

NOTES ON ERIOPHYID MITES (ERIOPHYOIDEA: ERIOPHYIDAE) OF THE SUBFAMILY ERIOPHYINAE FROM SEDGES (CYPERACEAE)

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ABSTRACT: The list of species of eriophyid mites from subfamily Eriophyinae Nalepa, 1898 living on sedges (Cyperaceae) is composed. *Eriophyes lentiginosus* Mitrofanov, Sharonov et Sekerskaja, 1983 and *E. altisonorae* (Keifer 1979) are redescribed. A key to species of the genus *Eriophyes* von Siebold, 1851 living on sedges of the genus *Carex* L. is given.

KEY WORDS: Eriophyidae, *Eriophyes*, *Aceria*, *Carex*, *Cyperus*, Cyperaceae

INTRODUCTION

The family Eriophyidae Nalepa, 1898 is evolutionary young and the biggest group of eriophyid mites, including more than 3200 species. Nearly one third of them relates to the two large genera: *Eriophyes* von Siebold, 1851 (about 300 species) and *Aceria* Keifer, 1944 (about 900 species) (Amrine et al. 2003). Many of these mites are determined only with morphometric approach (Sukhareva 1992). To date seven species of the genus *Eriophyes* von Siebold, 1851 and one of the genus *Aceria* Keifer, 1944 are known from sedges (Cyperaceae) (Table 1). In this paper I redescribe species *Eriophyes lentiginosus* Mitrofanov, Sharonov et Sekerskaja, 1983 and *E. altisonorae* (Keifer, 1979) and provide a key to species of the genus *Eriophyes* von Siebold, 1851 living on sedges of the genus *Carex* L.

MATERIAL AND METHODS

Mites were collected from leaves of different sedges (*Carex* L.) using a fine pine and mounted on slides in Berlese medium. In descriptions all measurements are given in micrometers (µm) and represented in Table 2. Values without brackets are means, limits are into brackets. The terms of eriophyid morphology follow Nalepa (1910) and Keifer (1975). Classification of Eriophyidae follows that of Amrine et al. (2003). The host nomenclature derives from Egorova (1999).

SYSTEMATICS

Family Eriophyidae Nalepa, 1898

Subfamily Eriophyinae Nalepa, 1898

Genus *Eriophyes* von Siebold, 1851

***Eriophyes lentiginosus* Mitrofanov, Sharonov et Sekerskaja, 1983**

Fig. 1.

lentiginosus Mitrofanov et al., 1983: 81–82, fig. 1; *Eriophyes lentiginosus*, Skoracka et al., 2004: 8–14, fig. 3–6.

Type material. 10 female and 5 male paratypes (slide # 2794/2) from *Carex* sp. (Cyperaceae) [upper surface of leaves; no damage observed], UKRAINE: Crimea, Yalta, «Cape Martiyan» Reserve, Nikita Botanical Gardens, 27 September 1976, coll. A. A. Sharonov.

Additional material. 12 females (slides # 2, 5) from *Carex brizoides* [upper surface of leaves; no damage observed], RUSSIA: Leningrad Prov., Volhov area, near Irsa station, 59°26' N, 31°55' E, 11 September 2002, coll. Ph. Chetverikov; 24 females (slides # 82, 84) from *Carex elata* [upper surface of leaves near leaf sheath; no damage observed], RUSSIA: Arkhangelsk Prov., Plesetsk area, near Denislavye village, 62°37' N 42°03' E, 3 September 2003, coll. Ph. Chetverikov; 11 females (slide # 78) from *Carex appropinquata* [upper surface of leaves near leaf sheath; no damage observed], RUSSIA: Arkhangelsk Prov., Plesetsk area, near Kokovka village, 62°14' N 39°29' E, 18 August 2003, coll. Ph. Chetverikov; 15 females (slides # 114, 115) from *Carex contigua* (Cyperaceae) [upper surface of leaves; no damage was observed], UKRAINE: Kherson Prov., Askaniya-Nova Reserve, 46°27' N, 33°51' E, 16 August 2002, coll. Ph. Chetverikov; 40 females (slides # 20, 21, 22) from *Carex praecox* [upper surface of leaves; no damage observed], UKRAINE: Dnepropetrovsk Prov., Moskovskoye Lake, 48°27' N, 34°59' E, 8 August 2003, coll. Ph. Chetverikov; 30 females (slides # 95, 96) from *Carex colchica* var. *colchicarova* [upper surface of leaves; no damage observed], UKRAINE: Dnepropetrovsk Prov., Moskovskoye Lake, 48°27' N 34°59' E, 10 July 2004, coll. Ph. Chetverikov; 1 female from *Carex* sp. (Cyperaceae) [upper surface of leaves; no damage observed], SERBIA: Belgrad, Goè, 24 July 2005, coll. R. Petanoviè.

