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TROMBIDIIDAE (ACARI: ACTINOTRICHIDA, TROMBIDIOIDEA) OF KURIL ISLANDS. PART I. PODOTHROMBIINAE THOR, 1935

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Abstract. — *Podothrombium filiforme* Mąkol, **sp. nov.**, *P. arbustiforme* Mąkol, **sp. nov.** and a new genus *Kurilothrombium* Mąkol with one species, *K. acanthinulum* Mąkol **gen. et sp. nov.**, all from the Kuril Islands, are described and illustrated in the adult instar. *Podothrombium strandi* var. *vogesianum* is regarded as *P. strandi*.

Key words. — acarology, taxonomy, Podothrombiinae, *Kurilothrombium*, new genus, new species, Kuril Islands.

INTRODUCTION

The Kuril Islands (Fig. 1) comprise an arch chain of mostly volcanic islands, almost 1200 km long, extending from north-east to south-west between the southern corner of the Kamchatka Peninsula and the north-eastern part of the Hokkaido Island. Extending over seven degrees of latitude (43°–51°N), the arc is divided into distinct botanical zones (Krivolutskaya 1973). Tundra dominates in the northern zone (Shumshu to Ushushir), with only one tree stand and scattered shrub pines, birches, alders and assorted scrub. The central zone (Ketoi to Urup) has the poorest vegetation. The southern zone (Iturup, Kunashir, Shikotan) possesses a relatively rich flora due to warm ocean currents and abundant rainfall; in addition to coniferous and mixed forests of birch and spruce, there are linden, ash, oak, and maple trees. Formerly this huge arc of islands constituted a peculiar bridge, which united two very different faunas: a "young" boreal fauna of Kamchatka and a more ancient fauna of Hokkaido, mostly of Palearchaearctic (= Manchurian) pattern. Geological history of the Kuril Islands in the near past (last glaciation period) is relatively well known (Krivolutskaya 1973).

Trombidiidae Leach, 1815, according to the most recent classification (Welbourn 1991), confirmed by a computer-based phylogenetic analysis (Zhang 1995), comprise three subfamilies: Trombidiinae Leach, 1815, Allothrombiinae Thor, 1935 and Podothrombiinae Thor, 1935 and, considering the number of species, constitute the second most speciose family among Trombidioidea. At present some 220 species are known, assigned to 19 genera; the systematic status of some of them is still unclear (Robaux 1967, Vercammen-Grandjean 1973, Welbourn 1984).

Literature data on the Trombidiidae of the Kuril Islands are very scarce. Thor and Uchida (1933) recorded *Trombidium holosericeum* (as *Sericothrombium holosericeum*) from Alaiad Island. Klimov (1998) provided information on six larvae of *Trombidium* sp. collected on Onekotan and Iturup Islands.

This paper, the first in the series of publications on the Trombidiidae of the Kuril Islands, includes data on the Podothrombiinae and descriptions of two species of *Podothrombium*, new to the science, and another species, whose unique characters justify its placement in a distinct genus.

Two genera were previously distinguished within the Podothrombiinae: *Podothrombium* Berlese, 1910 and *Variathrombium* Robaux, 1969, the latter, South-American genus, being known from postlarval stages only (Robaux 1969). *Podothrombium*, a genus of worldwide distribution, includes 44 nominal species most of which are known from the Holarctic region. The knowledge on many species is restricted to one development stage only. The problem of double systematics, common within terrestrial Parasitengona mites and consisting in constructing separate classification systems for larvae and postlarval stages, is even more

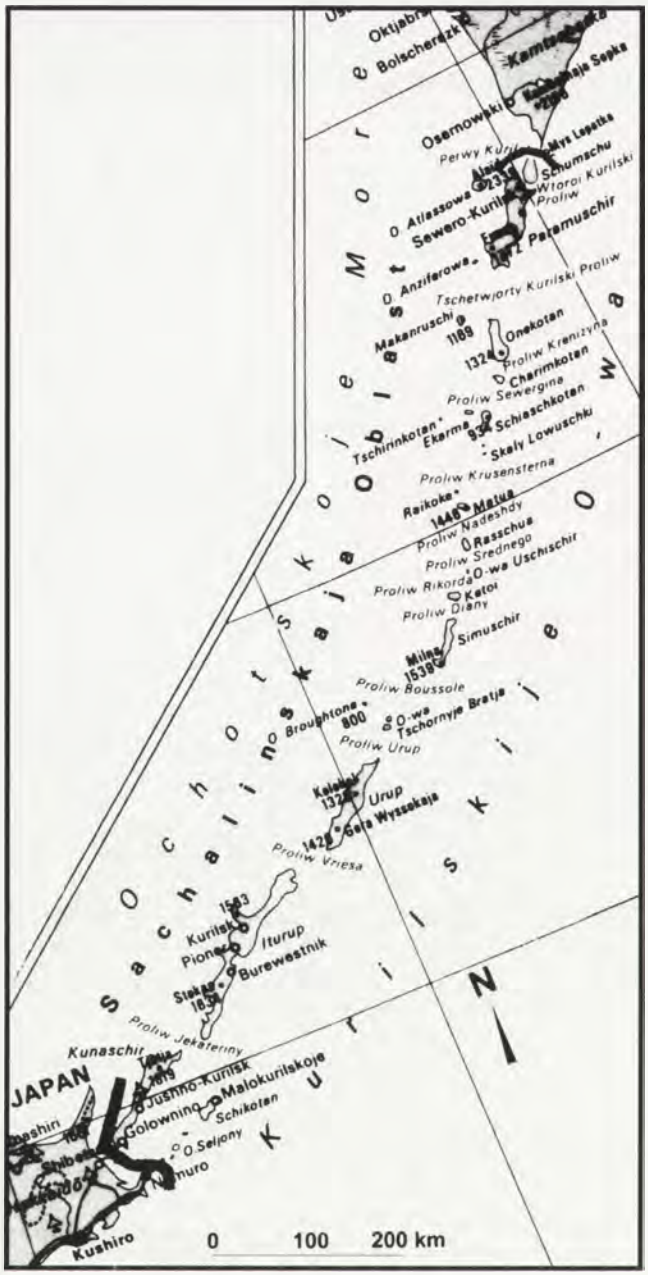


Figure 1. Kuril Islands (Alaïd = Alaiad Island)

complicated in relation to *Podothrombium* and, possibly, to other genera of Podothrombiinae. This is caused by differences between deutonymphs and adults, which are manifested not only in quantitative (e.g. chaetotaxy of palptibia, presence of tibia I always shorter than tarsus I in deutonymphs) but also qualitative characters (e.g. shape of idiosomal setae) (Mąkol 1998). This may imply additional problems in making decisions regarding specific affiliation of representatives of different postlarval stages. Attention should be also paid to sex-dependent characters since there are grounds to suspect that they are of real importance, at least within the *Podothrombium* (Mąkol 1998).

MATERIAL AND METHODS

The material was collected by the second author during two self-organised trips in 1996 and 1997 to North and South Kuriles respectively. Altogether arthropod fauna of 5 islands (Paramushir, Shumshu, and Onekotan in 1996; Kunashir and Shikotan in 1997) has been studied during these expeditions. The following collecting methods were used: pitfall traps, litter sifting, hand picking and collapsible Berlese-funnels (Norton and Kethley 1988).

The material, preserved in ethyl alcohol, was macerated in Nesbitt's fluid and then fixed on microscope slides in Faure's fluid. A part of the specimens was used for scanning electron microscope studies. Photographs of selected structures were taken in SEM LEO 435VP, after drying in critical point (Balzers CPD 010) and coating with gold (Edwards Scancoat Six, Pirani 501). Sex was determined on the basis of the presence of genital apparatus in males and egg-filled idiosoma in females. All metric characters in species descriptions are given in micrometres; in selected SEM pictures the scale is given in nanometres. The following abbreviations denote characters: L – body length, without gnathosoma; W – body width; CML – length of crista metopica; SB – distance between the bases of sensillary setae of crista metopica in active postlarval forms and of scutum in larvae; S – sensilla (or the length of) on crista metopica in active postlarval forms and on scutum in larvae; E – length of eye stalk; pDS – posterodorsal setae (or the length of) on opisthosoma; pVS – posteroventral setae (or the length of) on opisthosoma; GOP l – length of genital opening; GOP w – width of genital opening; Ch – length of internal edge of cheliceral claw; TiCl – tibial claw (or the length of); PaTa – palptarsus (or the length of); Cx – coxa (or the length of); Tr – trochanter (or the length of); bFe – basifemur (or the length of); tFe – telofemur (or the length of); Ti – tibia (or the length of); Ta – tarsus (or the length of); w – width); l/w – length by width; AM – non-sensillary seta of the 1st pair (or the length of) on scutum in larvae; AL – non-sensillary seta of the 2nd pair (or the length of) on scutum in larvae; PL – non-sensillary seta of the 3rd pair (or the length of) on scutum in larvae. L and W, contrary to other characters, are not of the crucial importance, as they show a significant variability range, affected mainly by the physiological condition and the way of mounting the specimen.

