

ERIOPHYID MITES OF THE SUBFAMILY PHYLLOOPTINAE (ERIOPHYIDAE) (ACARI: ERIOPHYIDAE) FROM SEDGES (CYPERACEAE)

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ABSTRACT: Species of the subfamily Phyllooptinae associated with sedges (Cyperaceae) are reviewed. Poorly known *Neoleipothrix acutiformis* (Roivainen, 1950) comb. nov. (from *Epitrimerus*), *N. goodenowii* (Roivainen, 1947) comb. nov. (from *Epitrimerus*), and *N. carexis* (Petanovic, 1995) comb. nov. (from *Epitrimerus*) are redescribed. *Neoleipothrix goodenowii* is considered as a senior subjective synonym of *Epitrimerus vicinus* Roivainen, 1950 syn. nov. Mites of the genus *Neoleipothrix* are recorded for Russia and Ukraine for the first time.

Key words: Eriophyidae, *Neoleipothrix*, *Leipothrix*, *Epitrimerus*, sedges, Cyperaceae

INTRODUCTION

The subfamily Phyllooptinae is one of the most specious taxa in Eriophyoidea. It includes more than 1100 species belonging to nearly 100 genera (Oldfield 1996). Up to the twentieth century only seven species of phyllooptine mites belonging to the genus *Epitrimerus* Nalepa, 1898 were known from Cyperaceae (Liro 1943; Roivainen 1947, 1950, 1951; Petanovic 1995). In 2004–2005 three new species of the genera *Cupacarus* Keifer, 1943 and *Leipothrix* Keifer, 1966, and a new monotypic genus *Moraesia* Flechtmann, 2004 were described from these host plants (Flechtmann 2004, Scoracka et al. 2004, Baimai and Takalakha 2005, Chetverikov 2005).

A comparison of descriptions of species of the genus *Epitrimerus* from Cyperaceae revealed that in all of them femoral setae (s. fem. I, II) are absent and, therefore, they should be excluded from this genus according to the conception of Amrine et al. (2003). Three species, *Epitrimerus roivaineni* (Liro, 1943), *Epitrimerus eriophori* (Roivainen, 1947) and *Epitrimerus bangkokus* (Chandrapatya, 1996) possess bifurcate setae on gnathosoma (s. apic.) and therefore have already been moved to the genus *Leipothrix* Keifer, 1966 (Baimai and Takalakha 2005, Chetverikov 2005). Descriptions of other four species, *Epitrimerus goodenowii* Roivainen, 1947, *Epitrimerus vicinus* Roivainen, 1950, *Epitrimerus acutiformis* Roivainen, 1950, and *Epitrimerus carexis* Petanovic, 1995 perfectly correspond to the diagnosis of the genus *Neoleipothrix* Wei et Kuang, 1993. We give a revised list of phyllooptine species occurring on Cyperaceae and their host associations (Table 1).

The majority of phyllooptine mites from Cyperaceae need a major revision. Their biology, female dimorphism, and variability are also poorly known recorded. In this paper, I review eriophyids

associated with Cyperaceae based on published and original data.

MATERIAL AND METHODS

Mites were collected from leaves of different plants belonging to the genera *Eriophorum* L., *Carex* L., and *Scirpus* L. using a fine pin and mounted in Berlese medium. All measurements are given in micrometers (µm) (Table 2), in the text the measurements are given as means. The terms of eriophyid morphology follow Nalepa (1910) and Keifer (1975). Classification of Eriophyidae follows that of Amrine et al. (2003). The host nomenclature is derived from Egorova (1999) for sedges and from Wielgorskaya (1995) and Cherepanov (1995) for other plants. Geographic coordinates were acquired from Free online atlas (<http://encarta.msn.com>).

In the European part of Russia and Ukraine, the subfamily Phyllooptinae from Cyperaceae is represented by five oligophagous species belonging to the genera *Leipothrix* and *Neoleipothrix*. Mites of the genus *Leipothrix* are fairly rare and inhabit plants of the genera *Carex*, *Eriophorum* and *Scirpus*, whereas *Neoleipothrix* spp. are widely distributed everywhere and live only on sedges (*Carex*). From them *N. carexis* is the most frequent and numerous species. Phyllooptine mites from Cyperaceae do not cause any visible damage and live mainly in midfurrow on the upper surface of leaves and also on the lower leaf surface. Cyperacean mites *Leipothrix* spp. and *Neoleipothrix* spp. overwinter on dry leaves of their hosts.

Phyllooptine mites were recorded from cyperacean plants belonging to the genera *Carex*, *Cyperus*, *Eriophorum*, and *Scirpus* (Table 1). I investigated 50 species of six cyperacean genera: *Blysmus* Panz. ex Schult. (*B. compressus*), *Bol-*