Remarks. According to the differential diagnosis of Mitrofanov et al. (1983) species *E. lentig-*

Table 1.
Mites of subfamily Eriophyinae Nalepa, 1898 from Cyperaceae L.

Species	Host-plant	Relation to host	Localisation	Reference
<i>Aceria diversicoloris</i> (Roivainen, 1950)	<i>Carex flacca</i> Schreb.(= ? <i>C. diversicolor</i> Cr.), <i>C. rostrata</i> Stok.,	Causing an impure pallid color of the basal leaf parts	Finland, Sweden	Roivainen, 1947, 1950
<i>Eriophyes altisonorae</i> (Keifer, 1979) Skoracka, 2004	<i>C. sp.</i> <i>C. sylvatica</i> Huds.	In basal blade sheaths Vagrant on upper leaf surfaces	USA, California Poland	Keifer, 1979 Skoracka, 2004
<i>E. caricis</i> Keifer, 1944	<i>C. panicea</i> L. <i>C. barbarae</i> Dew.* <i>C. panicea</i> L.	Vagrant on upper leaf surfaces In the base of leaves In laminar furrows of the leaves	North-West Russia USA, California Sweden	This paper Keifer, 1944 Roivainen, 1950
<i>E. cyperi</i> Channabasavanna, 1966	<i>Cyperus pangorii</i> Rottb.	In underneath sheathing bracts on inflorescences Vagrant on bases of upper leaf surface and under sheath bracts in inflorescences	India Brazil	Channabasavanna, 1966 Flechtmann, 2004
<i>E. cyperinus</i> Flechtmann, 2004	<i>Cyperus sp.</i>	Vagrant on upper leaf bases	Brazil	Flechtmann, 2004
<i>E. lentiginosus</i> (Mitrophanov, Sharonov et Sekerskaja, 1983)	<i>Carex sp.</i> <i>C. arenaria</i> L., <i>C. colchica</i> subsp. <i>ligerica</i> Egor. <i>C. contigua</i> Hoppe, <i>C. praecox</i> Schreb., <i>C. colchica</i> subsp. <i>colchica</i> Egor. <i>C. appropinquata</i> Schum., <i>C. elata</i> All., <i>C. brizoides</i> L.	? Vagrant on upper leaf surfaces Vagrant on upper leaf surfaces Vagrant on upper leaf surfaces near leaf-sheath In mid-furrows of the basal leaf parts	Ukraine, Crimea Poland Ukraine North-West Russia	Mitrophanov, Sharonov et Sekerskaja, 1983 Skoracka, 2004 This paper This paper
<i>E. mariscus</i> Roivainen, 1950	<i>Cladium mariscus</i> L.	Within leaf sheaths	Sweden	Roivainen, 1950
<i>E. rotundae</i> Mohanasundaram, 1983	<i>Cyperus rotundus</i>	Within leaf sheaths	India	Mohanasundaram, 1983

* This species is absent in the check list by Egorova (1999).