List of localities

1/. Paramushir Isl., North-East, E shore, Severo-Kurilsk env., 50°40'N, 156°06'E

a/. PA 1

10.08.1996, alder stand with *Gramineae* and ferns

Podothrombium filiforme: 1 ♀

b/. PA 33

27.08.1996, 2 km S of Severo-Kurilsk, on plateau by the sea, *Pinus pumila* with *Sphagnum* and other mosses

Podothrombium filiforme: 1 ♀

c/. PA 35

11–28.08.1996, sedge bog with *Sphagnum*, *Drosera*, etc., along a creek

Podothrombium filiforme: 2 ♀♀

d/. PA 48
30.08.1996, alder bushes on gorge floor, 250 m a.s.l.
Podothrombium filiforme: 2 ♀♀
e/. PA 92
30.08.–13.09.1996, alder bushes on gorge floor, 250 m a.s.l.
Podothrombium filiforme: 88 ♀♀, 2 ♂♂
f/. PA 97
14.09.1996, 2 km S of village, *P. pumila* with *Sphagnum* and *Gramineae*
Podothrombium filiforme: 1 ♀

2/. Paramushir Isl., NW shore, Shelikhova Bay, 50°22'N, 155°37'E
a/. PA 20
13–25.08.1996, high-grass meadow in "village"
Podothrombium filiforme: 9 ♀♀, 1 ?? (active postlarval form, condition of mounted specimen does not allow to ascertain the instar)
b/. PA 22
13–18.08.1996, meadows
Podothrombium filiforme: 1 ♀
c/. PA 23
19.08.1996, seashore tundra meadow along the Shelikhovka R.
Podothrombium filiforme: 1 ♀

3/. Paramushir Isl., North-East, NE shore, Severo-Kurilsk env., Utyosny Ck., 50°38'N, 156°07'E
a/. PA 30
27.08.1996, 5 km S of Severo-Kurilsk
Podothrombium filiforme: 1 ♀
b/. PA 32
27.08.1996, high-grass meadow, 1–3 km N of Utyosny Ck. mouth,
Podothrombium filiforme: 2 ♀♀

4/. Paramushir Isl., North-East, Severo-Kurilsk env., Ebeko Volcano, 50°41'N, 156°03'E, 500–700 m a.s.l.
a/. PA 37
28.08.1996, meadows in mountain tundra
Podothrombium filiforme: 1 ♀
b/. PA 38
28.08.1996, *P. pumila* with litter along the road to Ebeko Volcano, 500 m a.s.l.
Podothrombium filiforme: 1 ♀

5/. Paramushir Isl., North-East, E shore, Severo-Kurilsk env., 50°40'N, 156°06'E, 250 m a.s.l.
a/. PA 39
11–28.08.1996, meadow on E exposed slope
Podothrombium filiforme: 26 ♀♀, 9 ♂♂, 2 specimens for SEM studies
b/. PA 93
11.08.–13.09.1996, meadow on E exposed slope
Podothrombium filiforme: 12 ♀♀, 1 ♂

6/. Paramushir Isl., North-East, E shore, Severo-Kurilsk env., 50°43'N, 156°08'E, 120 m a.s.l.
a/. PA 43
29.08.1996, unnamed lake on plateau, N of Severo-Kurilsk, *P. pumila* around the lake
Podothrombium filiforme: 1 ♀

7/. Onekotan Isl., CE shore, Mussel Bay, 49°24'N, 154°50'E
a/. ON 50
31.08.–6.09.1996, meadows
Podothrombium filiforme: 5 ♀♀
b/. ON 52
31.08.–6.09.1996, in vegetation
Podothrombium filiforme: 3 ♀♀
c/. ON 63
31.08.–6.09.1996, under pebbles and on rocks
Podothrombium filiforme: 2 ♀♀
d/. ON 64
31.08.–6.09.1996, meadows
Podothrombium filiforme: 9 ♀♀; 1 ♂, 3 specimens for SEM studies
e/. ON 65
31.08.–6.09.1996, *P. pumila* stand, bushes up to 1.5 m, *Polytrichum* and dead litter
Podothrombium filiforme: 6 ♀♀

8/. Shumshu Isl., NW shore, 7 km NNE Baikovo, 50°46'N, 156°15'E
a/. SHU 74
10.09.1996, *Sphagnum* pillows on meadow along the lake shore
Podothrombium arbustiforme: 5 ♀♀
b/. SHU 85
12.09.1996, dried out *Sphagnum* bog
Podothrombium filiforme: 1 ♀

9/. Shumshu Isl., NW shore, Chubuiny Cape, 50°46'N, 156°13'E
a/. SHU 80
11.09.1996, seashore sloppy meadows
Podothrombium filiforme: 3 ♀♀
b/. SHU 81
11.09.1996, pebbly-clay shores along shallow creek on boggy meadow
Podothrombium filiforme: 1 ♀

10/. Kunashir Isl., 5 km E of Yu-Kurilsk, near Sukacheva Cp., 40°04'N, 145°52'E
a/. KU 04p/t II
30.08–8.09.1997, fir forest with birch, ferns, bamboo, *Gramineae* and mosses
Kurilothrombium acanthinulum: 1 ♀, 8 ♂♂, 3 specimens for SEM studies

11/. Kunashir Isl., W part of Yu-Kurilsk, 40°02'N, 145°51'E
a/. KU 35p/t
31.08–7.09.1997, *Sphagnum* bog with *Carex*, some *Ericaceae* and dwarfish *Picea*
Kurilothrombium acanthinulum: 6 ♂♂
b/. KU 36p/t
7.09.–22.09.1997, coniferous forest with moss and dead litter, along the seashore
Kurilothrombium acanthinulum: 4 ♂♂

12/. Kunashir Isl., S part, 2.5 km N of Golovnino, 43°46'N, 145°32'E
a/. KU 40p/t
1.09.1997, oak forest with few birches and bamboo
Kurilothrombium acanthinulum: 1 ♂

13/. Shikotan Isl., Krabozavodskoe Vil., 43°50'N, 146°45'E
a/. SH 85
12.09.1997, varia
Kurilothrombium acanthinulum: 2 ♂♂

RESULTS

PODOTHROMBIINAE Thor, 1935

Diagnosis. Adults and deutonymphs. Anterior of aspidosoma concave. A pair of double eyes situated on peduncular processes. Dorsal and ventral setae distally tapered. On PaTi modified, spine-like setae. Three pairs of genital acetabula in adults, two pairs in deutonymphs. No empodium on leg termination.

Larvae. See the diagnosis of *Podothrombium*.

Podothrombium Berlese, 1910

Type species. *Trombidium filipes* Koch, 1837.

Diagnosis. Adults. Crista metopica linear. Widened sensillary area located in the anterior or mid part of sclerite. Sensillary setae S with very fine setulae. Dorsal idiosomal setae with few branches or smooth. On ventral side of idiosoma setae with several spike-like setulae, longer than in pDS. Bases of dorsal and ventral setae in the form of tubercular, asymmetrical processes, distinctly raised above the idiosoma surface. Epivalval setae covered with setulae, centrovalval setae with setulae or smooth. On inner side of PaTi two combs: dorsal and ventral – formed of modified setae.

Deutonymphs. Crista less sclerotized than in adults. Idiosomal setae with less developed setulae. Dorsal and ventral comb of palptibia consisting of fewer setae (dorsal – usually of 1). Tarsus I never shorter than tibia I. For other characters – see diagnosis of adults.

Larvae. Scutum triangular in outline, with rounded margins. Anterior part of the sclerite distinctly constricted, forming a process on the border with gnathosoma. Scutum bears 4 pairs of setae (sensillary setae – S, non-sensillary setae – AM, AL, PL). Setae AM covered with fine setulae. Setae S with very few and minute setulae. Scutellum much narrower than scutum, with bases of non-sensillary setae. Setae AL, PL of scutum and non-sensillary setae of scutellum with distinct setulae. Dorsal setae with setulae covering whole shaft. Shafts of ventral setae thinner than in dorsal setae, also covered with setulae. Hypostomalae smooth or with fine barbs. No setae on PaTr. One seta on PaFe and PaGe. Three setae on PaTi. Palptibial claw single. Numerous eupathidia on Ta I.

