

Geographical Distribution Patterns of the Apiaceae in Sakhalin and the Kuril Islands

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Abstract Thirty species of the Apiaceae in Sakhalin (S) and the Kuril Islands (K) were examined on 1,592 specimens deposited in the main Japanese herbaria: KYO, SAPS, SAPT, TI and TNS. The geographical distribution of 27 of these 30 species was determined quantitatively. *Ligusticum scoticum* (number of specimens: S+K = 190) and *Tilingia ajanensis* (S+K = 171) represent the two most abundant species of the Apiaceae in these regions. The Sakhalin-Kurils index (S-K index: $S-K/S+K$) of *L. scoticum* showed a somewhat negative numerical value, -0.11 , and that of *T. ajanensis* showed an especially negative value, -0.43 , meaning a clear distribution bias of the latter species toward the Kurils. However, many Apiaceae species are characterized by positive S-K indices, which means generally a distribution bias toward Sakhalin. An extreme high positive S-K index ($+1.00$), which means the presence in Sakhalin but the absence in the Kurils, is found in the following six species: *Angelica edulis* (but only S+K = 1), *A. maximowiczii*, *A. saxatilis*, *A. ursina* (but actually present in Kunashir), *Phlojodicarpus villosus* and *Sphallerocarpus gracilis*. An extreme high negative S-K index (-1.00) is found in only one species, *Conioselinum filicinum*.

Kew words: Apiaceae, geographical distribution, Kurils, Sakhalin, S-K index

Introduction

The distribution patterns of gymnosperms (Takahashi 2004) and Ericaceae (Takahashi 2006) in Sakhalin and the Kuril Islands have been reported previously, and the Sakhalin-Kurils index (S-K index) proved to be a convenient way of showing the quantitative distribution patterns. Following these earlier reports, geographical distribution patterns of the Apiaceae are considered in this study. The plants of Apiaceae grow in a wide variety of habitats: coastal meadows and rocks, wet places along streams and valleys, forests to forest-edges in lowland to mountain regions, and alpine meadows. This family is regarded as one of the important main components of the boreal native flora and vegetation of the regions in question. Determining the extant distribution patterns of the Apiaceae in Sakhalin and the Kurils will contribute to the study on the past changes of flora and vegetation in Northeast Eurasia.

Materials and Methods

Thirty species of the Apiaceae have been recorded from Sakhalin and the Kurils. Specimens collected

from the regions were examined in the main Japanese herbaria: KYO, SAPS, SAPT, TI and TNS (acronyms following Holmgren et al. 1990, except for SAPT, which means the Herbarium of the Botanic Garden, Hokkaido University). As the presence of three species, *Hydrocotyle ramiflora*, *Seseli condensatum* and *Torilis japonica*, was not ascertained from the regions, the distribution patterns of the remaining 27 species were analyzed quantitatively. Specimens examined are listed in the Appendix. Geographical grids or island numbers used in the Appendix are shown in the maps of Sakhalin (Fig. 1) and the Kurils (Fig. 2).

The number of herbarium specimens excluding duplicate sheets are counted for Sakhalin (S) and the Kurils (K), and also counted for three parts of each region (Table 1). The S-K index is formulated as $S-K/S+K$. The numerical value of this index varies between -1.0 and $+1.0$; a higher positive number indicates more abundant distribution in Sakhalin than in the Kurils, and vice versa (Table 2).

Since this study aims mainly to determine quantitatively the geographical distribution patterns of the Apiaceae species in these regions, only representative synonyms and recent literatures are cited in the Results and Discussion.

Results and Discussion

Species distribution patterns APIACEAE

1. *Aegopodium alpestre* Ledeb. Fl. Altaic. **1**: 354 (1829); Pimenov in Charkevich et al., Pl. Vasc. Orient. Extr. Soviet. **2**: 226 (1987); Ohba in Iwatsuki et al., Fl. Jap. **IIc**: 281 (1999); Barkalov and Eremenko, Fl. Nat. Res. Kur. Pres. Little Kur.: 126 (2003); Barkalov and Taran in Storozhenko et al., Fl. Faun. Sakh. Isl. **1**: 50 (2004).

Japanese name: Ezo-bōhū.

[Representative distribution maps]

Sakhalin: Smirnov (2002) p. 11, second from the lower right.

Okhotsk Sea Region: Pimenov (1987) Fig. 76G.

This is a cool-temperate species of perennial herbs with 20–70 cm tall rather slender and mostly glabrous stems, 2 or 3 times ternately pinnate triangular leaves, and without bracts (or rarely few bracts) and bracteoles. The plants grow mostly in mountain forests.

Aegopodium alpestre is distributed in Altai, E. Siberia, China, N. Korea, Japan (central Honshu to Hokkaido), Sakhalin and the Kurils (Ohba 1999). It is found mainly in southern and middle Sakhalin and the southern Kurils: Habomais, Shikotan, Kunashir and Iturup (Table 1). It occurs somewhat abundantly in these regions (S+K = 90), and the S-K index (+0.44) means that the distribution is somewhat biased in favor of Sakhalin (Table 2).

2. *Angelica edulis* Miyabe [in Trans. Asiat. Soc. Jap. **21**: 205 (1893), nom. nud.] ex Y.Yabe in Journ. Coll. Sci. Imp. Univ. Tokyo **16**(2): 77 (1902); Pimenov in Charkevich et al., Pl. Vasc. Orient. Extr. Soviet. **2**: 256 (1987), author name as “Miyabe in Y.Yabe”; Ohba in Iwatsuki et al., Fl. Jap. **IIc**: 298 (1999).

Japanese name: Ama-nyū.

[Representative distribution maps]

Sakhalin: not listed in Smirnov (2002).

Okhotsk Sea Region: Pimenov (1987) Fig. 83B.

This is a cool-temperate species of large perennial herbs with 1–2 m tall glabrous stems, 1 or 2 times ternately pinnate leaves with relatively thin ovate or elliptic ultimate segments with cordate base. The plants grow in forests and forest-edges of mountains.

Angelica edulis is mostly endemic to Japan (central Honshu to Hokkaido) and extends very rarely to the southern part of Sakhalin (Table 1). It has rarely been reported from the southern Kurils (Iturup; Pimenov 1987). However, because this species is somewhat rare in eastern Hokkaido and there are no specimens of the Kurils found in the main Japanese herbaria, the presence in Iturup should be re-examined. Although there have been no records from Sakhalin in Russian literatures (Pimenov 1987, Smirnov 2002), Ohba (1999) recorded its distribution as “Sakhalin (?)”. I could ascertain an old Sakhalin specimen in TI (Toyohara,

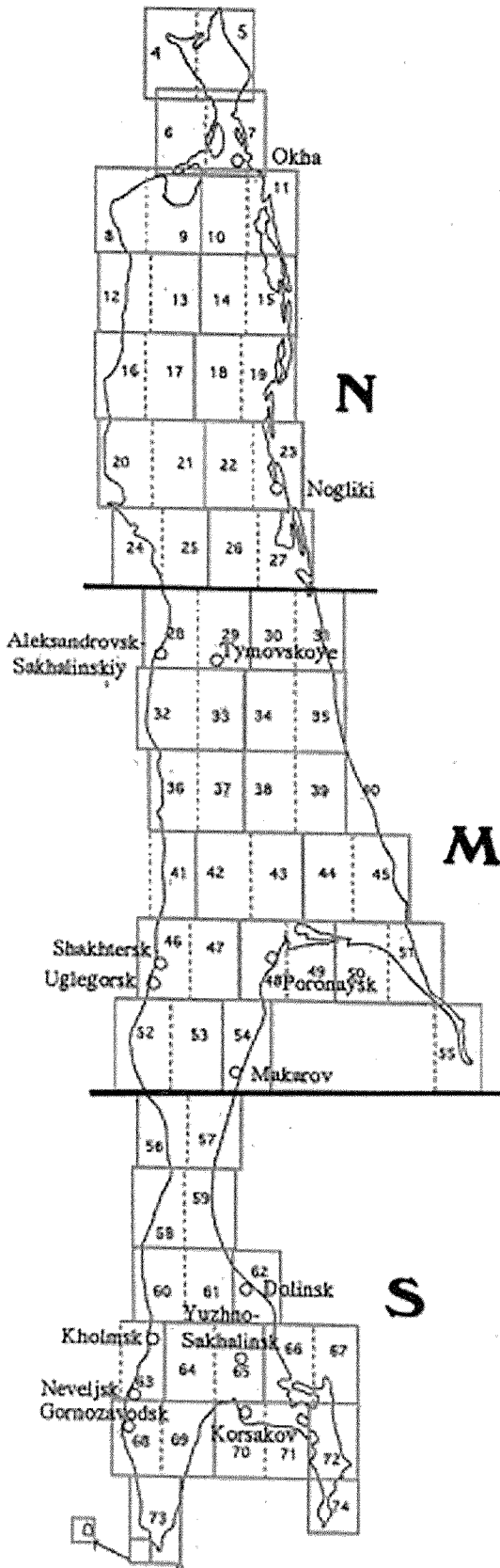


Figure 1.