Table 2.
Measurements of *Eriophyes lentiginosus* and *E. altisonorae*

Character	Mite species							
	<i>E. lentiginosus</i> (10 females)				<i>E. altisonorae</i> (10 females)			
	mean	min	max	S.D.	mean	min	max	S.D.
Length of body	255	225	275	16.2	166	150	200	15.3
Width of body	55	50	58	3.4	49	48	51	1.9
High of body	53	50	56	2.3	47	45	50	1.9
Length of shield	38	35	39	1.2	36	35	38	1.2
Width of shield	39	35	41	3.1	36	30	44	6.2
Length of s.apic.	6	5	6	0.6	9	8	11	1.3
Length of gnathosoma	24	21	26	1.8	22	19	24	1.6
Length of s.D.2	10	9	13	1.1	7	6	8	0.7
Distance between s.d.2	20	19	21	1.0	16	15	16	0.6
Number of tergits	87	82	92	3.6	78	75	83	2.6
Length of leg I	34	34	35	0.6	31	30	33	1.1
Length of tibial I	8	8	9	0.6	7	6	8	0.4
Length of tarsus I	7	6	8	0.6	6	5	8	0.8
Length of s.tibial I	9	8	11	1.3	8	8	10	0.9
Length of claw I	7	6	8	0.5	7	6	8	0.6
Length of leg II	32	31	33	0.5	29	28	31	1.3
Length of tibial II	7	6	8	0.6	5	5	6	0.4
Length of tarsus II	6	5	6	0.4	6	5	6	0.6
Length of claw II	8	8	9	0.7	7	6	8	0.6
Length of s.cox.I	8	6	10	1.8	9	6	13	3.0
Length of s.cox.II	19	19	20	0.6	22	19	25	3.6
Length of s.cox.III	39	38	44	3.1	35	25	44	8.1
Length of epiginum	12	10	13	0.8	12	11	14	0.8
Width of epiginum	21	20	21	0.7	20	19	20	0.7
Length of s.gen.	13	13	16	1.2	12	10	14	1.1
Length of s.l.	41	38	46	3.5	31	25	38	4.7
Length of s.v.1	38	38	44	2.0	39	31	44	4.4
Length of s.v.2	13	11	16	1.3	45	38	56	6.7
Length of s.v.3	26	21	31	2.8	24	23	26	1.2
Length of s.acc.	2	1	3	0.5	3	3	4	0.4
Number of sternits before s.l.	12	10	15	1.9	9	8	10	0.8
Number of sternits between s.l. and s.v.1	21	19	24	1.6	15	14	16	0.8
Number of sternits between s.v.1–2	28	25	34	3.1	21	19	22	1.1
Number of sternits between s.v.2–3	40	35	43	2.6	26	24	28	1.4

inosus differs from other representatives of the genus *Eriophyes* from sedges by the absence of distinct lines on the prodorsal shield. However the reexamined female paratypes (slide # 2794/2) as well as mites from my material from Russia and Ukraine and from Poland (Skoracka et al. 2004) have three parallel lines formed by bigger oval dots on the prodorsal shield (Fig. 1 C).

Biology and host associations of *E. lentiginosus*. This species so far was recorded in Ukraine on *Carex* sp. as a vagrant on leaves (Mitrofanov et al. 1983) and in Poland on *Carex arenaria* and *C.*

colchica ssp. *ligerica* as a vagrant on upper leaf surfaces (Skoracka et al. 2004). I collected these mites in Arkhangelsk Prov. from *Carex elata* and *C. appropinquata*, in Leningrad Prov. from *C. brizoides* and in Ukraine from *C. contigua*, *C. praecox* and *C. colchica* var. *colchica*. It is interesting that the majority of the host-species of *E. lentiginosus* (*Carex arenaria*, *C. brizoides*, *C. colchica* ssp. *ligerica*, *C. colchica* var. *colchica* and *C. praecox*) belongs to one and the same subsection Herporrhizae (O. Lang) Kük., 1909 (from sectio Ammoglochid Dumort., 1827) which comprises