Podothrombium filiforme Mąkol sp. nov.
(Figs 2–19)

Diagnosis. In both sexes tibia I longer than tarsus I. In females in dorsal comb, behind palptibial claw – 2–7 spine-like setae, in ventral comb – 3–7 (in males – in each comb 3–4 and 2–6 setae, respectively). Crista metopica with almost parallelsided anterior and posterior processes. Dorsal setae clearly tapered towards apex, with filiform ending; 1–3 fine setulae on whole length of pDS. Ventral setae also distinctly tapered towards apex, with 3–4 branches, longer than in pDS.

P. filiforme differs from most other members of *Podothrombium* in the length ratio of tibia I to tarsus I, which in both sexes of the new species reaches the value ≥ 1. Among other species, which also have tibia I longer than tarsus I, *P. filiforme* is distinguishable by the length of posterodorsal setae. The new species is similar to *P. strandi* Berlese, 1910 (including *P. strandi* var. *vogesianum* – see remarks) and *P. remyi* Robaux, 1967. It differs from *P. strandi* in the shape of dorsal setae. In *P. strandi* setae pDS are sharply terminated, in the new species they are thinner, thread-like terminated. It can be distinguished from *P. remyi* by the length of distal segments of legs I and IV and also by the shape of aspidosoma, which in *P. remyi* is markedly narrowed.

Description. Adult: Morphometric data in Table 1. Body slightly widened on the border between aspidosoma and opisthosoma. Crista (Figs 2, 12) with sensillary area located in the centre of sclerite. Anterior process of crista reaches margin of aspidosoma. Sensillary setae (Figs 13–14) with tiny barbs. Both processes of crista almost parallelsided. Dorsal setae (Figs 3, 15–16) in females very long (up to 122.45 μm), in males slightly shorter, with a few setulae, mainly in the region of mid part of the shaft. Termination of dorsal setae very thin, nearly thread-like. Ventral setae (Figs 4, 17) narrowed terminally, with several setulae, longer than in dorsal setae. Setae of centrovalva and epivalva (Figs 10–11, 18) with 1–3 setulae. Inner edge of cheliceral claw serrate on whole length (Figs 6–7). Palptibia, on its inner side, with two rows of modified, spine-like setae (Figs 5, 19a–c) forming the dorsal and ventral comb. In females in dorsal comb, behind palptibial claw – 2–7 spine-like setae, in ventral comb – 3–7 (in males – in each comb 3–4 and 2–6 setae, respectively). The number of spine-like setae in each comb on palptibia is positively correlated with the main linear measurements of the body. Shafts of setae of ventral comb, especially those located close to the base of PaTi, may form 1–2 branches, located more or less at half length of the seta. Numerous specialized setae on PaTa (Fig. 19d). Ti I longer than Ta I (Figs 8–9). Ti IV longer than Ta IV (ca. 1.3–1.9×).

Deutonymph and larva: unknown.

Remarks. In 1963 Robaux distinguished *Podothrombium strandi var. vogesianum* from *P. strandi* Berlese, 1910. Based on 8 specimens of *P. strandi var. vogesianum* (6 adults and 2 deutonymphs) and 2 specimens of *P. strandi* (adults) the author listed the main distinctive characters. One of these was length of Ta I, which in *P. strandi* is described as „beaucoup plus long" (437 μm and 414 μm) than in *P. strandi var. vogesianum* (up to 407 μm). According to various authors, in *P. strandi*, the character assumes values from 378 μm to 450 μm (Berlese 1912, Schweizer 1922, 1951, Feider 1955, Schweizer and Bader 1963). Robaux (1963), citing Schweizer (1951), gave an erroneous range 405–513 μm, which in the original publication refers to another species, *P. montanum* Berlese, 1910. Among the distinctive characters Robaux mentioned also length of Ti IV and Ta IV [in *P. strandi var. vogesianum* they are „beaucoup plus courts" (Ti IV up to 475 μm, Ta IV up to 347 μm) than in *P. strandi* (503–504 μm and 340–370 μm, respectively)], length of palp [„beaucoup plus courts" in *P. strandi var. vogesianum* (650–680 μm) than in *P. strandi* („ont 750 μm de long environ")], and presence of more complex structures covering the inner part of palptibia in *P. strandi*.

The analysis of metric characters, carried out for newly described species, shows a relatively wide variability range in the length of various leg segments. Additionally, the number of spine-like setae in each comb on palptibia, observed in series of specimens, shows a positive correlation with the main linear measurements of the body. This indicates that Robaux could have dealt with specimens of different size within the same life stage.

In view of small differences in metric characters, not confirmed by examination of large series of specimens, the differences listed by Robaux (1963) should be regarded as fitting within the variability range of *P. strandi*. *Podothrombium strandi var. vogesianum* is thus regarded as *P. strandi*. However, it should be stated that the *varietas*, described in 1963, has never been valid according to ICZN rules.

Type material. Holotype: Female RUS/114, collected on Onekotan Island (see locality list: 7a). Paratypes: Females

Table 1. Morphometric data of *Podothrombium filiforme* Mąkol sp. nov.

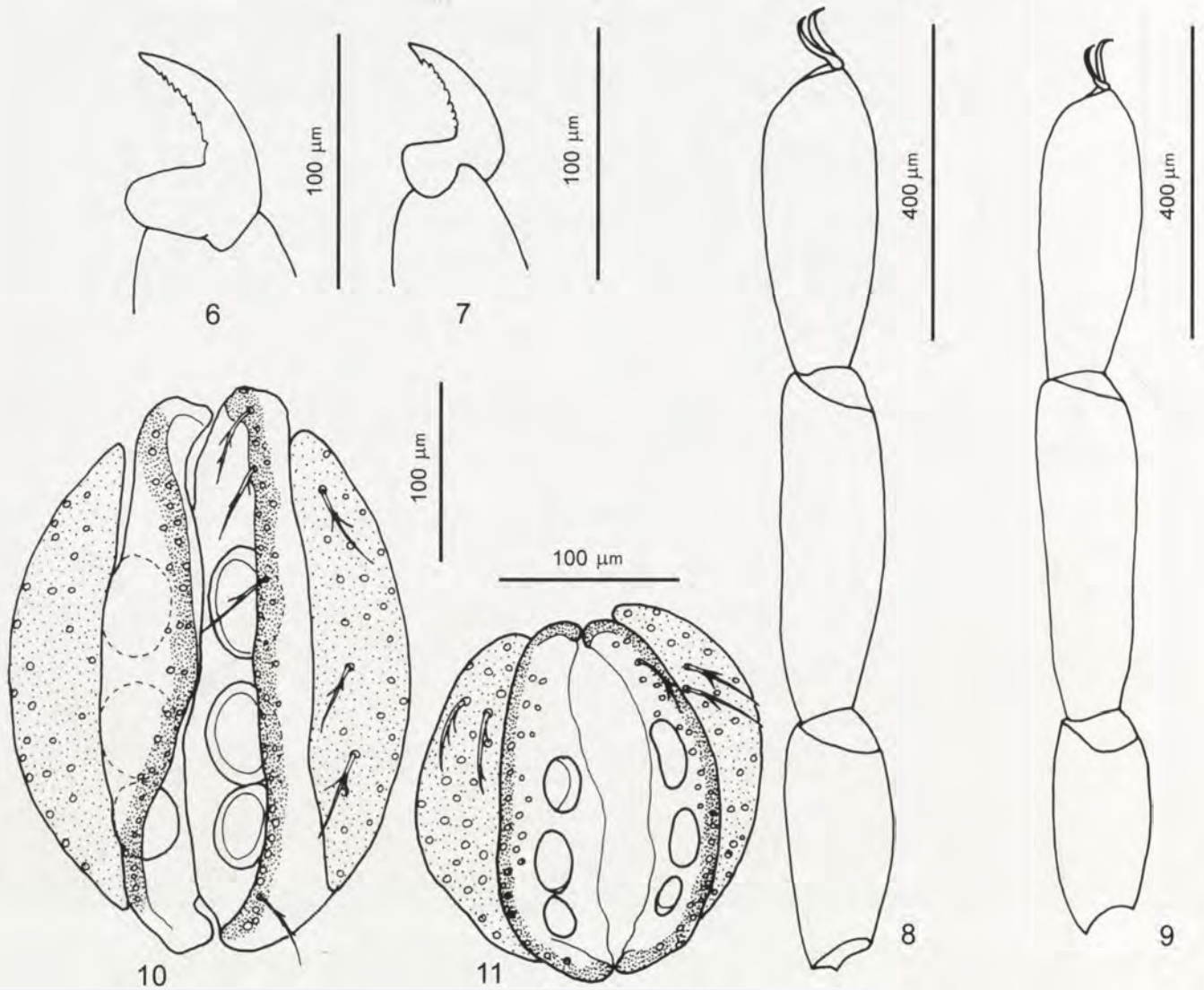
Podothrombium filiforme Mąkol sp. nov.						
Character	Sex	Sample size	Mean	Minimum	Maximum	Standard deviation
L	females	41	2222.29	1632.40	2849.00	281.82
	males	14	1491.60	1262.80	1786.40	133.83
W	females	36	1660.63	1262.80	2263.80	265.96
	males	14	1002.07	862.40	1262.80	95.04
L/W	females	35	1.34	1.12	1.68	0.10
	males	14	1.49	1.37	1.61	0.07
CML	females	39	342.33	268.60	395.00	33.23
	males	14	321.64	264.65	355.50	23.38
SB	females	46	53.84	39.50	71.10	6.52
	males	14	53.89	39.50	71.10	7.20
S	females	7	236.53	207.90	257.80	16.99
	males	0	–	–	–	–
E	females	45	112.71	82.95	138.25	10.16
	males	14	102.29	86.90	120.70	7.95
pDS	females	47	108.16	82.95	122.45	8.30
	males	14	83.51	67.15	98.75	7.72
pVS	females	45	70.84	59.25	82.95	4.94
	males	14	56.99	51.35	63.20	3.36
GOP l	females	44	349.93	248.85	414.75	33.65
	males	13	250.37	217.25	284.40	18.77
GOP w	females	34	252.80	213.30	308.10	22.45
	males	11	214.74	193.55	248.85	17.69
GOP l/w	females	34	1.42	1.14	1.72	0.12
	males	11	1.16	1.00	1.33	0.11
Ch	females	47	58.49	47.40	67.15	4.78
	males	14	50.50	43.45	55.30	4.15
TiCl	females	45	64.17	47.40	79.00	6.95
	males	14	55.30	43.45	67.15	5.80
PaTa	females	46	191.41	161.95	217.25	16.54
	males	14	172.11	134.30	201.45	14.51
Cx I	females	47	287.26	229.10	335.75	25.25
	males	14	263.52	209.35	284.40	20.93
Tr I	females	47	158.34	130.35	189.60	14.80
	males	14	158.56	134.30	181.70	12.48
bFe I	females	46	246.62	165.90	292.30	26.16
	males	14	284.68	217.25	316.00	25.53
tFe I	females	46	327.85	193.55	391.05	41.00
	males	14	375.25	264.65	402.90	36.07
Ge I	females	46	338.41	205.40	406.85	41.76
	males	14	371.30	264.65	406.85	36.50
Ti I	females	40	517.82	385.00	616.00	59.46
	males	14	652.30	446.60	723.80	89.10
Ta I	females	40	459.30	369.60	539.00	42.55
	males	14	526.90	400.40	600.60	58.62
Ti l/Ta I	females	40	1.13	1.00	1.23	0.05
	males	14	1.23	1.12	1.32	0.06
Ta I w	females	40	156.60	132.30	183.75	9.92
	males	14	141.05	132.30	154.00	5.58