A map showing the division into the southern (S), middle (M) and northern (N) parts. The grid numbers are equivalent to those in a list of Appendix and the map “Atlas of Sakhalin Region part I Sakhalin (1994)”.

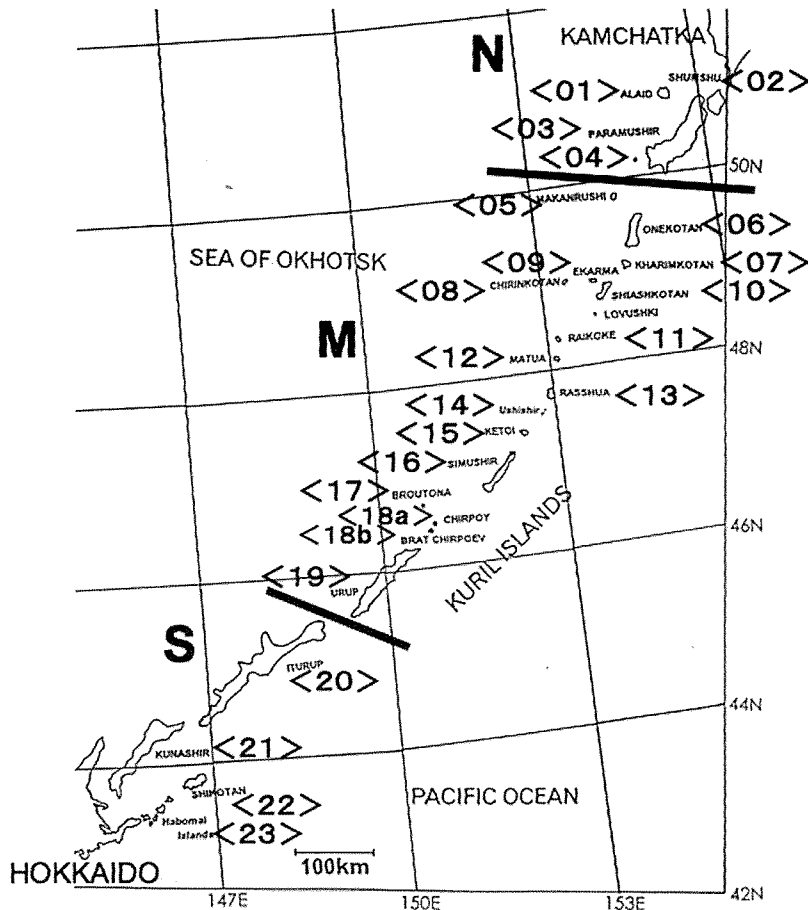


Figure 2.
A map of the Kuril Islands showing the division into the southern (S), middle (M) and northern (N) parts. The island numbers are equivalent to those in a list of Appendix.

collected by Muramatsu in 1923), and it should occur very rarely in southern Sakhalin (only S+K = 1, Table 1).

3. *Angelica genuflexa* Nutt. ex Torr. et A.Gray, Fl. N. Amer. **1**: 620 (1840); Pimenov in Charkevicz et al., Pl. Vasc. Orient. Extr. Soviet. **2**: 252 (1987); Ohba in Iwatsuki et al., Fl. Jap. **IIc**: 297 (1999); Barkalov and Eremenko, Fl. Nat. Res. Kur. Pres. Little Kur.: 127 (2003); Barkalov and Taran in Storozhenko et al., Fl. Faun. Sakh. Isl. **1**: 50 (2004).

Japanese name: Ōba-senkyū, Ezo-ōba-senkyū.

[Representative distribution maps]

Sakhalin: Smirnov (2002) p. 11, the lower right.

Okhotsk Sea Region: Pimenov (1987) Fig. 81V.

N. Hemisphere: Hultén (1968) p. 705, the lower.

This is a cool-temperate species of large perennial herbs with 1–2 m tall hollow and rather soft stems, 1 or 2 times ternately pinnate leaves, and a few linear-filiform bracteoles. The plants grow in wet places along streams and valleys in mountains. This species is similar in appearance to *A. sachalinensis* in the dried and pressed condition; however, *A. genuflexa* grows in wetter places than *A. sachalinensis*, and has thinner leaves and more clear bracteoles than *A. sachalinensis*.

Angelica genuflexa is distributed in the Pacific regions of E. Asia including Japan, Sakhalin, the Kurils and Kamchatka, and extends to northwestern N. America (Hultén 1968, Ohba 1999). It is found in Japan (central

Honshu to Hokkaido), and somewhat abundantly in all parts of both Sakhalin and the Kurils (S+K = 83, Table 1). The S-K index (+0.18) means more or less similar abundance between Sakhalin and the Kurils (Table 2).

4. *Angelica gmelinii* (DC.) Pimenov in Novosti. Syst. Vissh. Rast. (1965): 199 (1965); Pimenov in Charkevicz et al., Pl. Vasc. Orient. Extr. Soviet. **2**: 250 (1987); Barkalov and Eremenko, Fl. Nat. Res. Kur. Pres. Little Kur.: 127 (2003); Barkalov and Taran in Storozhenko et al., Fl. Faun. Sakh. Isl. **1**: 50 (2004).

Coelopleurum gmelinii (DC.) Ledeb., Fl. Ross. **2**: 361 (1844); Ohba in Iwatsuki et al., Fl. Jap. **IIc**: 287 (1999).

Japanese name: Ezo-no-shishiudo, Ezo-no-hamaudo (Miyabe and Miyake 1915).

[Representative distribution maps]

Sakhalin: Smirnov (2002) p. 12, the upper left.

Okhotsk Sea Region: Pimenov (1987) Fig. 81A.

N. Hemisphere: Hultén (1968) p. 705, the upper.

This is a cool-temperate to subarctic species of stout herbs with 1–1.5 m tall stems, 2 times ternately pinnate thick leaves having ovate to rhombic-ovate ultimate segments, and with many widely linear bracteoles. The plants grow usually in coastal meadows.

In most Japanese literatures this species is placed in the genus *Coelopleurum*, as *C. gmelinii*. I follow

Table 1. A comparison of the number of specimens of the Apiaceae between Sakhalin and the Kurils (KYO, SAPS, SAPT, TI and TNS).

Taxa	Locality					Total
	Regions	Southern	Middle	Northern	undet.	
1. <i>Aegopodium alpestre</i>	Sakhalin	43	21	1	–	65
	Kurils	25	–	–	–	25
2. <i>Angelica edulis</i>	Sakhalin	1	–	–	–	1
	Kurils	–	–	–	–	0
3. <i>Angelica genuflexa</i>	Sakhalin	26	20	2	1	49
	Kurils	15	8	11	–	34
4. <i>Angelica gmelinii</i>	Sakhalin	38	17	2	1	58
	Kurils	25	35	20	–	80
5. <i>Angelica maximowiczii</i>	Sakhalin	17	24	2	–	43
	Kurils	–	–	–	–	0
6. <i>Angelica sachalinensis</i>	Sakhalin	22	–	–	–	22
	Kurils	11	–	–	–	11
7. <i>Angelica saxatilis</i>	Sakhalin	2	1	–	–	3
	Kurils	–	–	–	–	0
8. <i>Angelica ursina</i>	Sakhalin	16	4	–	–	20
	Kurils	–	–	–	–	0
9. <i>Anthriscus sylvestris</i>	Sakhalin	36	14	1	–	51
	Kurils	17	5	31	–	53
10. <i>Bupleurum longiradiatum</i>	Sakhalin	53	27	–	3	83
	Kurils	39	–	–	–	39
11. <i>Bupleurum triradiatum</i>	Sakhalin	26	10	3	1	40
	Kurils	13	–	–	–	13
12. <i>Cicuta virosa</i>	Sakhalin	34	24	3	3	64
	Kurils	13	–	–	–	13
13. <i>Conioselinum chinense</i>	Sakhalin	23	24	3	–	50
	Kurils	30	29	1	–	60
14. <i>Conioselinum filicinum</i>	Sakhalin	–	–	–	–	0
	Kurils	10	7	–	–	17
15. <i>Cryptotaenia japonica</i>	Sakhalin	1	–	–	–	1
	Kurils	1	–	–	–	1
16. <i>Glehnia littoralis</i>	Sakhalin	13	4	2	1	20
	Kurils	10	9	1	–	20
17. <i>Heracleum lanatum</i>	Sakhalin	27	14	1	–	42
	Kurils	12	21	12	–	45
18. <i>Hydrocotyle ramiflora</i>	Sakhalin	–	–	–	–	0
	Kurils	–	–	–	–	0
19. <i>Liguticum scoticum</i>	Sakhalin	48	28	7	2	85
	Kurils	45	32	28	–	10
20. <i>Oenanthe javanica</i>	Sakhalin	8	–	–	–	8
	Kurils	9	–	–	–	9
21. <i>Osmorhiza aristata</i>	Sakhalin	18	7	–	–	25
	Kurils	6	–	–	–	6
22. <i>Peucedanum terebinthaceum</i>	Sakhalin	8	20	–	–	28
	Kurils	10	–	1	–	11