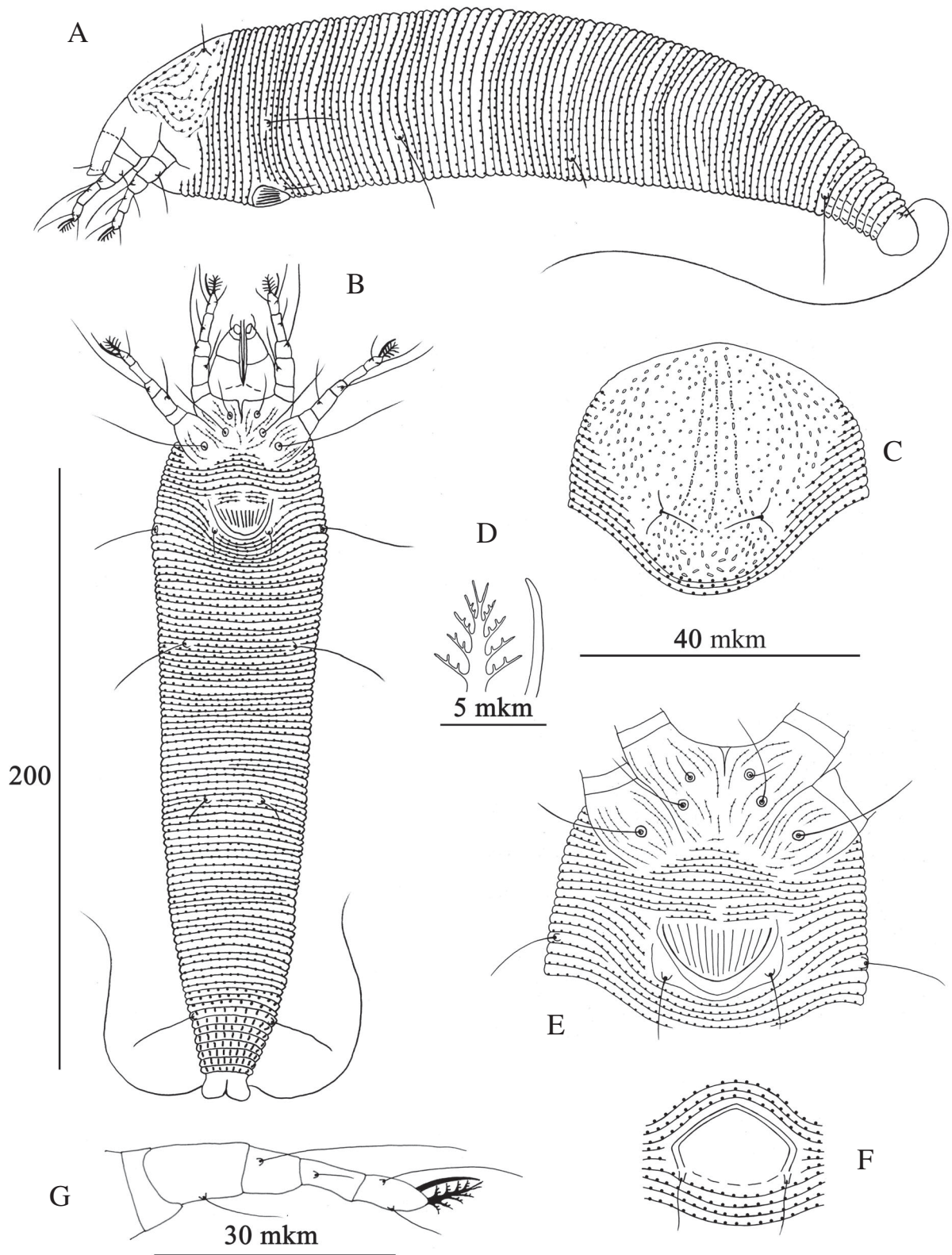


Fig. 1. *Eriophyes lentiginosus* (Mitrofanov, Sharonov et Sekerskaja, 1983), female (all except F), male (F): A — body in lateral view; B — body in dorsal aspect; C — prodorsal shield; D — empodium I and claw I; E — coxogenital region; F — epiandrium; G — foreleg.

sedge species having the long creeping rhizomes and distributed in central Europe and Africa (Egorova 1999). In summer all mites were found on sedges in the central part of leaflets of the upper leaf

surfaces. In June and July the colonies of *E. lentiginosus* were quite dense (about 30 males and females and not less than 15–20 nymphs per leaf). In autumn mites *E. lentiginosus* living on *C. elata* and

C. appropinquata in Arkhangelsk Prov. and on *C. brizoides* in Leningrad Prov. form groups consisting of 10–15 individuals close to the leaf sheaths entrance. I believe that mites *E. lentiginosus* are overwintering in this place.

***Eriophyes altisonorae* (Keifer, 1979)**

Fig. 2.

Phytoptus altisonorae Keifer, 1979: 1, fig. 4

Eriophyes altisonorae, Amrine and Stasny, 1994: 191.

Eriophyes altisonorae, Skoracka et al, 2004: 7.

Female (n = 10). Whitish, 166 (150–200) long, 49 (48–51) wide, 47 (45–50) high. Prodorsal shield with chaotically situated short strokes. Between tubercles of s.d.2 longer strokes, some of them form circle. Two curved lines forming arch near rear shield margin. Short strokes between arch-like lines and inside circle. Two broken transverse lines in middle area of shield. Two indistinct broken longitudinal lines in fore-third of shield. Short curved lines between lateral shield side and coxae. (Fig. 2 A, D). Prodorsal shield 36 (35–38) long, 36 (30–44) wide. Setae s.d.2 — 7 (6–8) long, directed upward and centrally, their tubercles 16 (15–16) apart. Gnathosoma 22 (19–24), directed downward. Setae s.apic. unbifurcated, 9 (8–11) long (Fig. 2 A).