Table 1 continued

Ta I l/w	females	40	2.93	2.51	3.40	0.21
	males	14	3.74	2.72	4.22	0.41
Cx II	females	47	305.16	256.75	367.35	27.29
	males	14	270.01	233.05	316.00	21.28
Tr II	females	47	139.43	110.60	169.85	14.91
	males	14	131.76	110.60	150.10	11.34
bFe II	females	47	173.46	138.25	225.15	18.87
	males	14	176.90	138.25	209.35	20.91
tFe II	females	47	210.19	158.00	256.75	23.54
	males	14	228.54	158.00	268.60	25.73
Ge II	females	47	202.71	150.10	248.85	23.89
	males	14	220.64	150.10	248.85	24.39
Ti II	females	45	338.65	240.95	410.80	42.09
	males	14	412.49	268.60	466.10	46.73
Ta II	females	45	323.55	252.80	387.10	28.85
	males	14	354.65	276.50	395.00	31.91
Cx III	females	47	273.73	217.25	335.75	27.28
	males	14	255.34	205.40	312.05	23.88
Tr III	females	47	150.27	118.50	177.75	14.43
	males	14	138.81	110.60	158.00	11.68
bFe III	females	44	182.96	142.20	217.25	20.56
	males	11	190.32	134.30	225.15	27.41
tFe III	females	44	226.32	173.80	268.60	23.37
	males	11	231.97	173.80	256.75	24.23
Ge III	females	44	221.74	158.00	268.60	25.85
	males	11	229.82	177.75	248.85	21.84
Ti III	females	43	423.40	316.00	505.60	50.77
	males	11	491.59	323.90	553.00	62.76
Ta III	females	43	335.84	272.55	395.00	29.38
	males	11	349.40	288.35	383.15	25.68
Cx IV	females	47	332.56	252.80	387.10	35.12
	males	14	308.95	248.85	355.50	24.65
Tr IV	females	47	218.43	150.10	260.70	24.82
	males	14	196.65	161.95	217.25	15.27
bFe IV	females	44	248.76	158.00	304.15	29.99
	males	12	246.22	201.45	288.35	23.96
tFe IV	females	44	339.43	229.10	430.55	42.84
	males	12	353.85	260.70	387.10	37.00
Ge IV	females	44	332.97	221.20	402.90	40.24
	males	12	344.64	233.05	395.00	46.41
Ti IV	females	41	625.01	462.00	754.60	71.07
	males	13	698.23	523.60	785.40	70.45
Ta IV	females	39	381.84	308.00	462.00	33.92
	males	13	399.22	323.40	446.60	30.45
Ti IV/Ta IV	females	39	1.63	1.30	1.81	0.11
	males	13	1.75	1.43	1.92	0.13

RUS/91, RUS/97, collected on Paramushir Island (see locality list: 2a), RUS/117, collected on Shumshu Island (see locality list: 9a), RUS/141, RUS/147 and males RUS/249, RUS/251, collected on Paramushir Island (see locality list: 5a). Holotype and one paratype (RUS/91) are deposited at the Museum of Natural History, Wrocław University, Poland,

Figures 2–5. *Podothrombium filiforme* Mąkol sp. nov. (RUS/114). (2) aspidosoma; (3) dorsal opisthosomal setae; (4) ventral opisthosomal setae; (5) palp



Figures 6–11. *Podothrombium filiforme* Mąkol sp. nov. (6) cheliceral claw of female (RUS/114); (7) cheliceral claw of male (RUS/249); (8) leg I (genu – tarsus) of female (RUS/114); (9) leg I (genu – tarsus) of male (RUS/249); (10) female genital opening (RUS/114); (11) male genital opening (RUS/249)

other paratypes (RUS/97, RUS/141, RUS/249) in Zoological Institute, St. Petersburg, Russia and – RUS/117, RUS/147, RUS/251 – at the Zoological Museum, Novosibirsk, Russia.

Other material studied. See the list of localities (1a–f, 2a–c, 3a–b, 4a–b, 5a–b, 6a, 7a–e, 8b, 9a–b). 5 specimens (from localities 5a, 7d) studied in SEM.

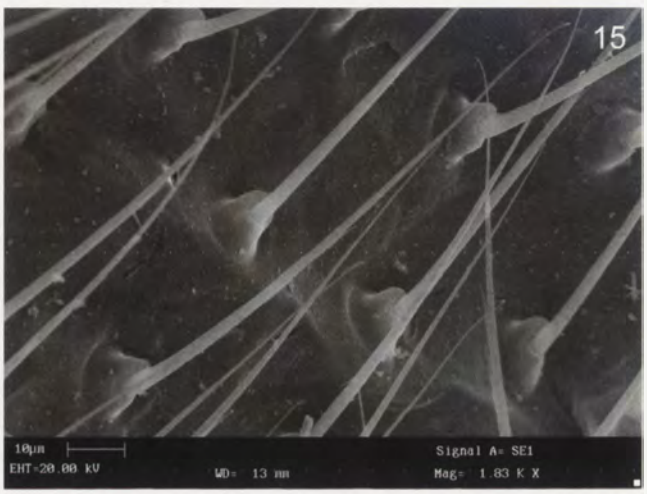
Etymology. The name of the species refers to filiform ending of its dorsal setae.