Table 1. *Continued.*

Taxa	Locality					Total
	Regions	Southern	Middle	Northern	undet.	
23. <i>Phlojodicarpus villosus</i>	Sakhalin	2	–	3	–	5
	Kurils	–	–	–	–	0
24. <i>Pleurospermum austriacum</i> subsp. <i>uralense</i>	Sakhalin	26	10	–	–	36
	Kurils	16	15	8	–	39
25. <i>Sanicula chinensis</i>	Sakhalin	1	–	–	–	1
	Kurils	7	–	–	–	7
26. <i>Seseli condensatum</i>	Sakhalin	–	–	–	–	0
	Kurils	–	–	–	–	0
27. <i>Sium suave</i>	Sakhalin	18	11	2	–	31
	Kurils	1	–	–	–	1
28. <i>Sphallerocarpus gracilis</i>	Sakhalin	–	1	–	–	1
	Kurils	–	–	–	–	0
29. <i>Tilingia ajanensis</i>	Sakhalin	33	11	5	–	49
	Kurils	51	42	29	–	122
30. <i>Torilis japonica</i>	Sakhalin	–	–	–	–	0
	Kurils	–	–	–	–	0

In Sakhalin, “Southern” is the part from <74> to <56>; “Middle” is from <55> to <28>; and “Northern” is from <27> to <4> in the grid (see Fig. 1). In the Kurils, “Southern” is the region of the Habomais <23>, Shikotan <22>, Kunashir <21> and Iturup <20>; “Middle” is the region from Urup <19> to Makanrushi <05>; and “Northern” is the region of Antsiferova <04>, Paramushir <03>, Shumshu <02> and Atlasova <01> (see Fig. 2).

Pimenov’s treatment (1987), which recognizes the section *Coelopleurum* within the genus *Angelica*. A recent phylogenetic study shows an inclusion of two *Coelopleurum* species in an *Angelica* clade (Feng 2009).

Angelica gmelinii is distributed in the Pacific regions of E. Asia and N. America, and extends disjunctly to eastern N. America (Hultén 1968). This distribution pattern is similar to that of *Conioselinum chinense*. In E. Asia it occurs in Ussuri, Japan (Hokkaido only), Sakhalin, the Kurils and Kamchatka. It occurs widely and abundantly in Sakhalin and the Kurils (S+K = 138). The S-K index (–0.16) means more or less similar abundance between Sakhalin and the Kurils (Table 2). Within the Kurils this species occurs more frequently in the middle part of the Archipelago (Table 1).

5. *Angelica maximowiczii* (F.Schmidt) Benth. ex Maxim. in Bull. Acad. Imp. Sci. Saint-Pétersbourg **19**: 274 (1874); Pimenov in Charkevich et al., Pl. Vasc. Orient. Extr. Soviet. **2**: 261 (1987); Barkalov and Taran in Storozhenko et al., Fl. Faun. Sakh. Isl. **1**: 50 (2004).

Japanese name: Hosoba-senkyū (Miyabe and Miyake 1915).

[Representative distribution maps]

Sakhalin: Smirnov (2002) p. 12, second from the

upper left.

Okhotsk Sea Region: Pimenov (1987) Fig. 85A.

This is a cool-temperate species of perennial herbs with 0.2–1 m tall somewhat slender stems, 2 to 4 times ternately pinnate triangular-ovate leaves having linear to ovate-lanceolate ultimate segments. The plants grow mostly in dry sandy forest-edges.

Angelica maximowiczii is distributed in E. Siberia, NE. China, Korea and Sakhalin (Pimenov 1987). It occurs widely and moderately (S+K = 43) in southern to northern Sakhalin, with relatively high abundance in the middle part (Table 1); however, is absent in Hokkaido and the Kurils, which is indicated by its extreme positive S-K index (+1.00, Table 2).

6. *Angelica sachalinensis* Maxim., Prim. Fl. Amur.: 127 (1859); Pimenov in Charkevich et al., Pl. Vasc. Prient. Extr. Soviet. **2**: 253 (1987); Barkalov and Eremenko, Fl. Nat. Res. Kur. Pres. Little Kur.: 127 (2003); Barkalov and Taran in Storozhenko et al., Fl. Faun. Sakh. Isl. **1**: 50 (2004).

Angelica anomala Avé-Lall. subsp. *sachalinensis* (Maxim.) H. Ohba in Iwatsuki et al., Fl. Jap. **IIc**: 299 (1999).

Japanese name: Ezo-no-yoroigusa (Miyabe and Miyake 1915).

[Representative distribution maps]

Table 2. A comparison of S–K index and S+K of the Apiaceae between Sakhalin and the Kurils (KYO, SAPS, SAPT, TI and TNS). Taxa are listed in order of S-K index.

Taxa (the number in text)	Sakhalin (S)	Kurils (K)	S–K	S+K	S-K index
<i>Angelica edulis</i> (3)	1	0	1	1	+1.00
<i>Sphallerocarpus gracilis</i> (28)	1	0	1	1	+1.00
<i>Angelica saxatilis</i> (7)	3	0	3	3	+1.00
<i>Phlojodicarpus villosus</i> (23)	5	0	5	5	+1.00
<i>Angelica ursina</i> (8)	20	0	20	20	+1.00
<i>Angelica maximowiczii</i> (6)	43	0	43	43	+1.00
<i>Sium suave</i> (27)	31	1	30	32	+0.94
<i>Cicuta virosa</i> (12)	64	13	51	77	+0.66
<i>Osmorhiza aristata</i> (21)	25	6	19	31	+0.61
<i>Bupleurum triradiatum</i> (11)	40	13	27	53	+0.51
<i>Peucedanum terebinthaceum</i> (22)	28	11	17	39	+0.44
<i>Aegopodium alpestre</i> (1)	65	25	40	90	+0.44
<i>Bupleurum longiradiatum</i> (10)	83	39	44	122	+0.36
<i>Angelica sachalinensis</i> (2)	22	11	11	33	+0.33
<i>Angelica genuflexa</i> (4)	49	34	15	83	+0.18
<i>Cryptotaenia japonica</i> (15)	1	1	0	2	0.00
<i>Glehnia littoralis</i> (16)	20	20	0	40	0.00
<i>Anthriscus sylvestris</i> (9)	51	53	–2	104	–0.02
<i>Heracleum lanatum</i> (17)	42	45	–3	87	–0.03
<i>Pleurospermum austriacum</i> subsp. <i>uralense</i> (24)	36	39	–3	75	–0.04
<i>Oenanthe javanica</i> (20)	8	9	–1	17	–0.06
<i>Conioselinum chinense</i> (13)	50	60	–10	110	–0.09
<i>Liguticum scoticum</i> (19)	85	105	–20	190	–0.11
<i>Angelica gmelinii</i> (5)	58	80	–22	138	–0.16
<i>Tilingia ajanensis</i> (29)	49	122	–73	171	–0.43
<i>Sanicula chinensis</i> (25)	1	7	–6	8	–0.75
<i>Conioselinum filicinum</i> (14)	0	17	–17	17	–1.00
<i>Hydrocotyle ramiflora</i> (18)	0	0	0	0	–
<i>Seseli condensatum</i> (26)	0	0	0	0	–
<i>Torilis japonica</i> (30)	0	0	0	0	–
Total	881	711	170	1592	+0.11

Sakhalin: Smirnov (2002) p. 12, second from the lower left.

Okhotsk Sea Region: Pimenov (1987) Fig. 82A.

This is a cool-temperate species of large perennial herbs with 1–2 m tall, hollow, slender and red-tinged stems. The plants have obovate and inflated leaf sheaths in apical part of stem, 2 or 3 times ternately pinnate triangular leaves with rather thick often again 2- or 3-fid or -parted narrowly ovate leaflets, usually without bracts and bracteoles. They grow in meadows to forest-edges of lowlands and mountains.

This taxon and its relatives in the Russian Far East are recognized by Pimenov (1987) as the following three geographically differentiated species: *A. cincta* Boissieu in E. Siberia, NE. China and Korea including northern Sakhalin; *A. dahurica* (Fisch.) Benth. et Hook. f. ex Franch. et Sav. in E. Siberia; and *A. sachalinensis* Maxim. in Sakhalin, the southern Kurils and Hokkaido. According to Pimenov (1987), *A. cincta*, which is

closely related to *A. sachalinensis*, was reported from northern Sakhalin, but this species was not noticed by Smirnov (2002) in Sakhalin. In this study, I included “*A. cincta*” in *A. sachalinensis*, which has been supported by a recent molecular phylogenetic study (Feng et al. 2009). Ohba (1999) regards *A. sachalinensis* as a subspecies of *A. anomala* (i.e., *A. anomala* subsp. *sachalinensis*), but I do not follow this opinion here because of a distant phylogenetic affinity shown in Feng et al. (2009).

