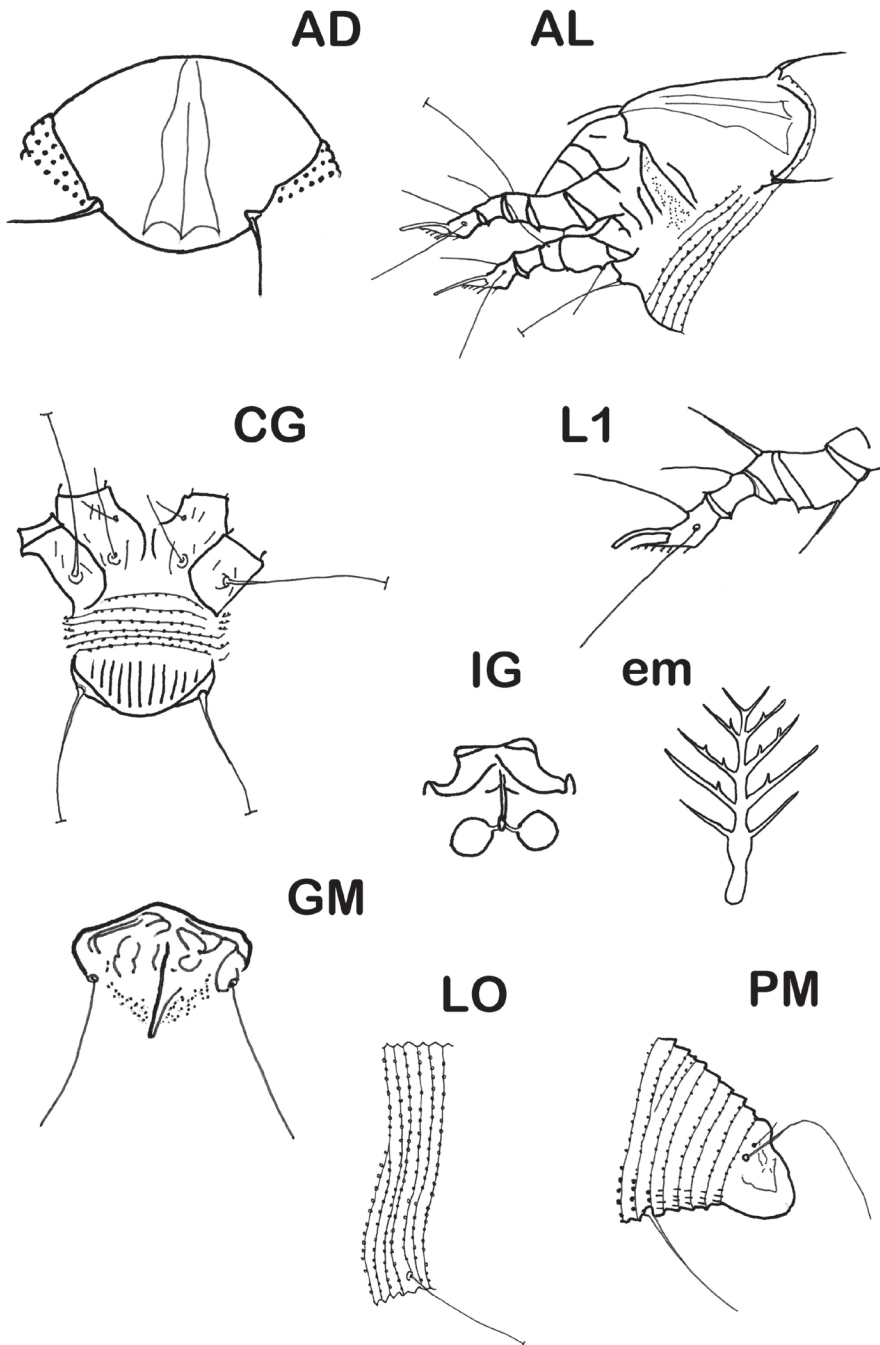


Fig. 7. *Aceria belarexi* n. sp., semischematic drawings

Ib 5–7, tubercles setae *Ib* 10–11 apart, proximal setae on coxa I, setae *Ia* 10–15, tubercles setae *Ia* 9–11 apart, proximal setae on coxa II, setae *2a* 25–44, very fine, tubercles setae *2a* 22–25 apart. Coxae I narrowly separated, sternal line absent. Coxigenital area with 5–7 microtuberculate semiannuli. Opisthosoma with 47–50 dorsal, 52–60 ventral semiannuli. Microtuberculate dorsal and ventral semiannuli. Minute, round and pointed microtubercles set on rear annular margin, except for 4–5 ventral semiannuli of anal lobes, which are elongate and linear. Setae *c2* 30–35, on ventral annulus 10–11, 48 apart; setae *d* 46–62, on ventral annulus 19–21, 30–35 apart; setae *e* 16–20, on ventral annulus 29–34, 20–21 apart; setae *f* 28–32 on ventral annulus 47–54, or 5–6 from rear, 20–22 apart. Setae *h2* 67–80, 10 apart; setae *h1* 4–5, 5 apart. Caudal lobes normal in size and shape. Genitalia 12–13, 20–21 wide, with minute granules on posterior $\frac{3}{4}$, setae *3a* 21–24, 17–18 apart.