Table 1.
Plants of the family Cyperaceae inhabited by phyllocoptine mites

Host species	Species										References	
	<i>Cupacarus acutivagrans</i>	<i>Neolei pothrinx acutiformis</i> (= <i>Epitrimerus acutiformis</i>)	<i>N. carexis</i> (= <i>Epitrimerus carexis</i>)	<i>N. goodenowii</i> (= <i>Epitrimerus goodenowii</i> , <i>E. vicinus</i>)	<i>Lei pothrinx bangkokus</i>	<i>L. hirtus</i>	<i>L. roivaineni</i> (= <i>Epitrimerus eriophori</i> , <i>E. roivaineni</i>)	<i>Moraesia tau</i>				
<i>Carex acuta</i> L. (= <i>C. gracilis</i> Curt.)	-	+	+	+	-	-	-	-	-	-	-	this paper
<i>C. acutiformis</i> Herd.	+	+	+	-	-	-	-	-	-	-	-	Boezek and Petanovic 1995; Roivainen 1950; Skoracka et al. 2004
<i>C. aquatilis</i> Wahlenb.	-	-	-	+	-	-	-	-	-	-	-	Roivainen 1951
<i>C. atherodes</i> Spreng.	-	+	-	+	-	-	+	-	-	-	-	this paper
<i>C. canescens</i> L. (= <i>C. cinerea</i> Poll.)	-	+	-	-	-	-	-	-	-	-	-	this paper
<i>C. cespitosa</i> L.	-	-	+	+	-	-	-	-	-	-	-	Roivainen 1950; this paper
<i>C. disticha</i> Huds.	-	-	+	-	-	-	-	-	-	-	-	this paper
<i>C. elata</i> All.	-	+	-	-	-	-	-	-	-	-	-	this paper
<i>C. elongata</i> L.	-	-	-	+	-	-	-	-	-	-	-	this paper
<i>C. globularis</i> L.	-	-	-	-	-	-	-	-	-	-	+	this paper
<i>C. hirta</i> L.	-	-	-	-	-	-	-	-	-	+	-	this paper
<i>C. hostiana</i> DC.	-	-	-	+	-	-	-	-	-	-	-	Roivainen 1951
<i>C. juncella</i> (Fries) Th. Fries	-	-	-	+	-	-	-	-	-	-	-	this paper
(= <i>C. juncea</i> Fries)	-	-	-	-	-	-	-	-	-	-	+	this paper
<i>C. lasiocarpa</i> Ehrh.	-	-	-	+	-	-	-	-	-	-	-	this paper
<i>C. limosa</i> L.	-	+	+	+	-	-	-	-	-	-	-	this paper
<i>C. nigra</i> (L.) Reich (= <i>C. goodenowii</i> Gay)	-	+	+	+	-	-	-	-	-	-	-	Roivainen 1947, 1950, 1951; this paper
<i>C. omskiana</i> Meinsh.	-	+	-	+	-	-	-	-	-	-	-	this paper
<i>C. panicea</i> L.	-	-	-	+	-	-	-	-	-	-	-	this paper
(= <i>C. diversicolor</i> Cr.)	-	-	-	-	-	-	-	-	-	-	-	this paper
<i>C. rhynchophysa</i> C.A. Mey	-	+	-	-	-	-	-	-	-	-	-	this paper

Table 1. Continued

Host species	Species								References
	<i>Cupacarus acutivagrans</i>	<i>Neolei pothrix acutiformis</i> (= <i>Epirimerus acutiformis</i>)	<i>N. carexis</i> (= <i>Epirimerus carexis</i>)	<i>N. goodenowii</i> (= <i>Epirimerus goodenowii</i> , <i>E. vicinus</i>)	<i>Lei pothrix bangkokus</i>	<i>L. hirtus</i>	<i>L. roivaineni</i> (= <i>Epirimerus eriophori</i> , <i>E. roivaineni</i>)	<i>Moraesia tau</i>	
<i>C. rostrata</i> Stok. (= <i>C. inflata</i> Sut., <i>C. ampullacea</i> Good)	-	-	+	+	-	-	-	-	Roivainen 1950; this paper
<i>C. vesicaria</i> L.	-	-	+	+	-	-	+	-	Roivainen 1951; this paper
<i>Cyperus gyganteus</i> Vahl.	-	-	-	-	-	-	-	+	Flechtmann 2004
<i>C. sp.</i>	-	-	-	-	-	-	-	-	Boczek, Chandrapatya 1996 this paper
<i>Eriophorum latifolium</i> L.	-	-	-	-	-	-	+	-	Roivainen 1947, 1950, 1951; this paper
<i>E. polystachyum</i> L.	-	-	-	-	-	-	+	-	Liro 1943
<i>E. vaginatum</i> L.	-	-	-	-	-	-	+	-	this paper
<i>Scirpus sybvestris</i> L.	-	-	-	-	-	-	+	-	this paper

Table 2.
Measurements of summer females of three species of *Neoleipothrix* spp. from sedges

Characteristics	<i>N. acutiformis</i> (n=10)		<i>N. carexis</i> (n=10)		<i>N. goodenowii</i> (n=10)	
	Min-max	mean \pm SD	Min-max	mean \pm SD	Min-max	mean \pm SD
length of body	163–181	170 \pm 6.9	181–218	196 \pm 12.3	138–170	155 \pm 8.3
width of body	53–58	55 \pm 1.7	55–58	56 \pm 0.8	50–56	54 \pm 1.9
length of shield	54–60	57 \pm 6.9	42–46	44 \pm 1.9	50–53	51 \pm 0.9
width of shield	50–55	52 \pm 1.8	50–53	51 \pm 0.7	46–52	50 \pm 1.9
length of frontal lobe	12–15	13 \pm 0.9	5–8	6 \pm 0.9	7–10	8 \pm 0.8
length of s.d.2	4–6	5 \pm 0.7	9–10	10 \pm 0.3	4–6	5 \pm 0.5
length of gnathosoma	24–27	25 \pm 1.2	22–26	24 \pm 1.5	21–24	22 \pm 0.9
length of s.apic.	12–19	15 \pm 1.8	13–18	15 \pm 1.4	7–10	8 \pm 0.8
length of foreleg	28–34	30 \pm 2.0	29–32	31 \pm 1.0	27–33	29 \pm 1.4
length of tibia I	6–8	7 \pm 0.4	6–8	7 \pm 0.5	5–6	6 \pm 1.4
length of s.tib. I	4–6	5 \pm 0.8	4–5	5 \pm 0.6	2–3	3 \pm 0.2
length of tarsus I	4–5	5 \pm 0.3	5–6	6 \pm 0.6	4–6	5 \pm 0.6
length of claw I	5–6	6 \pm 0.5	5–6	6 \pm 0.4	5–6	6 \pm 0.5
length of hindleg	26–31	29 \pm 1.7	29–31	30 \pm 0.8	27–29	28 \pm 0.6
length of tibia II	6–7	6 \pm 0.4	6–7	6 \pm 0.5	5–6	5 \pm 0.4
length of tarsus II	4–5	5 \pm 0.4	4–5	5 \pm 0.5	4–5	5 \pm 0.4
length of claw II	5–6	6 \pm 0.4	5–6	6 \pm 0.5	5–6	6 \pm 0.4
number of tergites	52–60	56 \pm 2.1	90–101	95 \pm 4.1	64–70	67 \pm 1.7
number of sternites	69–82	74 \pm 3.5	102–106	104 \pm 1.4	68–74	70 \pm 1.5
length of s.l.	19–25	23 \pm 3.3	27–37	31 \pm 3.5	19–27	22 \pm 3.8
length of s.v.1	25–39	32 \pm 6.4	39–56	47 \pm 6.7	23–35	30 \pm 4.1
length of s.v.2	8–13	10 \pm 1.6	10–14	12 \pm 1.2	32–39	36 \pm 2.1
length of s.v.3	21–29	24 \pm 1.9	26–35	31 \pm 2.7	25–31	27 \pm 2.2
number of tergites before s.l.	8–11	9 \pm 1.0	12–14	13 \pm 0.8	9–11	10 \pm 0.5
number of tergites between s.l. and s.v.1	14–19	15 \pm 1.6	20–23	21 \pm 1.1	12–15	13 \pm 0.8
number of tergites between s.v.1 and s.v.2	19–24	22 \pm 1.6	30–34	32 \pm 1.1	18–21	20 \pm 0.9
number of tergites between s.v.2 and s.v.3	20–25	23 \pm 1.4	30–34	31 \pm 1.4	20–24	21 \pm 1.2
length of epigynium	10–13	11 \pm 0.7	10–13	12 \pm 0.8	11–13	12 \pm 0.6
width of epigynium	18–21	19 \pm 0.9	20–22	21 \pm 0.7	15–18	17 \pm 0.9
length of s.gen.	15–25	21 \pm 3.5	10–17	14 \pm 3.4	15–23	18 \pm 2.1