Angelica sachalinensis is distributed in E. Siberia, N. and NE. China, Korea, Japan (central Honshu to Hokkaido), Sakhalin and the Kurils. The distribution of this species is confined to the southern part of both Sakhalin and the Kurils, and it occurs moderately in these regions (S+K = 33; Table 1). The S-K index (+0.33) means a distribution bias more or less toward Sakhalin (Tables 1 and 2).

7. *Angelica saxatilis* Turcz. ex Ledeb., Fl. Ross. **2**: 296 (1844); Pimenov in Charkevich et al., Pl. Vasc. Orient. Extr. Soviet. **2**: 250 (1987); Barkalov and Taran in Storozhenko et al., Fl. Faun. Sakh. Isl. **1**: 50 (2004).

Coelopleurum multisectum (Maxim.) Kitag. [in Bot. Mag. Tokyo **51**: 807 (1937)] var. *trichocarpum* (H.Hara) H.Ohba in Iwatsuki et al., Fl. Jap. **IIc**: 288 (1999).

Japanese name: Ezoyama-zengo

[Representative distribution maps]

Sakhalin: Smirnov (2002) p. 12, the lower left.

Okhotsk Sea Region: Pimenov (1987) Fig. 81B.

This is a species of perennial herbs with 20–40 cm tall stems, growing in sunny rocky places of high mountains. This species is closely related to maritime *A. gmelinii* (= *Coelopleurum gmelinii*), but is distinguished from *A. gmelinii* by having smaller ultimate leaf segments and more pubescent fruits.

Angelica saxatilis is distributed in E. Siberia, Hokkaido and Sakhalin. Barkalov and Taran (2004) recorded this species from middle and northern Sakhalin. In the present study three specimens were confirmed only from southern and middle Sakhalin, but no specimens were found in the Kurils (S+K = 3 and S-K index = +1.00, Table 1).

8. *Angelica ursina* (Rupr.) Maxim. in Bull. Acad. Imp. Sci. Saint-Petersbourg **22**: 258 (1876); Pimenov in Charkevich et al., Pl. Vasc. Orient. Extr. Soviet. **2**: 256 (1987); Ohba in Iwatsuki et al., Fl. Jap. **IIc**: 299 (1999); Barkalov and Eremenko, Fl. Nat. Res. Kur. Pres. Little Kur.: 127 (2003); Barkalov and Taran in Storozhenko et al., Fl. Faun. Sakh. Isl. **1**: 50 (2004).

Japanese name: Ezo-nyū.

[Representative distribution maps]

Sakhalin: Smirnov (2002) p. 12, the upper right.

Okhotsk Sea Region: Pimenov (1987) Fig. 83A.

This is a cool-temperate species of gigantic perennial herbs with 1–3 m tall stout and somewhat red-tinged stems, 2 or 3 times ternately pinnate leaves with again pinnatifid to pinnately parted narrowly ovate-oblong leaflets. The plants grow in forest-edges to meadows of low mountains to coastal regions.

Angelica ursina is distributed from E. Siberia, through Japan (northern Honshu to Hokkaido), Sakhalin and the Kurils to Kamchatka. It occurs somewhat rarely in southern and middle Sakhalin, and its distribution is biased in favor of the southern part (S+K = 20, Table 1). It has been reported from the southern Kurils (Kunashir; Pimenov 1987, Barkalov and Eremenko 2003), but at present there are no specimens from the Kurils in the main Japanese herbaria (S-K index = +1.00, Tables 1 and 2). As this species is actually present in Kunashir (my personal observation in 2009), the absence of specimens in Japanese herbaria should be attributed to low enthusiasm for collection by gigantic plant size of this species.

9. *Anthriscus sylvestris* (L.) Hoffm., Gen. Umbell. **1**: 40 (1814); Pimenov in Charkevich et al., Pl. Vasc. Orient. Extr. Soviet. **2**: 273 (1987); Ohba in Iwatsuki et al., Fl. Jap. **IIc**: 278 (1999); Barkalov and Eremenko, Fl. Nat. Res. Kur. Pres. Little Kur.: 127 (2003); Barkalov and Taran in Storozhenko et al., Fl. Faun. Sakh. Isl. **1**: 50 (2004).

Japanese name: Shaku.

[Representative distribution maps]

Sakhalin: Smirnov (2002) p. 12, second from the upper right.

Okhotsk Sea Region: Pimenov (1987) Fig. 88A.

N. Hemisphere: Hultén and Fries (1986) Map 1388.

This is a temperate species of perennial herbs with 0.8–1.5 m tall somewhat slender and branched stems, 2 or 3 times ternately pinnate ovate-triangular leaves having pinnatifid acute or acuminate ultimate segments. The plants grow in moist forests to forest-edges in mountains.

Anthriscus sylvestris is distributed widely in Europe through Siberia to NE. Eurasia: China, Korea, Japan (Kyushu to Hokkaido), Sakhalin and the Kurils to Kamchatka. It occurs widely (S-K index = –0.02, Table 1) and abundantly (S+K = 104; Table 2) in Sakhalin and the Kurils, but with low abundance in the middle Kurils (Table 1).

10. *Bupleurum longiradiatum* Turcz. in Bull. Soc. Imp. Naturalistes Moscou **17**(4): 719 (1844); Pimenov in Charkevich et al., Pl. Vasc. Orient. Extr. Soviet. **2**: 218 (1987); Barkalov and Eremenko, Fl. Nat. Res. Kur. Pres. Little Kur.: 127 (2003); Barkalov and Taran in Storozhenko et al., Fl. Faun. Sakh. Isl. **1**: 50 (2004).

Bupleurum longiradiatum Turcz. var. *breviradiatum* F.Schmidt ex Maxim. in Mem. Pres. Acad. Sci. Petersb. Div. Sav. **9**: 125 (1859); Ohba in Iwatsuki et al., Fl. Jap. **IIc**: 276 (1999).

Bupleurum longiradiatum Turcz. var. *shikotanense* (M. Hiroe) Ohwi in Bull. Nat. Sci. Mus. Tokyo (33): 80 (1953); Ohba in Iwatsuki et al., Fl. Jap. **IIc**: 277 (1999).

Japanese name: Hotaru-saiko (in broad sense).

[Representative distribution maps]

Sakhalin: Smirnov (2002) p. 12, second from the lower right.

Okhotsk Sea Region: Pimenov (1987) Fig. 74A.

This is a temperate species of perennial herbs with 0.2–1 m tall stems, entire and simple leaves, growing in mountains to coastal meadows. Stoutness of plants and length of bracteoles and pedicels are very variable depending on the different habitats.

Bupleurum longiradiatum is native to Amur, China, Korea, Japan (Kyushu to Hokkaido), Sakhalin and the Kurils. Several infraspecific varieties have been recorded within Japan (Ohba 1999), and plants of Shikotan have been regarded as var. *shikotanense* (M. Hiroe) Ohwi in having longer bracteoles than pedicels and lower 20–30cm stems.

It occurs abundantly (S+K = 122) in southern and middle Sakhalin, but only in the southern Kurils;

Shikotan and Kunashir (Table 1; Habomais also in Barkalov and Eremenko 2003 and Gage et al. 2006). The S-K index (+0.36) means that *B. longiradiatum* occurs somewhat more abundantly in Sakhalin than the Kurils (Table 2).

11. *Bupleurum triradiatum* Adams ex Hoffm., Gen. Umbell.: 115 (1814); Pimenov in Charkevicz et al., Pl. Vasc. Orient. Extr. Soviet. **2**: 217 (1987); Ohba in Iwatsuki et al., Fl. Jap. **IIc**: 276 (1999); Barkalov and Taran in Storozhenko et al., Fl. Faun. Sakh. Isl. **1**: 50 (2004).

Japanese name: Reibun-saiko.

[Representative distribution maps]

Sakhalin: Smirnov (2002) p. 12, the lower right.

Okhotsk Sea Region: Pimenov (1987) Fig. 73G.

N. Hemisphere: Hultén (1968) p. 698, the lower.

This is a subalpine to alpine species of low perennial herbs with 5–15 cm tall stems, entire and simple leaves, growing in stony alpine meadows.

Bupleurum triradiatum is native from Siberia through N. Asia including Hokkaido, Sakhalin and the Kurils, and to Alaska (Hultén 1968). It is found in southern to northern Sakhalin, but only in the southern Kurils; Shikotan only (but Kunashir also in Pimenov 1987), although I could not find the specimen of Kunashir in the main Japanese herbaria. Pimenov (1987) noted its distribution as “the northern Kurils (?)”, but because there are no specimens from the northern Kurils in the main Japanese herbaria and no records in Hultén’s map (1968), its presence should be re-examined. The specimens of *B. triradiatum* (S+K = 53) are about half as many as those of *B. longiradiatum* (S+K = 122). Somewhat high positive S-K index (+0.51) indicates that this species occurs more abundantly in Sakhalin than in the Kurils (Table 2).

12. *Cicuta virosa* L., Sp. Pl.: 255 (1753); Pimenov in Charkeviz et al., Pl. Vasc. Orient. Extr. Soviet. **2**: 223 (1987); Ohba in Iwatsuki et al., Fl. Jap. **IIc**: 282 (1999); Barkalov and Eremenko, Fl. Nat. Res. Kur. Pres. Little Kur.: 128 (2003); Barkalov and Taran in Storozhenko et al., Fl. Faun. Sakh. Isl. **1**: 50 (2004).