NYMPH (n = 2). White, vermiform, 87–107, 31–40 thick. Prodorsal shield 21–25. Tubercles of scapular setae *sc* on rear shield margin, scapular setae *sc* 7–8, pointing up and forward. Leg I 15–17. Leg II 13–15. Opisthosoma with 44–45 dorsal, 35–39 ventral semiannuli. Dorsal and ventral semiannuli with minute microtubercles like dots.

Host plant. Baby's breath or bachelor's button, *Gypsophila paniculata* L. (Caryophyllaceae); a perennial herb in Hungary. It is a characteristic species of dry sand vegetation.

Relation to the host plant. The mite was found in all stages of development in the leaf sheaths on the stem and in between the involucre bracts of inflorescence and axil. No damage was caused.

Type locality. In Budapest XXIII, Soroksár, Orbánhegyi dűlő, Central Hungary, in a private plot, 47°23'01.1" N, 19°06'46.9" E, 110–115 m above sea level. The host plant species, *Gypsophila paniculata*, grows in a sand hill of the Danube valley, in an inland dry grassland vegetation of the region developed on calcareous sandy soil (Borhidi, 2003).

Type material. Holotype: female (circled with black ink) with 5 paratype females and 1 male on the same slide (slide # 1344b), coll. G. Ripka, 22 June 2014. Paratypes: 6 females and 2 males (slide # 1344a), 6 females, 1 male (slide # 1344c), data same as for holotype, coll. G. Ripka. Deposited in the Department of Pest Management Development and Coordination, Directorate of Plant Protection, Soil Conservation and Agri-environment, National Food Chain Safety Office, Budapest, Hungary. 1 female, 3 males and 3 nymphs (slide # 1344d) coll. G. Ripka, deposited in the Hungarian Natural History Museum, Budapest, Hungary.

Etymology. The species is named in honour of King Béla III (1148–1196), king of Hungary (reigned: 1172–1196) from House of Árpád, or Dynasty of Árpád. He developed the economy, the Church, foreign trade relations, also supported the arts and sciences. The gender is feminine.

Differential diagnosis. To date, only one *Aceria* species has been recorded on the representatives of the genus *Gypsophila*, *Aceria gypsophilae* Roivainen (Roivainen, 1950). The new species described is close to *Aceria gypsophilae*, but the latter has short and unforked sternal line, 35, 45–50 and 70–75 long setae *c2*, setae *d* and setae *h2*, resp. It lives on *Gypsophila fastigiata* L. The male of *A. gypsophilae* is unknown. Whereas *Aceria belarexi* n. sp. has narrowly separated coxae I, lacking sternal line, significantly longer setae *c2* (42–50), setae *d* (63–82), and setae *h2* (81–105). The male of the new species is herein described.

The new species resembles some European nominal *Aceria* species living on Caryophyllaceae hosts: *Aceria cerastii* (Nalepa), *Aceria colocense* Ripka, *Aceria dianthi* (Lindroth) and *Aceria silenae* Liro (Nalepa, 1892b; Lindroth, 1904; Liro, 1940; Roivainen, 1950; Liro and Roivainen, 1951; Ripka, 2013a). The relevant morphological characteristics of *A. cerastii* are as follows: complex pattern on prodorsal shield (whereas faint ornamentation in *Aceria belarexi* n. sp.), tarsus 1.5 times longer than tibia (length of tarsus is approximately the same as the tibia in *Aceria belarexi* n. sp.), and empodium 4-rayed (Nalepa, 1892b) (versus 5-rayed in *Aceria belarexi* n. sp.). Its host plant is *Cerastium triviale* L. *Aceria dianthi* has 14–16 ridges on genital coverflap (apparently 11–14 in *A. belarexi* n. sp.), 8–13 long setae *e*, 9 long setae *3a*, 45 long setae *h2* (versus 18–28, 25–30 and 81–105, resp., in *A. belarexi* n. sp.), and its host is *Dianthus deltooides* L. (Lindroth, 1904; Liro and Roivainen, 1951). Characteristics of *Aceria colocense* Ripka living on *Silene borysthenea* (Gruner) Walters are as follows: length of leg I 38–47 and leg II 34–41 (whereas 29–32 and 27–30, resp., in *Aceria belarexi* n. sp.), presence of prosternal apodeme, 6–8 (apparently absent in *A. belarexi* n. sp.), length of setae *f* 20–24, setae *h2* 63–70 and setae *3a* 18–19 (versus 32–37, 81–105 and 25–30, resp., in *A. belarexi* n. sp.). *Aceria belarexi* n. sp. differs from *Aceria silenae* (Liro) by the shape and especially the pattern of prodorsal shield (whereas prodorsal shield without lines in *A. silenae*); in the length of scapular setae *sc* which are significantly shorter than the prodorsal shield (apparently setae *sc* slightly shorter than prodorsal shield in *A. silenae*); in the number of annuli, 49–66 (versus 69 in *A. silenae*); in the lengths of opisthosomal setae *c2* and *d*, which are definitely longer than scapular setae *sc* (whereas setae *c2* and *d* slightly longer than setae *sc* in *A. silenae*) (Liro, 1940). *Aceria belarexi* n. sp. can be clearly differentiated as follows: female genital coverflap with 11–14 ridges, narrowly separated coxa I with longitudinal line, lacking sternal line, distally rounded solenidia, considerably long (25–30) setae *3a*, and its host plant species, *Gypsophila paniculata*. *Aceria belarexi* n. sp. is the first *Aceria* species to be found inhabiting a *Gypsophila* species in Central Europe.