boschoenus (Aschers.) Palla (*B. maritimus*), *Carex* L. (41 species), *Cyperus* L. (*C. fuscus*), *Eriophorum* L. (*E. latifolium*, *E. polystachyum*, *E. vaginatum*), *Scirpoides* Seguiet (*Scirpoides holoschoenus* (L.) Sojak.), *Scirpus* L. (*S. sylvaticus* L.) and found phyllocoptins only on the plants of three genera: *Carex*, *Eriophorum*, and *Scirpus*. These mites were most frequently collected on sedges: a half of the investigated *Carex* species (21) were inhabited by phyllocoptins. Such common and abundant sedges in the North-East Russia as *Carex acuta*, *C. nigra*, *C. limosa*, *C. rostrata*, and *C. vesicaria* were most often colonized by mites. In my material, the sub-

family Phyllocoptinae is represented by the two genera, *Leipothrix* and *Neoleipothrix*. Data on the genus *Leipothrix* had already been published (Chetverikov 2005).

Genus *Neoleipothrix* Wei et Kuang, 1993

Neoleipothrix Wei et Kuang, 1993: 41; Amrine, 1996: 81.

Diagnosis. Body compact, massive; opisthosoma with broad tergites and more thin and numerous sternites; tergites form a middle ridge on dorsal surface of opisthosoma, sometimes 2 additional lateral ridges present on opisthosoma sides; s. d. 2