Japanese name: Doku-zeri; Hosoba-dokuzeri for var. *tenuifolia* (Miyabe and Miyake 1915)

[Representative distribution maps]

Sakhalin: Smirnov (2002) p.13, second from the upper left.

Okhotsk Sea Region: Pimenov (1987) Fig. 76A.

N. Hemisphere: Hultén and Fries (1986) Map 1412.

This is a temperate species of glabrous and toxic perennial herbs with 0.6–1.0 m tall, much branched hollow stems, thick and jointed rhizomes, 2 times pinnate triangular-ovate leaves having linear-lanceolate to widely lanceolate ultimate segments. The width of leaflets shows much variation among the plants. The plants grow in wet places in lowlands.

Cicuta virosa is distributed widely in Europe,

Siberia, China, Korea, Kamchatka, Japan (Kyushu to Hokkaido), Sakhalin and the Kurils. It occurs soemwaht abundantly (S+K = 77) in southern to northern Sakhalin, but only in the southern Kurils; Shikotan, Kunashir and Iturup (Habomais also in Barkalov and Eremenko 2003 and Gage et al. 2006). High positive S-K index (+0.66) means that the distribution is biased in favor of Sakhalin.

13. *Conioselinum chinense* (L.) Britt., Pogg. et Sterns, Prelim. Cat.: 22 (1888); Pimenov in Charkevicz et al., Pl. Vasc. Orient. Extr. Soviet. **2**: 247 (1987); Barkalov and Eremenko, Fl. Nat. Res. Kur. Pres. Little Kur.: 128 (2003); Barkalov and Taran in Storozhenko et al., Fl. Faun. Sakh. Isl. **1**: 50 (2004).

Conioselinum kamtschaticum auct., non Rupr. in Beitr. Pflanzenk. Russ. Reiches **11**: 22 (1859); Ohba in Iwatsuki et al., Fl. Jap. **IIc**: 288 (1999).

Japanese name: Karafuto-ninjin.

[Representative distribution maps]

Sakhalin: Smirnov (2002) p. 13, second from the lower left.

Okhotsk Sea Region: Pimenov (1987) Fig. 80D.

N. Hemisphere: Hultén (1968) p. 704, the lower; Hultén and Fries (1987) Map 1419.

This is a cool-temperate to subarctic species of perennial herbs with 20–80 cm tall stems, short and thick rhizomes, 3 times ternately pinnate triangular thick leaves having pinnatifid narrowly to widely ovate ultimate segments. The plants grow typically in sunny coastal meadows.

The species name “*Conioselinum kamtschaticum*” has been adopted in the most Japanese literatures, but in the present study I follow the Pimenov’s treatment (1987).

Maritime species “*C. kamtschaticum*” is generally distinguished well from next mountain species *C. filicinum* (H. Wolff) H.Hara in Hokkaido. But in eastern Hokkaido (Shiretoko Pen.) and the southern Kurils (Iturup and Urup), the plants morphologically intermediate between “*C. kamtschaticum*” and *C. filicinum* are found sometimes along the streams near the sea. By the presence of these intermediate plants, it is often difficult to distinguish the two species constantly in eastern Hokkaido and the southern Kurils; Iturup and Urup.

Conioselinum chinense is distributed in the Pacific regions of E. Asia and N. America, and also in eastern N. America (Hultén 1968, Hultén and Fries 1987). It is found in Japan (northern Honshu to Hokkaido), and widely and abundantly in most parts of both Sakhalin and the Kurils (S+K = 110, S-K index = –0.09; Tables 1 and 2), especially with high abundance in the southern and middle parts in both the regions.

14. *Conioselinum filicinum* (H. Wolff) H.Hara in J. Jap. Bot. **18**: 28 (1942); Ohba in Iwatsuki et al., Fl. Jap. **IIc**: 289 (1999).

Japanese name: Miyama-senkyū.

[Representative distribution maps]

Absent.

This is a cool-temperate species of perennial herbs with 40–80 cm tall stems, growing in forests to forest-edges in lowlands to subalpine regions. Probably *Conioselinum chinense* sensu Russian authors from the Kuril Islands includes *C. filicinum* recognized in this study. As stated already, it is sometimes difficult to recognize mountain *Conioselinum filicinum* from maritime *C. chinense* in eastern Hokkaido, Iturup and Urup. Hybridization between the two species may occur in these regions. In the present study I listed both the pure *C. filicinum* plants and the intermediate plants between *C. filicinum* and *C. chinense* under this species name (see Appendix).

Conioselinum filicinum is native to Japan (central Honshu to Hokkaido) and the Kurils (Tatewaki 1957, Kitagawa 1982, Ohba 1999), but Russian authors have not reported this species from the Kurils. This species occurs somewhat rarely in the southern and middle Kurils; Kunashir, Iturup and Urup, but not in Sakhalin (S+K = 17 and S-K index = -1.00, Tables 1 and 2).

15. *Cryptotaenia japonica* Hassk. in Retzia **1**: 113 (1855); Pimenov in Charkevich et al., Pl. Vasc. Orient. Extr. Soviet. **2**: 214 (1987); Ohba in Iwatsuki et al., Fl. Jap. **IIc**: 273 (1999); Barkalov and Eremenko, Fl. Nat. Res. Kur. Pres. Little Kur.: 128 (2003); Barkalov and Taran in Storozhenko et al., Fl. Faun. Sakh. Isl. **1**: 50 (2004).

Japanese name: Mitsuba.

[Representative distribution maps]

Sakhalin: Smirnov (2002) p. 13, the upper right.

Okhotsk Sea Region: Pimenov (1987) Fig. 73B.

This is a temperate species of glabrous perennial herbs with 30–60 cm tall stems, cordate-triangular, 3-foliate leaves having widely rhombic-ovate to widely ovate terminal leaflets. The plants grow in forests of hills and mountains. They are sometimes cultivated as a vegetable in Japan.

Cryptotaenia japonica is native to China, Korea, Japan (Ryukyu to Hokkaido), Sakhalin and the Kurils. The presence of this species in Sakhalin has not been noticed in Japanese literatures (Miyabe and Miyake 1915, Sugawara 1940, Ohba, 1999), but recent Russian literatures (Pimenov 1987, Smirnov 2002, Barkalov and Taran 2004) have reported the occurrences in southern Sakhalin and I could find an old Sakhalin specimen in TI (Tohutsu, collected by Hara in 1928). But it will be certainly rare in southern Sakhalin. There is only one specimen from Kunashir in SAPS (Chinomichi, collected by Tatewaki in 1923) within the main Japanese herbaria, so this species occurs very rarely in the southern Kurils (Kunashir only; Tatewaki 1957, Barkalov and Eremenko 2003). Rare occurrences of *C. japonica* in the southern part of both Sakhalin and the Kurils, are shown by few specimens confirmed (S+K = 2; Table 2).

16. *Glehnia littoralis* F.Schmidt ex Miq., Ann. Mus. Bot. Lugd.-Bat. **3**: 61 (1867, I-VII); Pimenov in

Charkevich et al., Pl. Vasc. Orient. Extr. Soviet. **2**: 267 (1987); Ohba in Iwatsuki et al., Fl. Jap. **IIc**: 285 (1999), author names as “F.Schmidt in Miq.”; Barkalov and Eremenko, Fl. Nat. Res. Kur. Pres. Little Kur.: 128 (2003); Barkalov and Taran in Storozhenko et al., Fl. Faun. Sakh. Isl. **1**: 50 (2004).

Japanese name: Hama-bōhū.

[Representative distribution maps]

Sakhalin: Smirnov (2002) p. 13, second from the upper right.

Okhotsk Sea Region: Pimenov (1987) Fig. 86D.

N. Hemisphere: Hultén (1968) p. 706, the upper.

This is a temperate species of perennial herbs with dense white hairs, 5–30 cm tall stems, elongated rhizomes, 1 or 2 times ternately pinnate triangular leaves having rather thick often 3-lobed elliptic to obovate-elliptic leaflets. The plants grow on sandy beaches.

Glehnia littoralis is distributed in China, Taiwan, Korea, Ussuri, Okhotsk (not in Kamchatka), Japan (Ryukyu to Hokkaido), Sakhalin and the Kurils, and it extends to the Pacific coast of N. America (Ohba 1999). It occurs moderately in the southern to northern parts of Sakhalin and the Kurils (S+K = 40, Table 1). The S-K index (0.00) means more or less similar abundance between Sakhalin and the Kurils (Tables 1 and 2).

17. *Heracleum lanatum* Michx., Fl. Bor.-Amer. **1**: 166 (1803); Pimenov in Charkevich et al., Pl. Vasc. Orient. Extr. Soviet. **2**: 269 (1987); Barkalov and Eremenko, Fl. Nat. Res. Kur. Pres. Little Kur.: 129 (2003); Barkalov and Taran in Storozhenko et al., Fl. Faun. Sakh. Isl. **1**: 50 (2004).