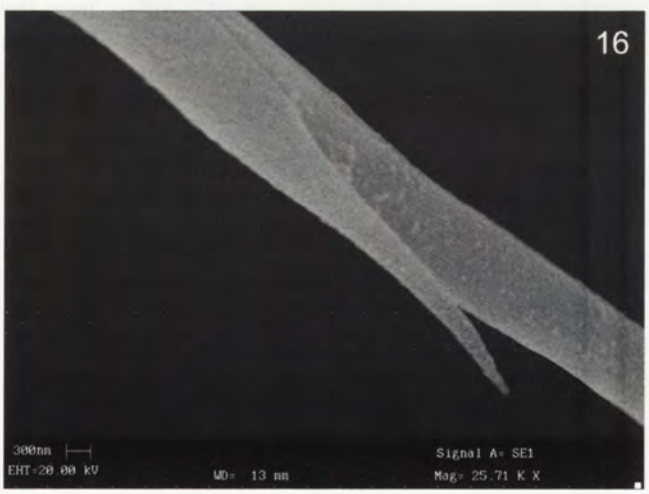
Podothrombium arbustiforme Mąkol sp. nov.
(Figs 20–26)

Diagnosis. Tibia I shorter than tarsus I. In dorsal comb, behind palptibial claw – 3–4 spine-like setae, in ventral comb – 4–7. Anterior process of crista metopica distinctly widened on the margin of aspidosoma. Dorsal setae narrowed terminally, with several (up to 5) relatively long setulae, mainly in the mid part of shaft. Ventral setae also narrowed terminally, with 3–4 branches.

P. arbustiforme sp. nov. belongs to the group in which females have tibia I shorter than tarsus I. It differs from other members of that group in the length of posterodorsal setae and (or) the length of two distal segments of leg I. In those characters the new species resembles *P. hispanicum* Robaux, 1967. However, it differs markedly from the latter species in the chaetotaxy of palptibia.

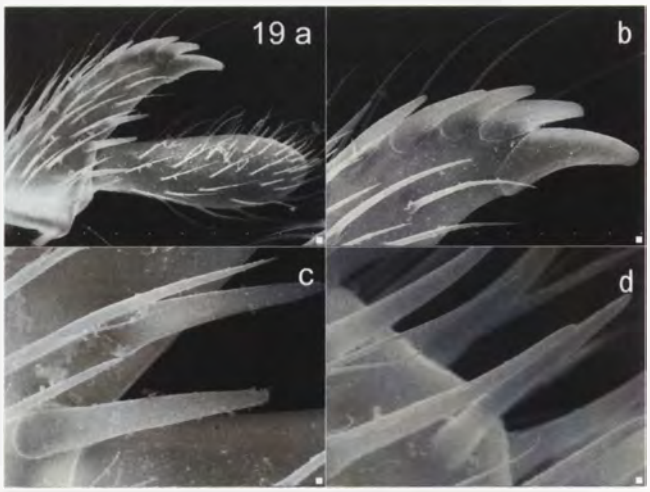
Description. Adult: Male unknown. Morphometric data of females in Table 2. Body slightly widened just behind aspidosoma. Sensillary area of crista metopica (Fig. 20) in the centre of sclerite. Anterior process of crista reaches margin of aspidosoma, clearly widening anteriad. Posterior process slightly narrowed terminally. Sensillary setae with very few, tiny setulae along the stem. Dorsal setae (Fig. 21) of medium length (up to 71.10 µm), with 3–5 relatively long setulae, mainly in the region of mid part of shaft, sharply terminated. Ventral setae (Fig. 22) narrowed terminally, with a few setulae, slightly longer than those in dorsal setae.





Figures 12–17. *Podothrombium filiforme* Mąkol sp. nov. (12) aspidosoma; (13) base of sensillary seta of crista metopica; (14) stem of sensillary seta; (15) dorsal opisthosomal setae; (16) stem of dorsal opisthosomal seta; (17) ventral opisthosomal setae

Centrovalval and epivalval setae (Fig. 23) with 1–3 setulae. Inner margin of cheliceral claw (Fig. 24) serrated on whole length. In dorsal comb of palptibia (Fig. 25), behind palptibial claw – 3–4 spine-like setae, in ventral comb – 4–7 setae.



Figures 18–19. *Podothrombium filiforme* Mąkol sp. nov. (18) genital opening; (19) palp (a. palptibia and palptarsus × 376, b. palptibial claw and modified setae on palptibial dorsum × 885, c. modified setae on palptibial ventrum × 1760, d. specialized setae on palptarsus ×4740)

Shafts of setae of ventral comb may form 1–2 branches, located more or less at half length of seta. Ti I shorter than Ta I (Fig. 26). Ti IV longer than Ta IV (ca. 1.1–1.2×).

Deutonymph and larva: unknown.

Type material. Holotype: Female RUS/128, collected on Shumshu Island (see locality list: 8a). Paratypes: Females RUS/127, RUS/148, RUS/154, RUS/156, collected on Shumshu Island (see locality list: 8a). Holotype and one paratype (RUS/127) are deposited at the Museum of Natural History, Wrocław University, Poland, other paratypes (RUS/148, RUS/154) in Zoological Institute, St. Petersburg, Russia and – RUS/156 – at the Zoological Museum, Novosibirsk, Russia.

Etymology. The name of the species refers to its shrub-like dorsal setae.

Kurilothrombium Mąkol gen. nov.

Type species. *Kurilothrombium acanthinulum* Mąkol sp. nov.

Diagnosis. Adults. Crista metopica strongly developed, formed of a nearly oval sclerite, with no clearly marked anterior and posterior processes. Sensillary area located in the centre of sclerite. Sensillary setae (S) of crista with very few, tiny setules along the stem. Dorsal setae of idiosoma spine-like, smooth or with fine barbs. Ventral setae with setulae. Bases of dorsal and ventral setae tubercular, raised above the idiosoma surface, slightly asymmetrical. Setae of epivalva and centrovalva covered with setulae. On inner side of PaTi two combs: dorsal and ventral – formed of modified setae. Inner margin of cheliceral claw smooth.

The new taxon differs from other members of Podothrombiinae in the shape of crista and of dorsal setae.

Description. See the description of *Kurilothrombium acanthinulum* Mąkol sp. nov.

Etymology. The name of the genus is derived from the Kuril Islands.

Kurilothrombium acanthinulum Mąkol sp. nov. (Figs 27–44)

Diagnosis. In both sexes tibia I shorter than tarsus I. In female in dorsal comb, behind palptibial claw – 2–3 spine-like setae, in ventral comb – 6–7 (in males in each comb 2–5 and 5–9 setae, respectively). Inner margin of cheliceral claw smooth. Crista metopica strongly developed, formed of a nearly oval sclerite, with no distinctly marked anterior and posterior processes. Dorsal setae short (up to 40 µm), spine-like, sharply terminated, sometimes with poorly marked barb. Ventral setae slightly longer than pDS, narrowed terminally, with 1–2 setulae located more or less at half length of shaft.