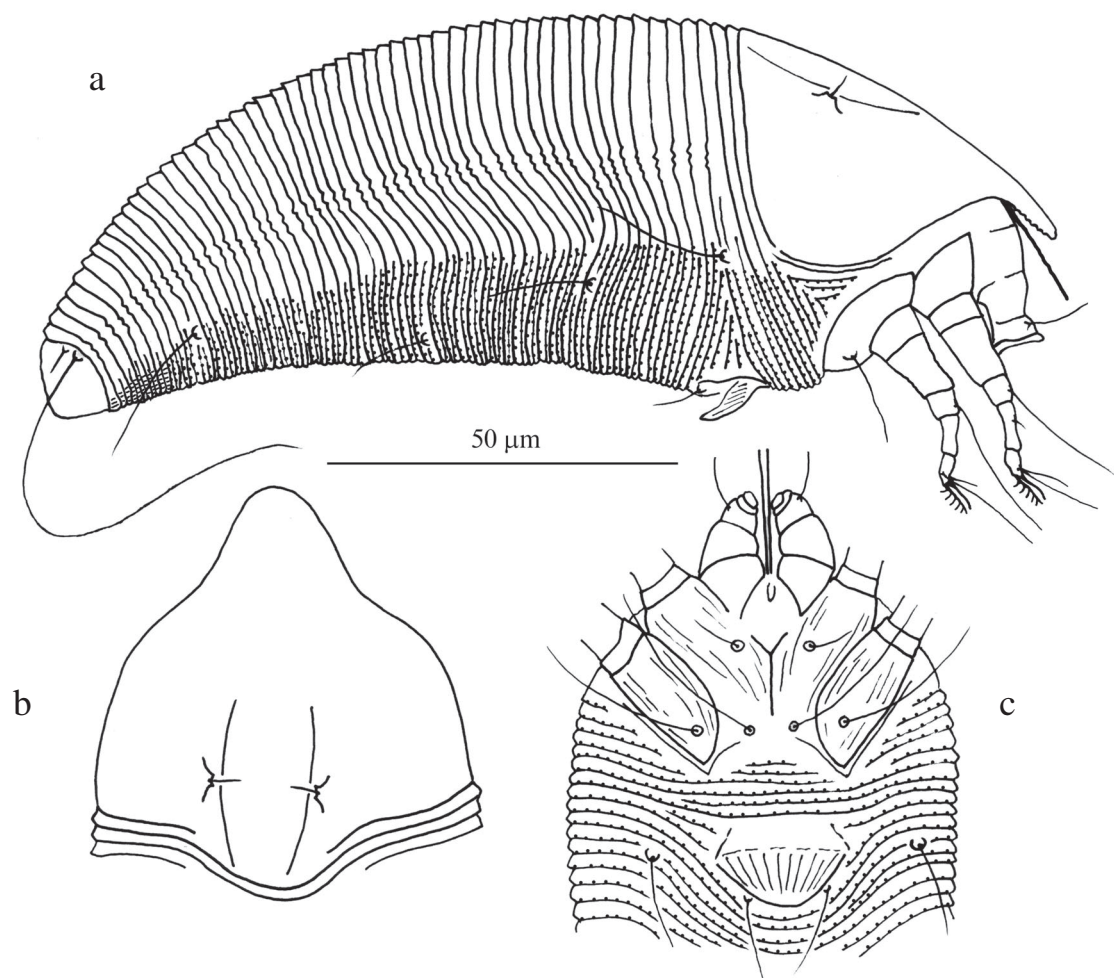


Fig. 1. *Neoleiopothrix acutiformis* (Roivainen, 1950) comb. n., female: a — body in lateral view; b — prodorsal shield; c — coxogenital region.

situated ahead of rear shield margin and directed up and forward; s. apic. unbranched; s. fem. I, II absent; s. tib. I sometimes absent; claws mostly without knobs; epigynium usually with longitudinal lines.

Type species. *Neoleiopothrix alocasiae* Wei et Kuang, 1993, by monotypy.

Species included. *N. acutiformis* (Roivainen, 1950) comb. n. (from *Epitrimerus*), *N. alnusae* Huang, 2001, *N. alocasiae* Wei and Kuang, 1993, *N. bambusae* Huang, 2001, *N. carexis* Petanovic, 1995) comb. n. (from *Epitrimerus*), *N. goodenowii* (Roivainen, 1947) comb. n. (from *Epitrimerus*), *N. leptae* Huang and Wang, 2004, *N. minutae* Huang, 2001, *N. multiflorus* Huang, 2001, *N. repenus* Huang, 2001, *N. superbae* Huang and Wang, 2004, *N. virgatus* Huang and Wang, 2004.

Distribution and hosts. Mites of this genus are recorded for Europe (Finland, Sweden, Serbia and Montenegro, Poland) and Asia (China, including Taiwan). In Russia and Ukraine mites of the genus *Neoleiopothrix* are recorded for the first time. Host plants of these mites include both monocoty-

ledon (Poaceae, Cyperaceae, and Araceae) and dicotyledons (Betulaceae, Rutaceae, Moraceae, Polygonaceae, Theaceae and Styraceae) (Table 3).

Remarks. The genus *Neoleiopothrix* resembles the genus *Epitrimerus* but can be easily distinguished from the latter by the absence of s. fem. I, II.

***Neoleiopothrix acutiformis* (Roivainen, 1950) comb. n.**

Fig. 1.

Epitrimerus acutiformis Roivainen, 1950:35; Petanovic and Boczek, 1995:71

Female (n = 10). Reddish, 170 long, 55 wide. Prodorsal shield with two short admedian lines between tubercles of s.d.2 (Fig. 1 b). Prodorsal shield 57 long, 52 wide; frontal lobe 13 long, rounded with arched striae on its lower surface. Setae s.d.2 5 long, directed upward and centrally, their tubercles 14 apart. Gnathosoma 25, directed downward. Setae s. apic. simple, 15 long (Fig. 1 a).

Foreleg 30, tibia 7, s. tib. I 5, tarsus 5, claw 6 long, without knob, feather claw 5(6)-rayed. Hindleg

Table 3. Eriophyid mites of the genus *Neoleiophthrix* Wei et Kuang, 1993

Species	Host species	Host family	Relation to host	Locality	Reference
<i>N. acutiformis</i> (Roivainen, 1950) comb. n.	<i>Carex acutiformis</i> , <i>C. acuta</i> , <i>C. atherodes</i> , <i>C. cinerea</i> , <i>C. elata</i> , <i>C. limosa</i> , <i>C. omskiana</i> , <i>C. rhynchophylla</i>	Cyperaceae	Vagrant in midfurrows of the leaves, no visible damage	Finland, Sweden, Russia(Arkhangelsk and Leningrad Prov.)	Roivainen 1950; this paper
<i>N. alnusae</i> Huang, 2001	<i>Ahnus japonica</i> (Thunb.) Steud.	Betulaceae	Vagrant on the lower leaf surface, no visible damage	Taiwan, Tengchih	Huang 2001
<i>N. alocasiae</i> Wei et Kuang, 1993	<i>Alocasia macrorrhiza</i> (L.) G. Don.	Araceae	?Vagrant	China, Guangxi Autonomous Region	Wei and Kuang 1993
<i>N. bambusae</i> Huang, 2001	<i>Bambusa dolichoclada</i> Hayata	Poaceae	Vagrant on the lower leaf surface, no visible damage	Taiwan, Walapi	Huang 2001
<i>N. carexis</i> (Petanovic, 1995) comb. n.	<i>Carex acutiformis</i> , <i>C. acuta</i> , <i>C. cespitosa</i> , <i>C. distiha</i> , <i>C. limosa</i> , <i>C. nigra</i> , <i>C. rostrata</i> , <i>C. vesicaria</i>	Cyperaceae	Vagrant in midfurrows of the leaves, no visible damage	Serbiaand Montenegro, Poland, Russia (Arkhangelsk and Leningrad Prov.)	Boczek and Petanovic, 1995; this paper
<i>N. goodenowii</i> (Roivainen, 1947) comb. n.	<i>Carex atherodes</i> , <i>C. acuta</i> , <i>C. cespitosa</i> , <i>C. elongata</i> , <i>C. limosa</i> , <i>C. nigra</i> , <i>C. juncella</i> , <i>C. omskiana</i>	Cyperaceae	Vagrant on the lower leaf surface and rarely in midfurrows of the leaves, no visible damage	Finland, Sweden, Russia(Arkhangelsk and Leningrad Prov.), the Ukraine	Roivainen 1947, 1950; this paper
<i>N. leptae</i> Huang et Wang, 2004	<i>Evodia leptae</i> (Spreng.) Merr.	Rutaceae	Vagrant on the lower leaf surface, no visible damage	Taiwan, Hueysuen	Huang and Wang 2004
<i>N. minutae</i> Huang, 2001	<i>Morus australis</i> Poir.	Moraceae	Vagrant on the lower leaf surface, no visible damage	Taiwan, Lanyu	Huang 2001
<i>N. multiflorus</i> Huang, 2001	<i>Polygonum multiflorum</i> Thunb.	Polygonaceae	Vagrant on the lower leaf surface, no visible damage	Taiwan, Tengchih	Huang 2001
<i>N. repenus</i> Huang, 2001	<i>Panicum repens</i> L.	Poaceae	Vagrant on the lower leaf surface, no visible damage	Taiwan, Tengchih	Huang 2001
<i>N. superbae</i> Huang et Wang, 2004	<i>Schima superba</i> Gard. et Champ. var. <i>superba</i>	Theaceae	Vagrant on the lower leaf surface, no visible damage	Taiwan, Hueysuen	Huang and Wang 2004
<i>N. virgatus</i> Huang et Wang, 2004	<i>Styrax formozana</i> Matsum. var. <i>formosana</i>	Styraceae	Vagrant on the lower leaf surface, no visible damage	Taiwan, Hueysuen	Huang and Wang 2004