Heracleum sphondylium L. subsp. *montanum* (Schleich. ex Gaudin) Briq. in Schinz et R.Keller, Fl. Schweiz ed. 2, **1**: 372 (1905); Ohba in Iwatsuki et al., Fl. Jap. **IIc**: 302 (1999).

Japanese name: Ō-hanaudo, Hana-udo.

[Representative distribution maps]

Sakhalin: Smirnov (2002) p. 13, second from the lower right.

Okhotsk Sea Region: Pimenov (1987) Fig. 87B.

N. Hemisphere: Hultén (1968) p. 707, the upper.

This is a cool-temperate species of perennial herbs with 1–2 m tall hollow usually pubescent stems, relatively thin pinnately 3-foliate leaves having widely ovate-cordate leaflets. The plants grow in grassy meadows of lowlands to mountains.

There are taxonomic problems on the species demarcation in *Heracleum* (Hultén and Fries 1987; Ohba 1999). I follow the opinion of Hultén (1968) and Pimenov (1987).

Heracleum lanatum is distributed from N. America through the northern Pacific regions to Japan and its neighbors. It is native to Honshu and Hokkaido in Japan, and Sakhalin and the Kurils. It occurs widely and somewhat abundantly in the southern to northern parts of both Sakhalin and the Kurils (S+K = 87, Table 1). Within the Kurils it occurs especially more frequently in the middle part of the Archipelago (Table 1).

18. *Hydrocotyle ramiflora* Maxim. in Bull. Acad. Imp. Sci. Saint-Petersbourg **31**: 46 (1887); Pimenov in Charkevicz et al., Pl. Vasc. Orient. Extr. Soviet. **2**: 207 (1987); Ohba in Iwatsuki et al., Fl. Jap. **IIc**: 269 (1999); Barkalov and Eremenko, Fl. Nat. Res. Kur. Pres. Little Kur.: 129 (2003).

Japanese name: Ō-chidome

[Representative distribution maps]

Sakhalin: absent in Smirnov (2002).

Okhotsk Sea Region: Pimenov (1987) Fig. 72A.

This is a temperate species of perennial herbs which have long creeping slender stems with up to 15 cm long ascending branches and orbicular-cordate simple leaves. The plants grow in sunny and moist places in lowlands and hills.

Hydrocotyle ramiflora is native to Korea and Japan (Kyushu to Hokkaido) (Ohba, 1999). The presence of this species in the southern Kurils; Kunashir and Iturup has been reported in the Russian literatures (Pimenov 1987; Barkalov and Eremenko 2003). But it has not been reported from the Kurils in the previous Japanese literatures (Tatewaki 1957, Hiroe 1958, Ohba 1999) and no specimens could be found from the Kurils in the main Japanese herbaria (Table 1). Possibly this species has been naturalized in the southern Kurils by human activities after the World War II. There is no record from Sakhalin.

19. *Ligusticum scoticum* L., Sp. Pl.: 250 (1753); Pimenov in Charkevicz et al., Pl. Vasc. Orient. Extr. Soviet. **2**: 239 (1987); Barkalov and Eremenko, Fl. Nat. Res. Kur. Pres. Little Kur.: 129 (2003); Barkalov and Taran in Storozhenko et al., Fl. Faun. Sakh. Isl. **1**: 50 (2004).

Ligusticum hultenii Fernald in Rhodora **32**: 7 (1930); Ohba in Iwatsuki et al., Fl. Jap. **IIc**: 287 (1999).

Japanese name: Maruba-tōki.

[Representative distribution maps]

Sakhalin: Smirnov (2002) p. 14, second from the upper left.

Okhotsk Sea Region: Pimenov (1987) Fig. 79B.

N. Hemisphere: Hultén (1968) the lower; Hultén and Fries (1986) Map 1417.

This is a cool-temperate species of perennial herbs with 0.3–1 m tall red tinged glabrous stems, relatively thick 2 times ternately pinnate widely triangular-orbicular leaves having widely rhombic-ovate ultimate segments. The plants grow in meadows or rocky places near seashores.

Ligusticum scoticum is a circumpolar maritime species discontinuously found in N. Hemisphere, and the plants of the Pacific regions are sometimes treated as a separate species *L. hultenii* or a separate subspecies *L. scoticum* subsp. *hultenii*. In the present study, I recognize the single circumpolar species; *L. scoticum* (cf. Kitamura and Murata 1961, p. 21).

It is found in Japan (northern Honshu to Hokkaido), and occurs very abundantly in all parts of both Sakhalin and the Kurils (S+K = 190, S-K index = -0.11; Tables 1 and 2).

20. *Oenanthe javanica* (Blume) DC., Prodr. **4**: 138 (1830); Pimenov in Charkevicz et al., Pl. Vasc. Orient. Extr. Soviet. **2**: 231 (1987); Ohba in Iwatsuki et al., Fl. Jap. **IIc**: 280 (1999); Barkalov and Eremenko, Fl. Nat. Res. Kur. Pres. Little Kur.: 129 (2003); Barkalov and Taran in Storozhenko et al., Fl. Faun. Sakh. Isl. **1**: 50 (2004).

Japanese name: Seri.

[Representative distribution maps]

Sakhalin: Smirnov (2002) p. 14, second from the lower left.

Okhotsk Sea Region: Pimenov (1987) Fig. 78B.

This is a temperate species of glabrous perennial herbs with 20–40 cm tall stems and long stolons, 1 or 2 times pinnate triangular leaves having ovate or narrowly ovate ultimate segments. The plants grow in wet places in lowlands. They are sometimes cultivated as a vegetable in Japan.

Oenanthe javanica is distributed in Australia, Himalaya, India, Malaysia, China, Taiwan, Japan (Ryukyu to Hokkaido), Sakhalin and the Kurils. It occurs somewhat rarely (S+K = 17; Table 2) in southern Sakhalin and the southern Kurils; Kunashir and Iturup (Table 1 and Appendix; Shikotan also in Pimenov 1987 and Barkalov and Eremenko 2003).

21. *Osmorhiza aristata* (Thunb.) Rydb., Bot. Surv. Nebraska **3**: 37 (1894); Ohba in Iwatsuki et al., Fl. Jap. **IIc**: 275 (1999); Barkalov and Taran in Storozhenko et al., Fl. Faun. Sakh. Isl. **1**: 50 (2004), author names as “(Thunb.) Makino et Y.Yabe”.

Uraspermum aristatum (Thunb.) Kuntze, Revis. Gen. Pl. **1**: 270 (1891); Pimenov in Charkevicz et al., Pl. Vasc. Orient. Extr. Soviet. **2**: 272 (1987); Barkalov and Eremenko, Fl. Nat. Res. Kur. Pres. Little Kur.: 131 (2003).

Osmorhiza aristata (Thunb.) Rydb. var. *montana* Makino in J. Jap. Bot. **2**: 7 (1918); Ohba in Iwatsuki et al., Fl. Jap. **IIc**: 275 (1999).

Japanese name: Yabu-ninjin; Onaga-yabu-ninjin (Miyabe and Miyake 1915), Miyama-yabu-ninjin.

[Representative distribution maps]

Sakhalin: Smirnov (2002) p. 14, the lowest left.

Okhotsk Sea Region: Pimenov (1987) Fig. 87E.

This is a temperate species of pubescent perennial herbs with 40–60 cm tall stems, 2 or 3 times ternately pinnate triangular and acute leaves having triangular-ovate ultimate segments. The plants grow in woods in hills and mountains.

Osmorhiza aristata is distributed in E. Siberia, Korea, Japan (Kyushu to Hokkaido), Sakhalin and the Kurils. It occurs moderately in the southern to middle parts of Sakhalin and in the southern Kurils; Kunashir and Iturup (S+K = 31, Table 1 and Appendix). The S-K index (+0.61) indicates that this species occurs more abundantly in Sakhalin than in the Kurils (Table 2).

22. *Peucedanum terebinthaceum* (Fisch. ex Spreng.) Fisch. ex Turcz., Cat. Pl. Baic.: 93 (1838); Ohba in Iwatsuki et al., Fl. Jap. **IIc**: 301 (1999), authors as "(Fisch.) Fisch. ex Turcz."

Kitagawia terebinthacea (Fisch. ex Spreng.) Pimenov in Bot. Zhurn. (St. Petersburg) **71**(7): 944 (1986); Pimenov in Charkevicz et al., Pl. Vasc. Orient. Extr. Soviet. **2**: 263 (1987); Barkalov and Eremenko, Fl. Nat. Res. Kur. Pres. Little Kur.: 129 (2003); Barkalov and Taran in Storozhenko et al., Fl. Faun. Sakh. Isl. **1**: 50 (2004).

Japanese name: Kawara-bōhū.

[Representative distribution maps]

Sakhalin: Smirnov (2002) p. 14, the upper left (as *Kitagawia terebinthacea*).

Okhotsk Sea Region: Pimenov (1987) Fig. 86A (as *Kitagawia terebinthacea*).