Foreleg 31 (30–33), tibia 7 (6–8), s.tib. I 8 (8–10), tarsus 6 (5–8), claw 7 (6–8) long, without knob, featherclaw 6-rayed (Fig. 2 B). Hindleg 29 (28–31), tibia 5 (5–6) long, tarsus 6 (5–6) long, claw 7 (6–8) long, without knob, featherclaw 6-rayed. Sternum short, not reaching tubercles of s.cox. II. Coxae with numerous thin wave lines. Setae s.cox. I — 9 (6–8) long, 10 (8–13) apart; s.cox. II — 22 (19–25) long, 10 (9–11) apart; s.cox. III — 35 (25–44) long, 22 (20–25) apart. Epigynium 12 (11–14) long, 20 (19–20) wide; s.gen. 12 (10–14). Epigynium with 13–14 thin longitudinal striae (Fig. 2 C).

Opisthosoma with 78 (75–83) tergites and 78 (76–80) sternites, both microtuberculate (Fig. 2 A). Microtubercles roundish. Four-five sternites present before epigynium. Telosome with 6 (6–7) rings ventrally covered by elongated microtubercles. Setal lengths: s.l. — 31 (25–38), s.v.1 — 39 (31–44), s.v.2 — 45 (38–56), s.v.3 — 24 (23–26), s.acc. 3 (3–4); 9 (8–11) sternites anterior to s.l., 15 (14–16) sternites situated between s.l. and s.v.1, 21 (19–22) sternites situated between s.v.1 and s.v.2; 26 (24–28) sternites situated between s.v.2 and s.v.3.

Material examined. 10 females, (slide # 20) from *Carex panicea* (Cyperaceae) [upper surface

of leaves; no damage observed], RUSSIA: Leningrad Prov., Gatchina area, station Marienburg, «Chudo-Polyana», 59°37' N, 30°07' E, 8 October 2002, coll. Ph. Chetverikov; 18 females (slides # 31, 32) from *Carex panicea* [upper surface of leaves; no damage observed], RUSSIA: Smolensk Prov., near Kobysi village, 55°16' N, 31°14' E, 10 July 2004, coll. Ph. Chetverikov; 2 females from *Carex sylvatica* [upper surface of leaves; no damage observed], POLAND: leafy forest near Mosina, 30 May 2005, coll. A. Skoracka.

Remarks. According to Keifer (1944, 1979) two very close species *Eriophyes caricis* Keifer, 1979 and *E. altisonorae* Keifer, 1944 distinguishing only by the shield pattern live on sedges in North America. In *E. caricis*, the prodorsal shield is covered by numerous of small round dots, the median and admedian lines are distinct and the «Ж»-like figure formed by short lines is present between tubercles of s.d.2 are present (Fig. 2 E). In *E. altisonorae* the prodorsal shield is covered by chaotically situated short strokes, the median line is absent, the admedian lines are indistinct in the fore-third of the prodorsal shield, a circle and arch are present between tubercles of s. d. 2 (Fig. 2 D).

Biology and host associations of *E. altisonorae*. The species so far was recorded in North America (California) in basal blade sheaths of *Carex* sp. (Keifer 1979) and in West Poland on *C. sylvatica* as a vagrant on upper leaf surfaces (Skoracka et al. 2004). In the central European part of Russia I collected these mites on *Carex panicea* only from mid-furrows of leaves. Roivainen (1950) found mites *Eriophyes caricis* on the same host in Finland. In my material from Russia and Ukraine mites *Eriophyes caricis* are absent. From July to October the colonies of *E. altisonorae* were quite dense (about 20–30 males and females and about 10–20 nymphs per leaf).

Below I give a key to species of the genus *Eriophyes* living on sedges set on the ground of original and published data (Keifer 1944, 1979; Mitrofanov et al. 1983; Skoracka et al. 2004).

Key to species of genus *Eriophyes* von Siebold, 1851 living on sedges of the genus *Carex* L.