29, tibia 6 long, s. tib. II absent, tarsus 5 long, claw 6 long, without knob, feather claw 5(6)-rayed. Setae s. fem. I and II absent. Sternum 11 long, bifurcated in anterior part. Coxae with numerous thin short lines (Fig. 1 c). Setae s.cox. I — 12 long, 11 apart; s.cox. II — 16 long, 6 apart; s.cox. III — 25 long, 19 apart. Epigynium 11 long, 19 wide; s.gen. 21 long; with 8–10 thin longitudinal striates (Fig. 1 c). Opisthosoma with 56 smooth tergites and 74 microtuberculate sternites. Microtubercles rounded. Four-six sternites present anterior to epigynium. Telosome with 5 rings ventrally covered by elongated microtubercles. Setal lengths: s.l. 23, s.v.1 32, s.v.2 10, s.v.3 24, s.acc. 2; 9 sternites anterior to s.l.; 15 sternites situated between s.l. and s.v.1; 22 sternites situated between s.v.1 and s.v.2; 23 sternites situated between s.v.2 and s.v.3. Male: Unknown.

Material examined. 10 females (slide #82) from *Carex elata* All. (Cyperaceae) (upper surface of leaves; no damage observed), RUSSIA: Arkhangelsk Prov., Plesetsk area, marsh near village Denislavje, 62°35.2180' N, 40°04.4993' E, 3 September 2003, coll. Ph. Chetverikov.

Biology and host associations. The species so far was recorded in Sweden on *Carex acutiformis* as a vagrant in the laminar furrows of the lower leaf parts (Roivainen 1950). I collected these mites during the summer and in the first half of autumn from midfurrow on the upper surface of leaves of 8 species of *Carex* (Table 1). In the summer samples from these plants we usually found not more than 10–15 females of *N. acutiformis* per one leaf. There were a few nymphs in the samples. I also observed immobile overwintering females of *N. acutiformis* on frosted leaves of *Carex limosa* on 6 October 2002 on Mshinskoje marsh in Leningrad Prov. These females resided on the lower parts of the leaves in groups of 15–20 individuals. They were situated in lines along the middle furrow with their legs under the body. Morphologically overwintered females of *N. acutiformis* are identical to summer females and can not be distinguished from them on the basis of measurements.

***Neoleipothrix carexis* (Petanovic, 1995)
comb. n.**

Fig. 2.

Epitrimerus carexis Petanovic, 1995:71, fig. 2; Skoracka et al., 2004:7.

Summer female (n = 10). Yellowish, 196 long, 56 wide, 54 high. Prodorsal shield rhomboidal, with two short distinct admedian lines connect-

ed by transverse line near posterior shield margin so that U-shaped figure can be seen in space between tubercles of s.d.2. Lateral field of prodorsal shield bearing some very thin lines forming 3–4 cells (Fig. 2 c). Prodorsal shield 44 long, 51 wide; frontal lobe 6 long, rounded. Setae s.d.2 — 10 long, directed upward and centrally, their tubercles 14 apart. Gnathosoma 24, directed downward. Setae s. apic. simple, 15 long (Fig. 2 a).

Foreleg 31, tibia 7, s. tib. I 5, tarsus 6, claw 6 long, without knob, feather claw 5(6)-rayed. Hindleg 30, tibia 6 long, s. tib. II absent, tarsus 5 long, claw 6 long, without knob, feather claw 5(6)-rayed. Setae s. fem. I and II absent. Sternum 12 long. Coxae with numerous thin short lines (Fig. 2 b). Setae s.cox. I — 8 long, 10 apart; s.cox. II — 20 long, 7 apart; s.cox. III — 31 long, 21 apart. Epigynium 12 long, 21 wide; s.gen. 14 long. Epigynium with 12–14 thin longitudinal ribs in distal part and with short striae in proximal part (Fig. 2 b).

Opisthosoma with 95 tergites and 104 sternites. Both tergites and sternites covered by rounded microtubercles (Fig. 2 a, d). 4–6 sternites present anterior to epigynium. Telosome with 7 rings ventrally, covered by elongated microtubercles. Setal lengths: s.l. 31, s.v.1 47, s.v.2 12, s.v.3 31, s.acc. 3; 13 sternites anterior to s.l.; 21 sternites situated between s.l. and s.v.1; 32 sternites situated between s.v.1 and s.v.2; 31 sternites situated between s.v.2 and s.v.3.

Males: 165–170 long, prodorsal shield 37–40 long, design of prodorsal shield identical to that of females, opisthosoma of 75–82 tergites and 80–85 sternites, epiandrium 7–9 long and 12–14 wide (Fig. 2 d, e).