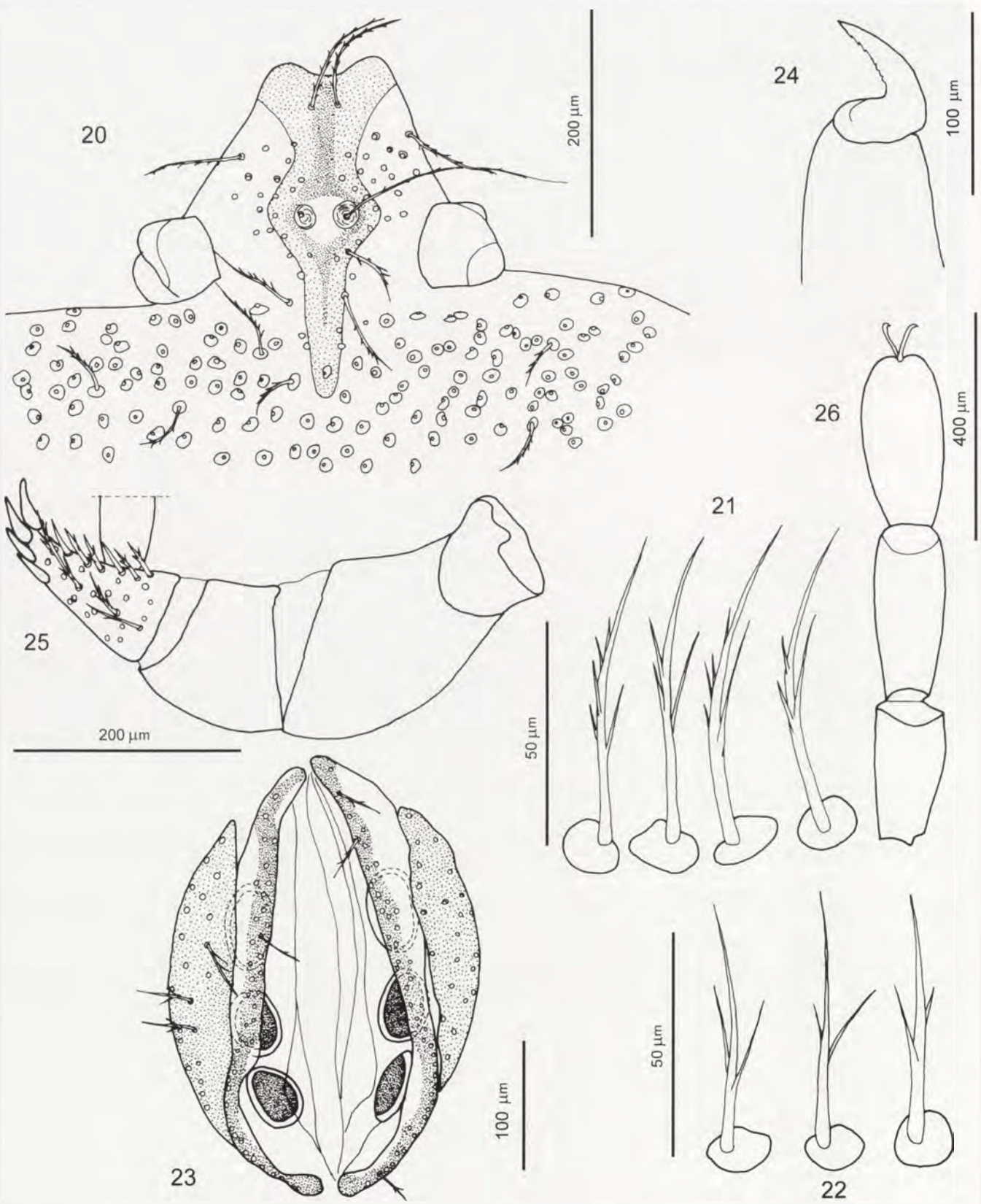
The new species is similar to *P. shibai* Gabryś, 1988 in the shape of crista metopica. However, it differs from the latter in the length of dorsal setae (46–54 µm in *P. shibai*, up to 39.60 µm in *K. acanthinulum*) and the length ratio of tibia I to tarsus I, which in the new species, contrary to *P. shibai*, does not exceed 1.

Deutonymph and larva: unknown.

Description. Adult: Morphometric data in Table 3. Body roughly widened at the border of aspidosoma and opisthosoma. Aspidosoma trapezial in outline. Termination of opisthosoma rounded. Crista (Figs 27, 37) with sensillary area located in the centre of sclerite, strongly developed, with no clearly marked anterior and posterior processes. Lateral margins of the sclerite rounded, anterior margin level with aspidosoma termination, posterior margin truncate. Sensillary setae (Figs 38–39) of crista with tiny barbs. Dorsal setae (Figs 28, 40–41) short (up to 40 µm), spine-like, sharply terminated, sometimes with very poorly marked barb located more or less half length or (and) at the end of seta. Ventral setae (Figs 29, 42) slightly longer than pDS, narrowed terminally, with 1–2 well marked setulae located more or less half length of the shaft. Setae of centrovalva and epivalva (Figs 35–36, 43) with 1–2 setules. Inner margin of

Table 2. Morphometric data of *Podothrombium arbustiforme* Mąkol sp. nov.

Podothrombium arbustiforme Mąkol sp. nov.						
Character	Sex	Sample size	Mean	Minimum	Maximum	Standard deviation
L	females	5	1931.16	1724.80	2079.00	132.74
W	females	5	1697.08	1540.00	1848.00	140.05
L/W	females	5	1.14	1.11	1.23	0.05
CML	females	5	281.24	244.90	308.10	30.00
SB	females	5	39.50	35.55	43.45	3.95
S	females	2	214.83	201.96	227.70	18.20
E	females	5	71.10	63.20	82.95	9.26
pDS	females	5	68.73	63.20	71.10	3.53
pVS	females	5	60.83	59.25	63.20	2.16
GOP I	females	5	331.01	300.20	355.50	25.35
GOP w	females	4	271.56	256.75	296.25	18.91
GOP l/w	females	4	1.24	1.15	1.38	0.11
Ch	females	5	48.19	43.45	51.35	3.30
TiCl	females	5	48.19	43.45	51.35	3.30
PaTa	females	5	114.55	94.80	126.40	14.78
Cx I	females	5	209.35	185.65	229.10	16.52
Tr I	females	5	116.92	102.70	126.40	12.98
bFe I	females	5	207.77	177.75	237.00	23.80
tFe I	females	5	194.34	161.95	225.15	24.73
Ge I	females	5	217.25	165.90	256.75	35.79
Ti I	females	5	274.92	217.25	316.00	41.48
Ta I	females	5	302.57	237.00	343.65	41.86
Ti I/Ta I	females	5	0.91	0.80	0.99	0.07
Ta I w	females	5	131.93	98.75	154.05	21.92
Ta I l/w	females	5	2.31	2.13	2.49	0.15
Cx II	females	5	235.42	217.25	260.70	18.44
Tr II	females	5	105.07	86.90	122.45	14.13
bFe II	females	5	150.10	130.35	173.80	17.66
tFe II	females	5	125.61	110.60	138.25	12.92
Ge II	females	5	142.20	118.50	169.85	21.45
Ti II	females	5	184.07	169.85	209.35	19.67
Ta II	females	5	231.47	213.30	252.80	18.01
Cx III	females	5	218.83	205.40	237.00	11.72
Tr III	females	5	107.44	90.85	122.45	12.62
bFe III	females	5	148.52	114.55	177.75	25.54
tFe III	females	5	127.19	106.65	146.15	17.53
Ge III	females	5	139.04	118.50	158.00	17.53
Ti III	females	5	210.14	181.70	233.05	26.11
Ta III	females	5	224.36	197.50	240.95	22.76
Cx IV	females	5	268.60	233.05	288.35	22.34
Tr IV	females	5	153.26	130.35	185.65	20.60
bFe IV	females	5	188.02	161.95	201.45	17.58
tFe IV	females	5	185.65	158.00	213.30	24.51
Ge IV	females	5	210.93	173.80	248.85	29.64
Ti IV	females	5	298.76	261.80	323.40	27.98
Ta IV	females	5	255.64	215.60	292.60	31.93
Ti IV/Ta IV	females	5	1.17	1.11	1.21	0.04



Figures 20–26. *Podothrombium arbustiforme* Mąkol sp. nov. (RUS/128, female). (20) aspidosoma; (21) dorsal opisthosomal setae; (22) ventral opisthosomal setae; (23) genital opening; (24) cheliceral claw; (25) palp; (26) leg I (genu – tarsus)

Table 3. Morphometric data of *Kurilothrombium acanthinulum* Mąkol gen. et sp. nov.