This is a temperate species of perennial herbs with 30–80 cm tall stems, ternately pinnate widely ovate leaves having somewhat pinnately cleft and again incised, widely ovate to triangular leaflets. The plants grow in dry places in mountains.

Recent Russian authors adopt the genus name *Kitagawia*, but in the present study I use the traditional genus name *Peucedanum*.

Peucedanum terebintheceum is distributed in E. Siberia, NE. China, Korea, Japan (Kyushu to Hokkaido), Sakhalin and the Kurils. It occurs moderately in south to middle Sakhalin and in the southern and northern Kurils (S+K = 39, Table 1). The specimen from the northern Kurils in TNS (Paramushir, collected by Koidzumi in 1924) is far distant from the main southern distribution region in the Kurils (see Appendix). Somewhat positive S-K index (+0.44) means that the distribution is relatively biased in favor of Sakhalin (Table 2).

23. *Phlojodicarpus villosus* (Turcz. ex Fisch. et C.A.Mey.) Ledeb., Fl. Ross. **2**: 331 (1844); Pimenov in Charkevicz et al., Pl. Vasc. Orient. Extr. Soviet. **2**: 235 (1987); Barkalov and Taran in Storozhenko et al., Fl. Faun. Sakh. Isl. **1**: 50 (2004).

Japanese name: Takasu-zeri as *Johrenia villosa* (Kudo 1924), Hosobano-ibukibōhū as *Seseli libanotis* var. *angustissima* (Sugawara 1937).

[Representative distribution maps]

Sakhalin: Smirnov (2002) p. 14, the upper right.

Okhotsk Sea Region: Pimenov (1987) Fig. 78V.

N. Hemisphere: Hultén (1968) p. 704, the upper.

This is an arctic or alpine species of perennial and glaucous herbs with up to 40 cm tall stems, 2 or 3 times pinnate glabrous leaves, growing on stony tundra.

Phlojodicarpus villosus is distributed in Siberia, Mongol to the Russian Far East (Hultén 1968). It has been recorded in the northern part of Sakhalin (Sugawara 1940, Pimenov 1987, Smirnov 2002, Barkalov and Taran 2004). Additionally the specimens from southern Sakhalin could be confirmed in KYO and SAPT (collected by Sugawara in 1932, see Appendix). It occurs rarely in Sakhalin (S+K = 5) and does not occur

in the Kurils and Japan (S-K index = +1.00).

24. *Pleurospermum austriacum* (L.) Hoffm. subsp. **uralense** (Hoffm.) Sommier, Fl. Ob Inf.: 73 (1893); Ohba in Iwatsuki et al., Fl. Jap. **IIc**: 284 (1999).

Pleurospermum uralense Hoffm., Gen. Umbell.: 9 (1814); Pimenov in Charkevicz et al., Pl. Vasc. Orient. Extr. Soviet. **2**: 212 (1987); Barkalov and Eremenko, Fl. Nat. Res. Kur. Pres. Little Kur.: 130 (2003); Barkalov and Taran in Storozhenko et al., Fl. Faun. Sakh. Isl. **1**: 50 (2004).

Japanese name: Ō-kasamochi.

[Representative distribution maps]

Sakhalin: Smirnov (2002) p. 14, second from the upper right (as *P. uralense*).

Okhotsk Sea Region: Pimenov (1987) Fig. 73A (as *P. uralense*).

N. Hemisphere: Hultén and Fires (1986) Map 1407, as *P. austriacum*.

This is a cool-temperate to subarctic species of stout perennial herbs with up to 1.5 m tall stems, 2 times ternately pinnate widely ovate-triangular leaves having narrowly ovate ultimate segments. The plants grow in sunny places in hills and mountains.

Pleurospermum austriacum is distributed widely in Eurasia; continuously from Europe to Asia (Tatewaki 1957, Ohba 1999). Eastern Russian and Asiatic plants are regarded as another subspecies *uralense*. Although most recent Russian authors have used *P. uralense* as a distinct species from *P. austriacum*, I adopt the subspecific rank in the present study because of the lack of distinct geographic independence of east Eurasian population in this species.

Pleurospermum austriacum subsp. *uralense* is distributed in Siberia, Ussuri, NE. China, Korea, Japan (central Honshu to Hokkaido), Sakhalin and the Kurils, and it extends to Kamchatka (Ohba 1999). It occurs somewhat abundantly in southern and middle Sakhalin, and in the southern to northern Kurils (S+K = 75, Tables 1 and 2). The S-K index (–0.04) indicates more or less similar abundance between Sakhalin and the Kurils.

25. *Sanicula chinensis* Bunge, Enum. Pl. China Bor.: 106 (1833); Pimenov in Charkevicz et al., Pl. Vasc. Orient. Extr. Soviet. **2**: 210 (1987); Ohba in Iwatsuki et al., Fl. Jap. **IIc**: 272 (1999); Barkalov and Eremenko, Fl. Nat. Res. Kur. Pres. Little Kur.: 130 (2003).

Japanese name: Umano-mitsuba.

[Representative distribution maps]

Sakhalin: not listed in Smirnov (2002).

Okhotsk Sea Region: Pimenov (1987) Fig. 72B.

N. Hemisphere: Hultén and Fries (1986) Map 1383.

This is a temperate species of perennial herbs with 30–60 cm tall stems, 5-angled reniform-cordate trisected leaves having rhombic-obovate lobes or segments. The plants grow in woods of low mountains.

This species is regarded as an east Asiatic species composing the *S. europaea* L. complex which has a

circumpolar distribution (Hultén and Fries 1986).

Sanicula chinensis is distributed in China, Korea, Japan (Kyushu to Hokkaido), Sakhalin and the Kurils. It occurs rarely in southern Sakhalin and the southern Kurils; Kunashir only (S+K = 8, Table 1 and Appendix). Hiroe (1958) cited the specimen of this species from southern Sakhalin in KYO (Soriofka [Solove'vka], collected by Faurie 376 in 1908) and that specimen was verified in this study. On the other hand, recent Russian literatures (Pimenov 1987, Smirnov, 2002, Barkalov and Taran 2004) have not supported the presence in Sakhalin. Miyabe and Miyake (1915) noticed the only presence from Sakaehama [Starodubskoye] of southern Sakhalin, but no Sakhalin specimens could be found in SAPS. Thus I expect that *Sanicula chinensis* occurs very rarely in southern Sakhalin. But it occurs somewhat moderately in Kunashir (K= 7; Table 1).

26. *Seseli condensatum* (L.) Rchb.f., Icon. Fl. Germ. **21**: 37 (1867); Pimenov in Charkevich et al., Pl. Vasc. Orient. Extr. Soviet. **2**: 232 (1987); Barkalov and Taran in Storozhenko et al., Fl. Faun. Sakh. Isl. **1**: 50 (2004).

Japanese name: absent.

[Representative distribution maps]

Sakhalin: Smirnov (2002) p. 14, second from the lower right.

Okhotsk Sea Region: Pimenov (1987) Fig. 77V.

This is a continental boreal species of perennial herbs with 30–80cm tall stems, 2 times pinnate leaves, growing in wet meadows to forests.

Seseli condensatum is distributed in Europe, Siberia, Mongol to the Russian Far East. It has been recorded from the northern part of Sakhalin (Schmidt peninsula; Pimenov 1987, Smirnov 2002, Barkalov and Taran 2004), but not from the Kurils and Japan. The Sakhalin specimens of this species could not be found in the main Japanese herbaria (Table 1), mainly owing to the scarcity of field research in the northern Sakhalin by Japanese botanists.

27. *Sium suave* Walter, Fl. Carol.: 115 (1788); Pimenov in Charkevich et al., Pl. Vasc. Orient. Extr. Soviet. **2**: 230 (1987); Ohba in Iwatsuki et al., Fl. Jap. **IIc**: 283 (1999); Barkalov and Taran in Storozhenko et al., Fl. Faun. Sakh. Isl. **1**: 50 (2004).

Sium suave Walter var. *nipponicum* (Maxim.) H.Hara in J. Fac. Sci. Univ. Tokyo sect. 3, Bot. **6**: 95 (1952), in adnot.; Ohba in Iwatsuki et al., Fl. Jap. **IIc**: 283 (1999).

Sium suave Walter var. *ovatum* (Y.Yatabe) H.Hara in J. Fac. Sci. Univ. Tokyo sect. 3, Bot. **6**: 95 (1952), in adnot.; Ohba in Iwatsuki et al., Fl. Jap. **IIc**: 283 (1999).

Japanese name: Numa-zeri (as the species rank), Hosoba-numazeri.

[Representative distribution maps]

Sakhalin: Smirnov (2002) p. 14, the lower right.

Okhotsk Sea Region: Pimenov (1987) Fig. 78A.

N. Hemisphere: Hultén (1968) the lower.

This is a temperate species of perennial herbs with 60–100 cm tall stems and short creeping rhizomes,

pinnate leaves having 7–9 sessile narrowly ovate leaflets. The plants grow in wet places in lowlands. There are some infraspecific names based on different width of leaflets, but I recognize the single species without any recognition of infraspecific taxa.