Material examined. Holotype female (slide # 628/4) and 3 paratype females (slides # 628/2 and # 628/5 from Department of Entomology, Faculty of Agriculture, University of Belgrad) from *Carex acutiformis* Ehrh. (Cyperaceae), upper surface of leaves, no damage was observed, SERBIA AND MONTENEGRO: Carska bara, Mala greda, 10 June 1994, coll. R. Petanović; 1 female (unnumbered slide) from *Carex acutiformis* Ehrh. (Cyperaceae), upper surface of leaves, no damage was observed, POLAND: Poznań, Lasek Marceliński forest, 30 June 1999, coll. A. Skoracka; 10 summer females and 5 males (slide #9) from *Carex vesicaria* L. (Cyperaceae) (upper surface of leaves; no damage was observed), RUSSIA: Leningrad Prov., Vsevolodjsk region, vil. Orehovo, marsh near railway-station, 60°27.9475', 30°15.5617' E, 6 June 2001, coll. Ph. Chetverikov; 6 overwintering fe-

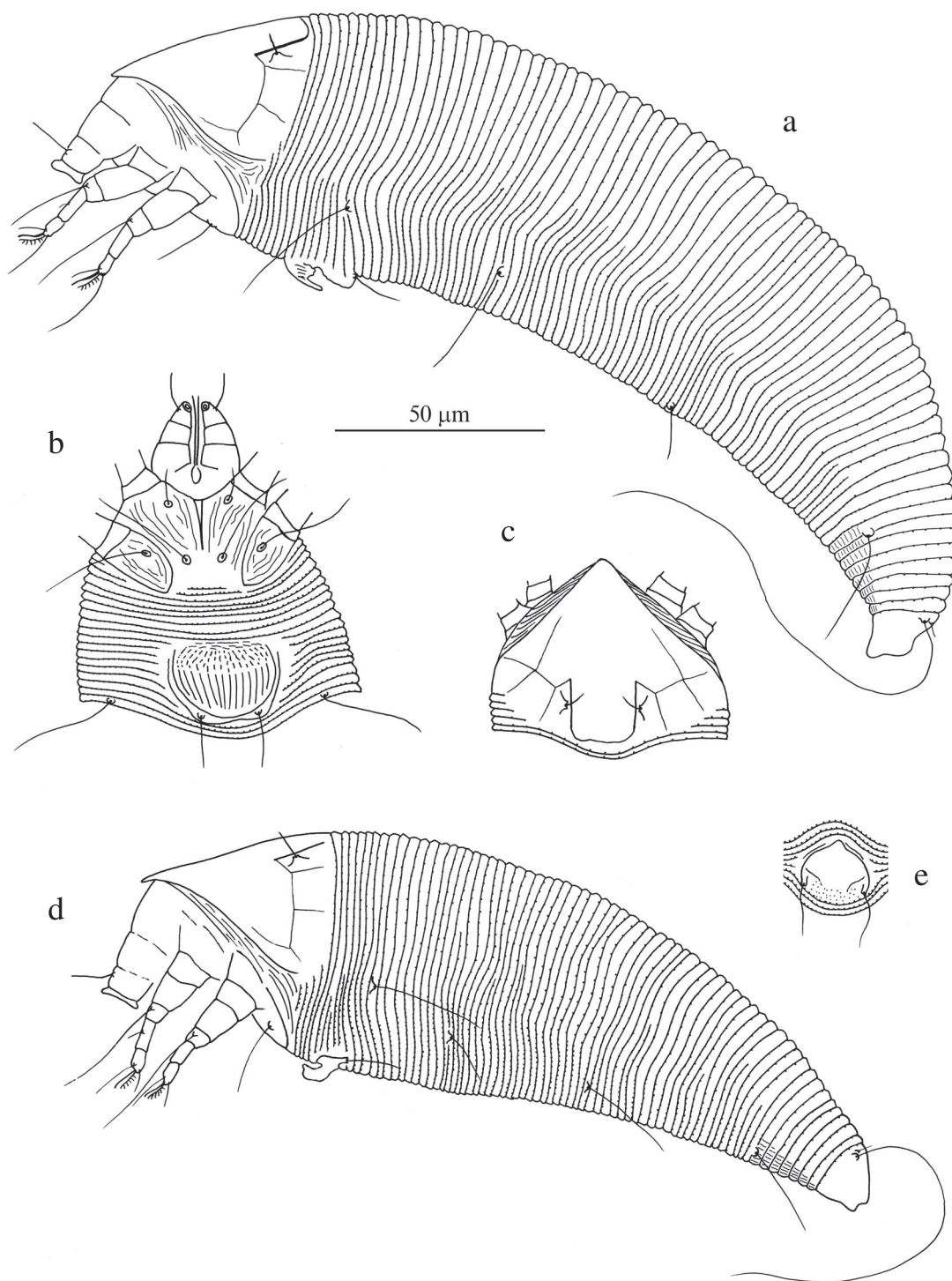


Fig. 2. *Neoleipothrix carexis* (Petanovic, 1995) comb. n. a, b, c — female; d, e — male: a — body in lateral view; b — coxogenital region; c — prodorsal shield; d — body in lateral view; e — epiandrium.

males, (slide # 3) from *Carex vesicaria* L. (Cyperaceae) (upper surface of leaves; no damage was observed), from the same place where the summer females were collected, 29 May 2005, coll. Ph. Chetverikov.

Overwintering female (n=6). Reddish, opisthosoma with 75 (70–79) smooth tergites and 87 (80–95) microtuberculate sternites. Other characteristics as in summer female.

Remarks. According to the original description of *N. carexis* (Petanovic, 1995), a median line is present on the prodorsal shield. I observed an indistinct median and distinct sternal lines in the holotype and paratypes. In addition I examined more than 100 specimens collected from different sedges during 2000–2005 in Russia and a single female from Poland. In all these mites the prodorsal shield did not have the median line.