Aceria ankarensis Denizhan, Monfreda, Cobanoglu et de Lillo was described from *Dianthus chinensis* L. in Turkey (Denizhan et al., 2006). The new species differs from *A. ankarensis* in having narrowly separated coxae I (whereas prosternal apodeme not well defined in *A. ankarensis*), number of empodial rays, 5 (apparently 6 in *A. ankarensis*), the length of setae *1a* 15–20, setae *3a* 25–30 and setae *e* 18–28 (versus 30–37, 54–60 and 59–68, resp. in *A. ankarensis*), number of ridges on genital coverflap 11–14 (apparently 13–15 in *A. ankarensis*).

New date-locality-host records for eriophyoid mites are as follows

On the leaves of *Syringa vulgaris* L. (Oleaceae) lilac rust mite, *Aceria petanoviccae* Amrine et de Lillo was collected by G. Ripka in a garden, in Gyarmat village (Győr-Ménfőcsanak-Sopron county), 12 July 2014. Majority of the mites was present on the underside of the leaves. On the foliage distinct damage symptoms, e.g. leaf silvery and bronzing were caused by the mites. There was a considerable confusion about the accepted or valid name of this species. In the literature the mite has been assigned to the genera *Phyllocoptes*, *Aculops*, *Aculus*, *Aceria* and *Vasates*, and was mentioned as *Aculops massalongoi* (Na-

lepa), *Aceria saalasi* (Liro) and *Aceria saalasi* Roiv. (sic!) (Farkas, 1966; Keifer, 1975; Amrine and Stasny, 1994; Ripka, 2007; Denizhan et al., 2015). The name assignment of this species and the correct authorship were clarified in our days by Amrine and de Lillo (Denizhan et al., 2015).

On the deformed leaves of *Teucrium chamaedrys* L. (Lamiaceae), in small hairy erineae and irregular greenish yellow galls *Aculus teucrii* (Nalepa) was detected by G. Ripka in Vászoly (Veszprém county), 14 August 2014, in seminatural habitat.

On the leaves of *Salvia nemorosa* L. (Lamiaceae), in tiny, white erineae (approx. 1–2 mm in diameter) *Aceria salviae* (Nalepa) was identified by G. Ripka in Vászoly (Veszprém county), 14 August 2014, in seminatural habitat. On the upper side of the leaves, small yellowish green spots were visible.

Diptacus gigantorhynchus (Nalepa) and *Phyllocoptes abaeus* Keifer were found on the leaf undersides of cherry plum, *Prunus cerasifera* Ehrh. (Rosaceae) in the Buda Arboretum of Budapest Corvinus University, 7 September 2014 by Dr László Érsek. *Ph. abaeus* fed on the midrib and auxiliary veins of the leaves. Besides, tetranychid, tarsonemid and tydeid mites were the members of the rich mite community.

From the leaves of dappled willow, *Salix integra* Thunb. (Salicaceae), protogyne and deutogyne females of *Aculus tetanothrix* (Nalepa) were collected in a city park, in Budapest XI, 7 September 2014 by Dr László Érsek. *A. tetanothrix* caused minute galls on the leaf underside and leaf edge roll (Nalepa, 1889, 1892a, b, 1900). *Salix integra* is a new host plant of *A. tetanothrix*.

Eriophyes mali Nalepa was collected in an apple orchard, in Pusztaszabolcs (Fejér county), 21 October 2014 by Mr Vilmos Garamvölgyi. The mite caused blister galls on the apple leaves (*Malus domestica* Borkh.) (Rosaceae).

Eriophyes viburni (Nalepa) was collected from the leaves of wayfaring tree, *Viburnum lantana* L. (Caprifoliaceae) in Pilisborosjenő, Ezüst-hegy (Pest county, Central Hungary), 30 June 2015 by Dr Ágnes Szénási. The mite caused tiny and hairy leaf galls on the upper side of the leaves. The plant association of wayfaring tree was *Cotino-Quercetum pubescentis* Soó (1931) 1932, a karst shrub, developed on dry, shallow rendzina soil, on dolomite rocks (Borhidi, 2003).

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