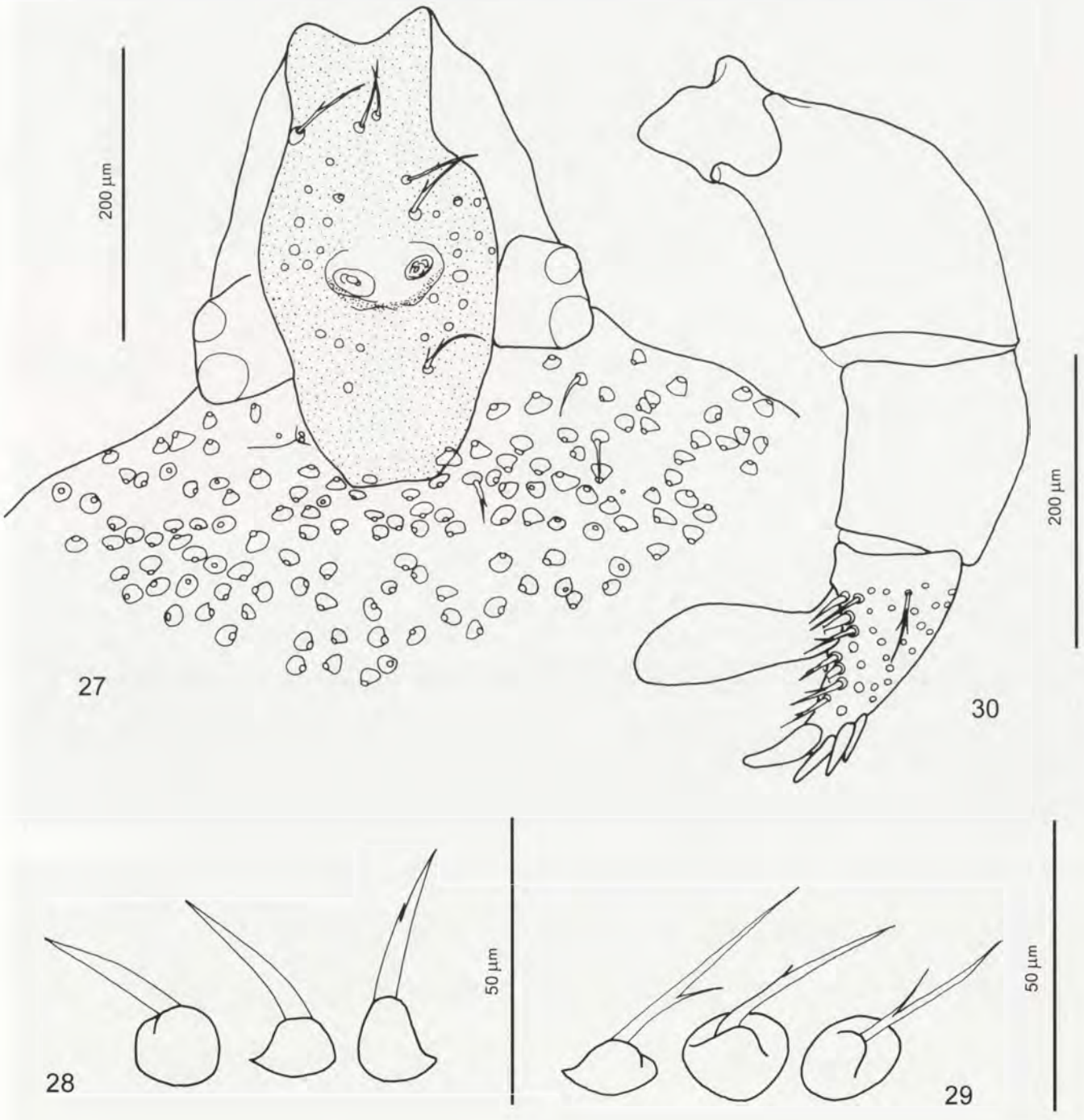
Kurilothrombium acanthinulum Mąkol gen. et sp. nov.						
Character	Sex	Sample size	Mean*	Minimum	Maximum	Standard deviation
L	females	1	1370.60	–	–	–
	males	18	1368.03	1247.40	1524.60	60.97
W	females	1	970.20	–	–	–
	males	21	895.40	800.80	1016.40	60.29
L/W	females	1	1.41	–	–	–
	males	18	1.53	1.36	1.69	0.09
CML	females	1	331.80	–	–	–
	males	21	344.97	296.25	391.05	27.63
SB	females	1	51.35	–	–	–
	males	20	55.10	47.40	71.10	5.80
S	females	0	–	–	–	–
	males	1	211.86	–	–	–
E	females	1	82.95	–	–	–
	males	21	79.00	71.10	90.85	4.67
pDS	females	1	35.64	–	–	–
	males	21	33.09	27.72	39.60	3.20
pVS	females	1	49.50	–	–	–
	males	21	43.18	39.60	47.52	2.91
GOP l	females	1	300.20	–	–	–
	males	19	217.25	189.60	244.90	13.17
GOP w	females	1	237.00	–	–	–
	males	18	177.97	150.10	209.35	16.89
GOP l/w	females	1	1.27	–	–	–
	males	18	1.23	1.00	1.45	0.13
Ch	females	1	98.75	–	–	–
	males	21	80.88	71.10	90.85	4.77
TiCl	females	1	75.05	–	–	–
	males	21	64.70	59.25	71.10	4.23
PaTa	females	1	173.80	–	–	–
	males	21	153.67	142.20	177.75	8.18
Cx I	females	1	276.50	–	–	–
	males	21	270.29	248.85	296.25	14.44
Tr I	females	1	173.80	–	–	–
	males	21	168.16	138.25	201.45	13.72
bFe I	females	1	256.75	–	–	–
	males	21	280.64	248.85	316.00	20.66
tFe I	females	1	237.00	–	–	–
	males	21	293.80	264.65	323.90	14.27
Ge I	females	1	292.30	–	–	–
	males	21	332.36	296.25	379.20	18.37
Ti I	females	1	374.85	–	–	–
	males	21	466.20	418.95	514.50	26.35
Ta I	females	1	426.30	–	–	–
	males	21	496.65	455.70	543.90	26.46
Ti I/Ta I	females	1	0.88	–	–	–
	males	21	0.94	0.87	0.99	0.03
Ta I w	females	1	191.10	–	–	–
	males	21	189.35	161.70	220.50	15.22

Table 3 continued

Ta I l/w	females	1	2.23	–	–	–
	males	21	2.63	2.30	2.96	0.17
Cx II	females	1	316.00	–	–	–
	males	21	286.66	264.65	335.75	17.73
Tr II	females	1	122.45	–	–	–
	males	21	131.29	118.50	154.05	9.42
bFe II	females	1	177.75	–	–	–
	males	21	183.39	150.10	217.25	16.88
tFe II	females	1	158.00	–	–	–
	males	21	175.49	158.00	197.50	11.21
Ge II	females	1	173.80	–	–	–
	males	21	192.42	177.75	221.20	13.17
Ti II	females	1	217.25	–	–	–
	males	21	276.13	244.90	304.15	17.03
Ta II	females	1	260.70	–	–	–
	males	21	316.94	296.25	347.60	14.88
Cx III	females	1	244.90	–	–	–
	males	21	245.09	209.35	304.15	21.72
Tr III	females	1	134.30	–	–	–
	males	21	135.24	118.50	158.00	11.64
bFe III	females	1	146.15	–	–	–
	males	21	171.92	142.20	201.45	17.78
tFe III	females	1	161.95	–	–	–
	males	21	177.56	161.95	201.45	11.88
Ge III	females	1	181.70	–	–	–
	males	21	198.22	177.75	229.10	13.18
Ti III	females	1	264.65	–	–	–
	males	21	321.45	288.35	351.55	17.06
Ta III	females	1	288.35	–	–	–
	males	21	320.51	292.30	371.30	19.00
Cx IV	females	1	296.25	–	–	–
	males	21	292.68	256.75	355.50	22.20
Tr IV	females	1	177.75	–	–	–
	males	21	186.21	165.90	209.35	11.67
bFe IV	females	1	213.30	–	–	–
	males	20	235.22	201.45	284.40	20.92
tFe IV	females	1	268.60	–	–	–
	males	20	289.14	229.10	323.90	21.24
Ge IV	females	1	284.40	–	–	–
	males	20	320.54	296.25	355.50	16.97
Ti IV	females	1	477.40	–	–	–
	males	21	532.40	492.80	585.20	24.63
Ta IV	females	1	354.20	–	–	–
	males	21	387.20	354.20	431.20	22.47
Ti IV/Ta IV	females	1	1.35	–	–	–
	males	21	1.38	1.27	1.52	0.07

* for the samples containing only one specimen, the character value was given

cheliceral claw smooth (Figs 31–32). On inner side of palptibia dorsal and ventral combs, formed by modified setae (Figs 30, 44a–c). In female in dorsal comb, behind palptibial claw – 2–3 spine-like setae, in ventral comb – 6–7 setae (in