Emendation of diagnosis of *N. carexis* (Petanovic, 1995) comb. n. This species can be easily distinguished from other phyllocoptins associated with Cyperaceae by the presence of cells on the lateral fields of the prodorsal shield and by the round microtubercles on the tergites (Fig. 2 a c, d).

Biology and host associations. The species was recorded on *Carex acutiformis* as a vagrant on the ears and upper leaf surfaces (Boczek and Petanovic 1995, Skoracka et al. 2004). I collected these mites during the summer and the first half of autumn from midfurrow on the upper surface of leaves of *Carex rostrata*, *C. vesicaria*, *C. cespitosa*, *C. disticha*, *C. limosa*, *C. acuta*, and *C. nigra*. The summer colonies of *N. carexis* were very dense (about 100 yellowish summer males and females and not less than 40–50 nymphs per leaf). In the end of May and in September numerous reddish winter females were found in the samples. In contrast to the summer females they had a fewer number of the opisthosomal rings. Only solitary winter females were collected during summer. Overwintering takes place on dry sedge leaves.

***Neoleipothrix goodenowii* (Roivainen, 1947)
comb. n.**

Fig. 3.

Epitrimerus goodenowii Roivainen 1947: 31, fig. 5; Roivainen 1950: 38, 41; Roivainen 1951: 44; Petanovic and Boczek 1995: 71; Boczek and Chandrapatya 1996: 67.

Epitrimerus vicinus Roivainen 1950: 40; Roivainen 1951: 48.

Female (n = 10). Reddish, with wax on opisthosoma while alive, 155 long, 54 wide (Fig. 3 a). Prodorsal shield with three distinct lines (median line and two admedian lines), extending from its posterior margin to end of frontal lobe. These lines connected. There are two short weakly developed submedian lines between tubercles of s.d.2 and admedian lines (Fig. 3 c). Prodorsal shield 51 long, 50 wide; frontal lobe 8 long. Setae s.d.2 — 5 long, directed upward and centrally, their tubercles 12 apart. Gnathosoma 22, directed downward. S. apic. unbifurcated, 8 long (Fig. 3 d).

Foreleg 29, tibia 6, s. tib. I 3, tarsus 5, claw 6 long, without knob, feather claw 5(6)-rayed. Hindleg 28, tibia 5 long, s. tib. II absent, tarsus 5 long, claw 6 long, without knob, feather claw 5(6)-rayed. Setae s. fem. I and II absent. Sternum 10 long, bifurcated anteriorly. Coxae with numerous thin short lines (Fig. 3 b). Setae s.cox. I — 8 long, 10 apart; s.cox. II — 18 long, 7 apart; s.cox. III — 26 long, 19 apart. Epigynium 12 long, 17 wide; s.gen.

18 long. Epigynium with 10–12 thin longitudinal striae situated in two rows (Fig. 3 b).

Opisthosoma with 67 smooth tergites forming one central and two lateral ridges and 70 microtuberculate sternites (Fig. 3 a). Five-six sternites present before epigynium. Telosome with 6 rings covered ventrally by elongated microtubercles. Setal lengths: s.l. 22, s.v.1 30, s.v.2 36, s.v.3 27, s.acc. 3; 10 sternites anterior to s.l.; 13 sternites situated between s.l. and s.v.1; 20 sternites situated between s.v.1 and s.v.2; 21 sternites situated between s.v.2 and s.v.3.

Male. Unknown.

Material examined. 10 females, (slide # 7) from from *Carex nigra* (Cyperaceae) (upper surface of leaves; no damage was observed), RUSSIA: Leningrad Prov., Vsevolodzhsck region, suburbs of village Orehovo, pine forest, 60°27.1788', 30°17.8975'E, 21 September 2002, coll. Ph. Chetverikov.

Remarks. The original descriptions of *Epitrimerus goodenowii* Roivainen, 1947 and *E. vicinus* Roivainen, 1950 are almost indistinguishable from each other. In the diagnosis of *E. vicinus* Roivainen (1950) noted that these species are very close to each other but could be distinguished by the length of the gnathosoma, chelicerae, and opisthosomal setae. However his account on the variability of *E. goodenowii* (Roivainen 1951) and my measurements clearly show that these metric characters are overlapping in *E. goodenowii* and *E. vicinus*. Their host ranges are also completely overlapping (Roivainen 1947, 1950). I consider *Epitrimerus vicinus* Roivainen, 1950 as a junior synonym of *Neoleipothrix goodenowii* (Roivainen, 1947) comb. n.

According to Roivainen (1947, 1950, 1951) *N. goodenowii* greatly varies in the length of the body: In his samples the length of body varies in the range 190–245 (ex *Carex nigra*), 155–165 (ex *C. hostiana*), and 205–225 (ex *C. aquatilis*). In mites from my material collected on *Carex nigra* the length of body varies in the range 138–170.

Emendation of diagnosis. This species can be easily distinguished from the other eriophyoid mites known from Cyperaceae by the wax excrescences on the opisthosomal ridges and by the presence of the longitudinal, almost confluent median and admedian lines on the prodorsal shield (Fig. 3 a, c).