1. Prodorsal shield with distinct median and admedian lines. «Ж»-like figure present between tubercles of s. d. 2 *E. caricis* Keifer, 1944 (Fig. 2 E).
— Prodorsal shield without median line, admedian lines indistinct and incomplete; «Ж»-like figure between tubercles of s. d. 2 absent 2

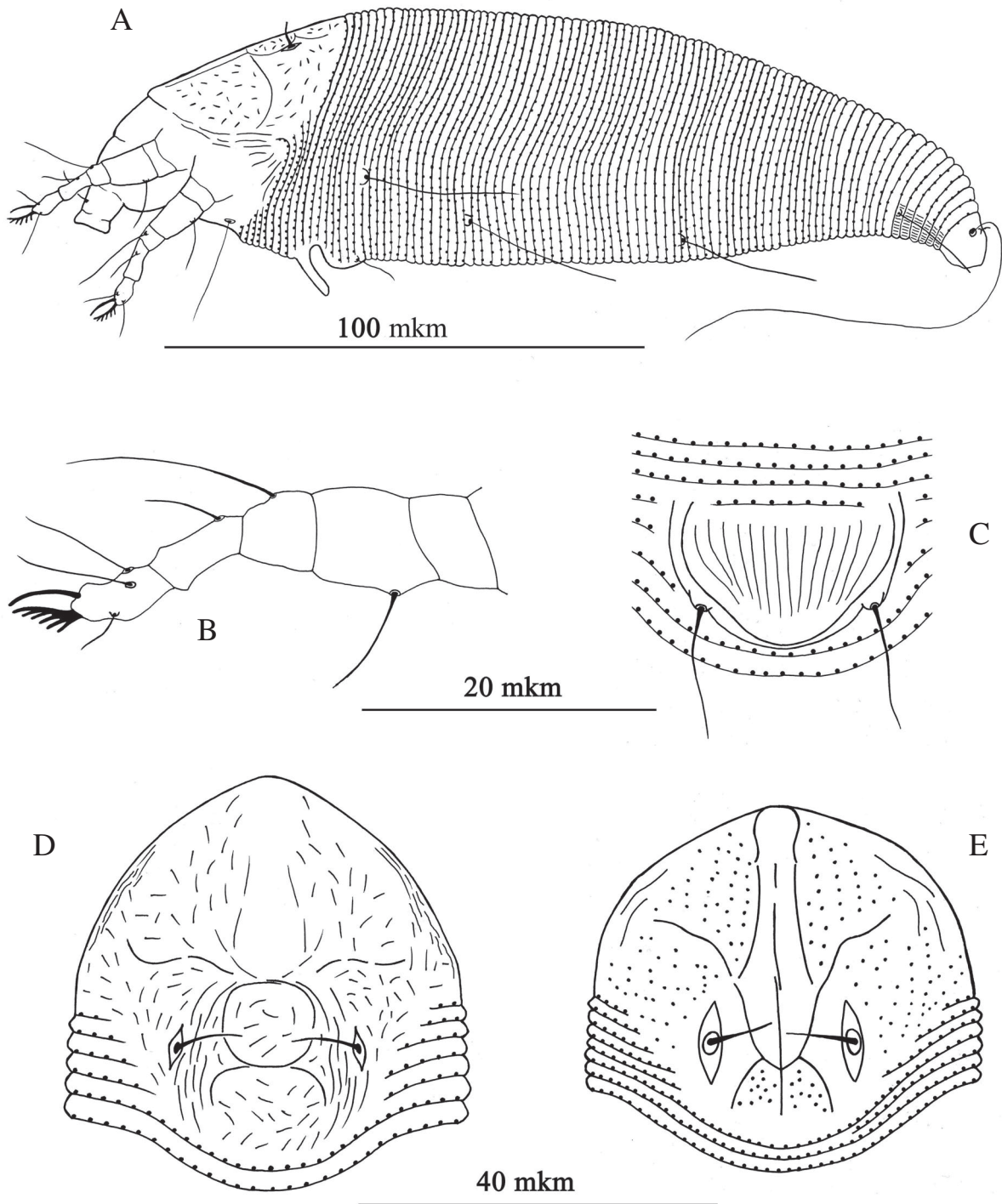


Fig. 2. *Eriophyes altisonorae* (Keifer, 1944), female: A — body in lateral view; B — foreleg; C — epigynum; D — prodorsal shield; E — prodorsal shield of *Eriophyes caricis* Keifer, 1979 (according to: Keifer, 1979).

2. Prodorsal shield with numerous dots, 3 longitudinal lines present, beginning between tubercles of s. d. 2 and going through this shield to its anterior margin *E. lentiginosus* (Mitrofanov, Sharonov et Sekerskaja, 1983) (Fig. 1 C).
 — Prodorsal shield with numerous strokes, circle between tubercles of s. d. 2 present; 2 short bent

lines situated behind this circle and forming arch
 *E. altisonorae* (Keifer, 1979) (Fig. 2 D).

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