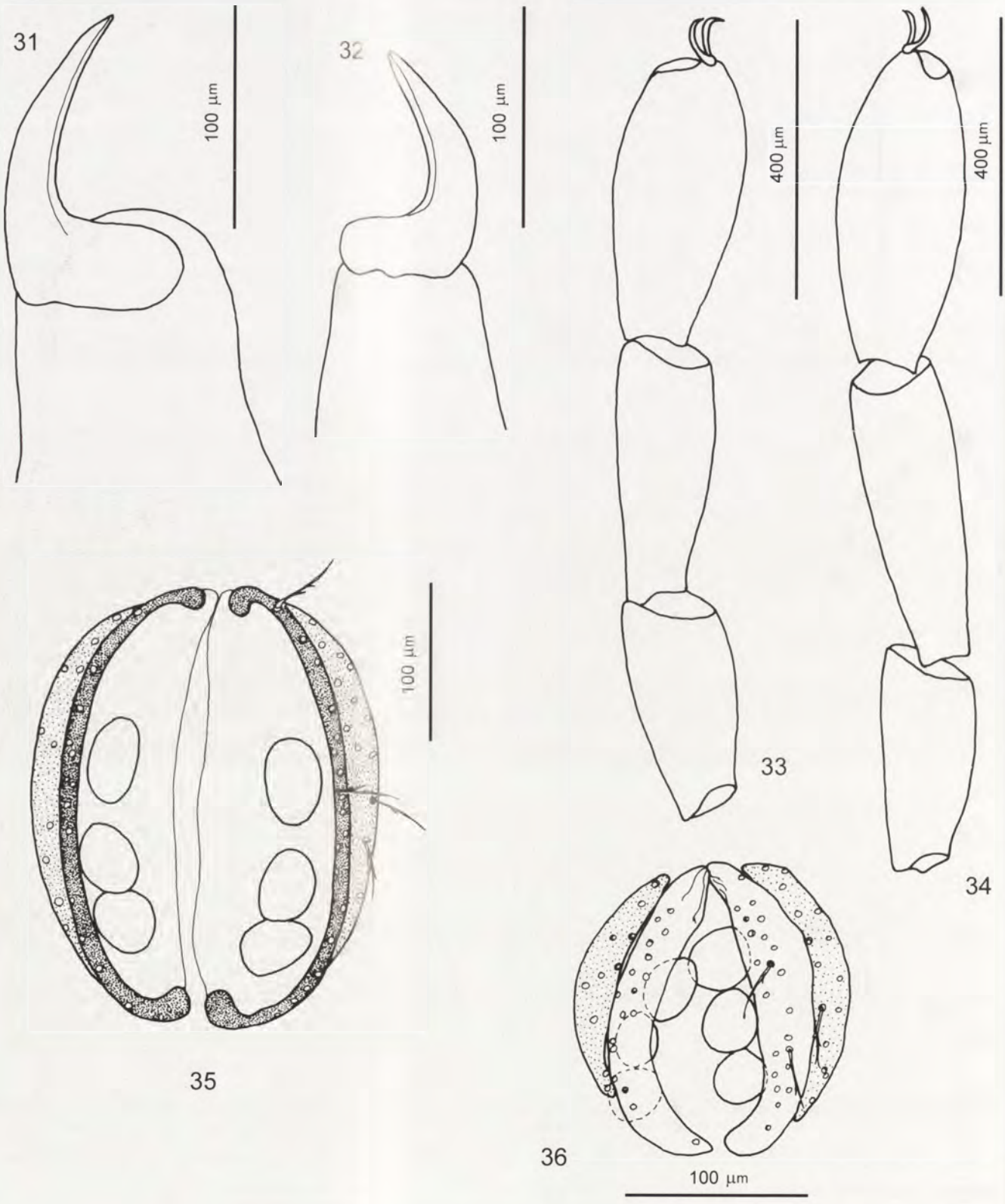


Figures 27–30. *Kurilothrombium acanthinulum* Mąkol gen. et sp. nov. (RUS/323, male). (27) aspidosoma; (28) dorsal opisthosomal setae; (29) ventral opisthosomal setae; (30) palp

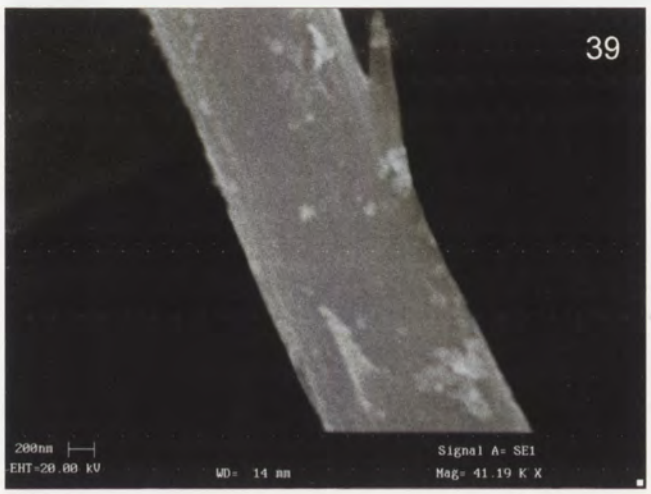
males in each comb 2–5 and 5–9 setae, respectively). The number of spine-like setae in each comb on palptibia is positively correlated with the main linear measurements of the body. Shafts of setae of ventral comb, especially located close to base of PaTi, may form 1–2 branches, located more or less at half length of seta. Numerous specialized setae on PaTa (Fig. 44d). Ti I shorter than Ta I (Figs 33–34). Ti IV longer than Ta IV (ca. 1.2–1.6 ×).

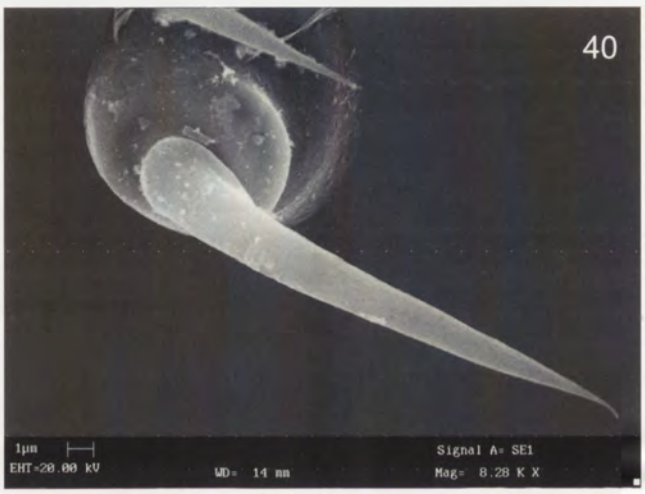
Deutonymph and larva: unknown.

Remarks. At present *Kurilothrombium acanthinulum* Mąkol sp. nov. is the only species placed in the newly described genus. It shows some similarity to *P. shibai*



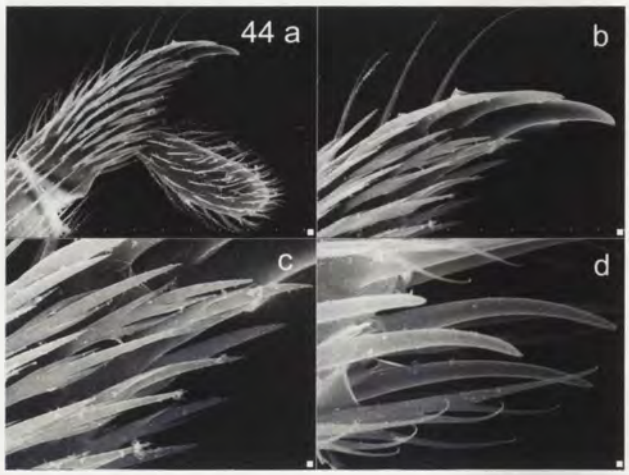
Figures 31–36. *Kurilothrombium acanthinulum* Mąkol gen. et sp. nov. (31) cheliceral claw of female (RUS/327); (32) cheliceral claw of male (RUS/323); (33) leg I (genu – tarsus) of female (RUS/327); (34) leg I (genu – tarsus) of male (RUS/323); (35) female genital opening (RUS/327); (36) male genital opening (RUS/323)





Figures 37–42. *Kurilothrombium acanthinulum* Mąkol gen. et sp. nov. (37) aspidosoma; (38) base of sensillary seta of crista metopica; (39) stem of sensillary seta; (40) dorsal opisthosomal seta without barbs; (41) dorsal opisthosomal seta with barbs; (42) ventral opisthosomal seta

Gabryś, 1988 (see diagnosis), described originally by Shiba (1969) as *Podothrombium montanum*. The similarity, involving first of all the shape of crista metopica, creates the probability of transfer of the latter species to *Kurilothrombium*, after the examination of type specimen. However, both species can be easily differentiated by the length of



Figures 43–44. *Kurilothrombium acanthinulum* Mąkol gen. et sp. nov. (43) genital opening; (44) palp (a. palptibia and palptarsus × 376, b. palptibial claw and modified setae on palptibial dorsum × 885, c. modified setae on palptibial ventrum × 1760, d. specialized setae on palptarsus × 4740)

dorsal setae and the length ratio of tibia I to tarsus I (see diagnosis).

Type material. Holotype: Male RUS/323, collected on Kunashir Island (see locality list: 11a). Paratypes: Female RUS/327, males RUS/329, RUS/331, RUS/333, collected on Kunashir Island (see locality list: 10a). Holotype and one paratype (RUS/327) are deposited at the Museum of Natural History, Wrocław University, Poland, other paratypes (RUS/329, RUS/331) in Zoological Institute, St. Petersburg, Russia, and – RUS/333 – at the Zoological Museum, Novosibirsk, Russia.

Other material studied. See the list of localities (10a, 11a–b, 12a, 13a). 3 specimens (from locality 10a) studied in SEM.

Etymology. The name of the species refers to its spine-like dorsal setae.

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