Biology and host associations. The species so far was recorded in Fennoscandia on *Carex nigra*, *C. rostrata*, *C. vesicaria*, *C. diversicolor*, *C. cespitosa*, *C. aquatilis*, and *C. hostiana* as a vagrant in the midfurrows of leaves (Roivainen 1947, 1950, 1951). I collected these mites from the midfurrow

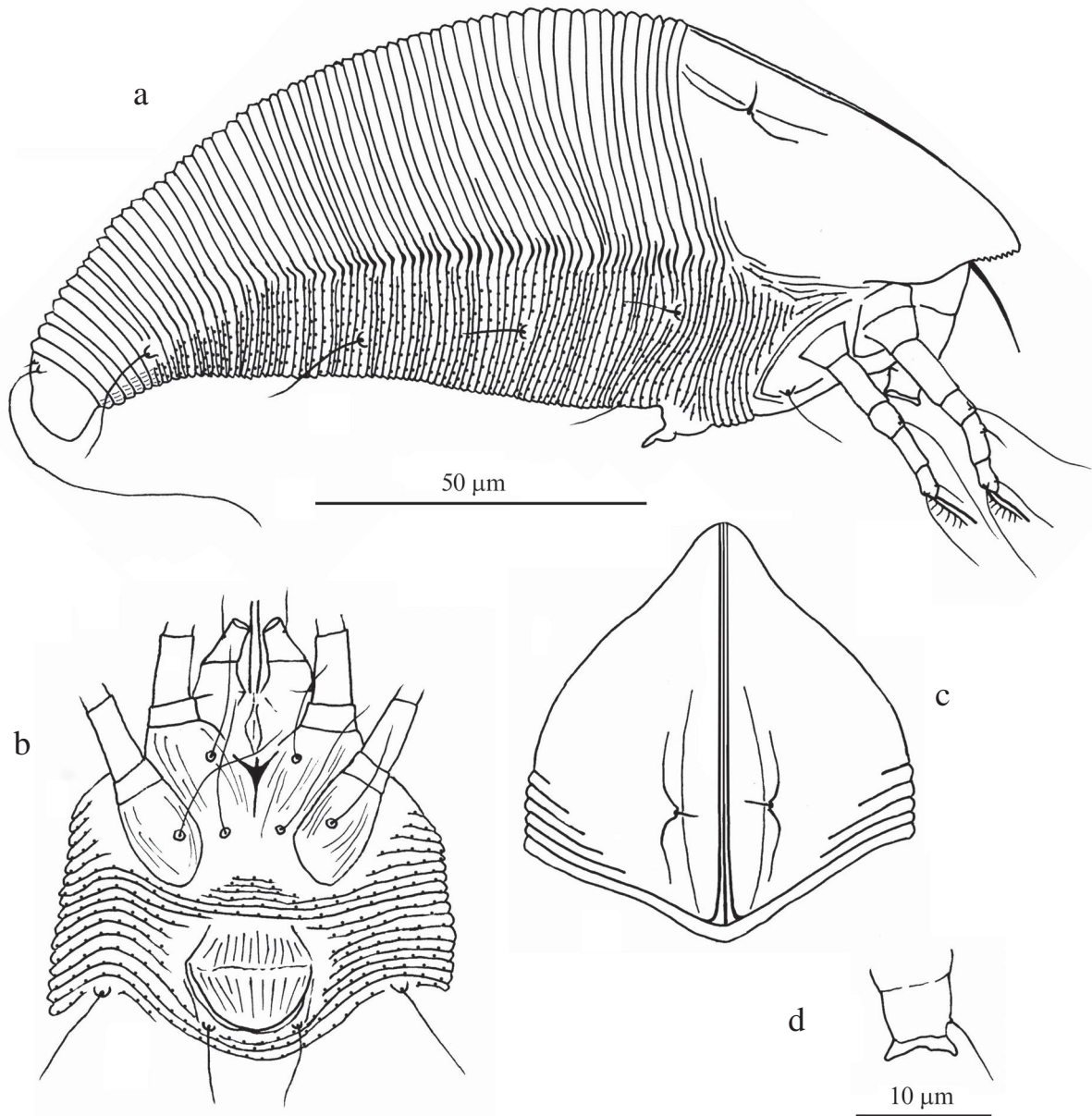


Fig. 3. *Neoleipothrix goodenowii* (Roivainen, 1947) comb. n., female: a — body in lateral view; b — coxo-genital region; c — prodorsal shield; d — distal part of gnathosoma with s. apic.

on the upper surface of leaves on *Carex juncella*, *C. atherodes*, *C. omskiana*, *C. elongata*, *C. limosa*, *C. nigra* and from the lower surface of leaves on *C. acuta* and *C. cespitosa*. In all these cases mites were rare. During the summer, I 5–10 females and solitary nymphs per leaf. *N. goodenowii* overwinters on dry leaves of their hosts.

KEY TO SPECIES

of the subfamily Phyllocoptinae associated with Cyperaceae

- 1. s.apic. bifurcate 2
- s.apic. unbifurcate 5
- 2. s.v.1 and s.v.2 absent 2
- *Moraesia tau* Flechtmann, 2004

- s.v.1 and s.v.2 present (genus *Leipothrix*) 3
- 3. Sternum present *L. roivaineni* (Liro, 1943)
- Sternum absent 4
- 4. Posterior shield margin not elevated, no slope posterior to prodorsal shield. Tubercles of s. d. 2 situated at distance 20–22 from posterior shield margin and extending in two distinct lines anteriorly. Admedian lines close to each others. Frontal lobe indistinct *L. bangkokus* (Chandrapatya, 1996)
- Rear shield margin slightly elevated, slope posterior to prodorsal shield present. Tubercles of s. d. 2 situated at distance 14–16 from posterior shield margin. Admedian lines widely distinctly separated. Frontal lobe massive, 10–12 long *L. hirtus* Chetverikov, 2005

5. Dorsal opisthosoma flat, with middorsal furrow distinct and subdorsal furrows slender; claw with large spherical knob
*Cupacarus acutivagrans* Skoracka, 2004 — Dorsal opisthosoma with median ridge, claw without knob (genus *Neoleipothrix*) 6
6. Median line very distinct and reaches frontal lobe
*N. goodenowii* (Roivainen, 1947) (Fig. 3) — Median line is absent or incomplete and indistinct 7
7. Number of tergites 50–57, lateral areas of prodorsal shield smooth
*N. acutiformis* (Roivainen, 1950) (Fig. 1) — Number of tergites 80–100, net-like pattern consisting of 3–4 cells can be seen on lateral areas of prodorsal shield
*N. carexis* (Petanovic, 1995) (Fig. 2)

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