Sium suave is distributed in Siberia, Japan (Kyushu to Hokkaido), Sakhalin, the Kurils, Kamchatka, and North America (Hultén 1968). It occurs moderately in southern to northern Sakhalin, but very rarely in the southern Kurils (S+K = 32, S-K index = +0.94). Although it has not been reported in the Kurils (Tatewaki 1957; Pimenov 1987), the only specimen from the Kurils was verified in TNS (Kunashir, collected by Koidzumi, H. 21817 in 1929). This species occurs very rarely in the southern Kurils.

28. *Sphallerocarpus gracilis* (Bess. ex Trev.) K.-Pol. in Bull. Soc. Nat. Moscou, n.s. **29**: 202 (1916); Pimenov in Charkevich et al., Pl. Vasc. Orient. Extr. Soviet. **2**: 274 (1987); Barkalov and Eremenko, Fl. Nat. Res. Kur. Pres. Little Kur.: 130 (2003); Barkalov and Taran in Storozhenko et al., Fl. Faun. Sakh. Isl. **1**: 50 (2004).

Japanese name: Zūe-sō.

[Representative distribution maps]

Sakhalin: Smirnov (2002) p. 15, the upper left.

Okhotsk Sea Region: Pimenov (1987) Fig. 88B.

This is a cool-temperate to subarctic continental species of glabrous perennial herbs with 1.0–1.5 m tall stems, growing on meadows. It is similar to *Anthriscus sylvestris* in general appearance, but the ellipsoid-oblong fruits of this species is clearly different from lanceolate ones of *A. sylvestris*.

Sphallerocarpus gracilis is found sporadically in E. Siberia, Mongol, China, Korea, Sakhalin, the Kurils, Kamchatka to the Chukotskiy Peninsula (Pimenov 1987). It does not occur in Japan. It has been recorded rarely from Sakhalin and the southern Kurils (Pimenov 1987, Barkalov and Eremenko 2003, Barkalov and Taran 2004). In the main Japanese herbaria only one Sakhalin specimen was found in SAPT (Handa, collected by Sugawara in 1931), but no specimens of the Kurils were found in Japanese herbaria (S+K = 1, Table 1). This species should occur very rarely in Sakhalin and the southern Kurils.

29. *Tilingia ajanensis* Regel in Regel and Tiling, Fl. Ajan.: 97 (1858); Pimenov in Charkevich et al., Pl. Vasc. Orient. Extr. Soviet. **2**: 241 (1987); Ohba in Iwatsuki et al., Fl. Jap. **IIc**: 286 (1999); Barkalov and Eremenko, Fl. Nat. Res. Kur. Pres. Little Kur.: 130 (2003); Barkalov and Taran in Storozhenko et al., Fl. Faun. Sakh. Isl. **1**: 50 (2004).

Japanese name: Shirane-ninjin, Chishima-ninjin.

[Representative distribution maps]

Sakhalin: Smirnov (2002) p. 15, second from the upper left.

Okhotsk Sea Region: Pimenov (1987) Fig. 79G.

N. Hemisphere: Hultén (1968) the lower (as *Cnidium ajanense*).

This is a cool-temperate to arctic species of small perennial herbs with 7–20 (rarely –35) cm tall stems, 2–4 times ternately pinnate leaves having widely ovate to narrowly oblong ultimate segments, with few but distinct linear bracteoles. The plants grow in subalpine and alpine rocky meadows.

Tilingia ajanensis is distributed in E. Siberia, Okhotsk, Kamchatka, the Chukotskiy Peninsula, Japan (central Honshu to Hokkaido), Sakhalin and the Kurils, and very rarely in Alaska (Hultén 1968). It occurs widely and very abundantly ($S+K = 171$) in the southern to northern parts of both Sakhalin and the Kurils, and the high negative S-K index (–0.43) means that *T. ajanensis* occurs more abundantly in the Kurils than in Sakhalin (Table 2).

30. *Torilis japonica* (Houtt.) DC., Prodr. 4: 219 (1830); Pimenov in Charkevich et al., Pl. Vasc. Orient. Extr. Soviet. 2: 276 (1987); Ohba in Iwatsuki et al., Fl. Jap. IIc: 274 (1999); Barkalov and Eremenko, Fl. Nat. Res. Kur. Pres. Little Kur.: 131 (2003).

Japanese name: Yabu-jirami.

[Representative distribution maps]

Sakhalin: not listed in Smirnov (2002).

Okhotsk Sea Region: Pimenov (1987) Fig. 88D.

N. Hemisphere: Hultén and Fries (1986) Map 1433.

This is a temperate species of short appressed setose biennials with 30–70 cm tall stems, 2 times ternately pinnate ovate-triangular acute leaves having narrowly ovate, pinnatifid ultimate segments. The plants grow in forest-edges and roadsides in lowlands.

Torilis japonica is distributed widely from Europe, through Asia to Japan (from Kyushu to Hokkaido) and its neighbors. It has not been reported from Sakhalin (Miyabe and Miyake 1915, Sugawara 1940, Hiroe 1958, Pimenov 1987, Smirnov 2002, Barkalov and Taran 2004). Tatewaki (1957) reported its presence from Kunashir, but that specimen could not be found in SAPS in the present study. Pimenov (1987) also noticed its presence in the southern Kurils (Kunashir?: not clear in Fig. 88D), and Barkalov and Eremenko (2003) reported it as comparatively often from Shikotan and Kunashir.

Comments on escaped or naturalized species

Carum carvi L. is a temperate species of annual or biennial glabrous herbs with 0.3–1.0 m tall stems, native to Europe and Asia. This species has been widely cultivated and has escaped; it now has a discontinuous circumpolar distribution (Hultén and Fries 1986). In southern and middle Sakhalin and the Kurils, this species has been rarely reported as escaped plants (Pimenov 1987, Barkalov and Taran 2004). One specimen of the northern Kurils (Shumshu, probably a remained plant of cultivated origin) was found in SAPS.

Conium maculatum L. is an annual or biennial toxic herb with 1–2 m tall stems, native to the Mediterranean region and W. Asia, but it has been introduced as a medicinal herb in several regions.

It is now a widespread species found sporadically throughout the world. It was recorded from middle Sakhalin (Smirnov 2002, Barkalov and Taran 2004), but there had been no records before from Sakhalin and the Kurils (Pimenov 1987). It may be a somewhat newly introduced or escaped plant in middle Sakhalin.

Daucus carota L. is a European plant cultivated and escaped all over the world. It is a common naturalized plant often found along roadsides in Japan, including Hokkaido, but it has not been reported distinctly from Sakhalin and the Kurils as a naturalized plant until now. One herbarium specimen of *D. carota* cultivated in Sakhalin is preserved in SAPT (collected by Sugawara, no date), and Smirnov (2002) listed this species as a cultivated plant in Sakhalin. This species may become an escaped plant in Sakhalin in the near future.

Foeniculum vulgare Mill. is a glabrous and glaucous perennial herb with 1–2 m tall stems, native to the Mediterranean region, and the plants are cultivated and escaped in other regions of the world. The specimen from Sakhalin (Miyabe & Miyagi at Kusunnai [Il'inskiy] in 1906) is preserved in SAPS. Although this species was not listed as a cultivated or escaped plant in Sakhalin (Smirnov 2002), it could be one of the escaped plants found rarely in Sakhalin.

Heracleum sosnowskyi Manden. is a naturalized plant which has been recorded from southern Sakhalin (Pimenov 1987, Smirnov 2002, Barkalov and Taran 2004). Unfortunately no specimens are deposited in the main Japanese herbaria, so this species may have been introduced recently to Sakhalin.

Comments on some dubious species

Bupleurum falcatum L. var. *scorzonerifolium* (Willd.) Ledeb. was listed by Hiroe (1958) from Ohdomari in southern Sakhalin (Nakamura, TNS), and Kitagawa (1982) recognized the occurrence of *B. scorzonerifolium* Willd. in Sakhalin. I was unable to find this specimen in TNS.

Ligusticum filisectum (Nakai & Kitag.) M. Hiroe was listed by Hiroe (1958), citing the specimens from Mt. Totsuso, Motodomari of Sakhalin (Honda in TI and Kimura in TI), but the presence of this species in Sakhalin has never been supported by recent Russian literatures (Pimenov 1987; Smirnov 2002). I was unable to find these specimens in TI.

Peucedanum multivittatum Maxim. was listed by Hiroe (1958), citing one specimen (Endo, TNS) from Shumshu of the northern Kurils, but I ascertained that this is a misidentification of *Ligusticum scoticum*. Thus *P. multivittatum* is not native to the Kurils.

Seseli libanotis (L.) K.Koch subsp. *japonicum* (H.Boissieu) H.Hara was recorded from the southern Kurils (Ohba 1999). The presence of this species in the southern Kurils (Shikotan and Kunashir) was noticed in Tatewaki (1957), but it is attributed to a misidentification of *Peucedanum therebinthaceum*. *Seseli libanotis* is distributed in southwestern Hokkaido, so its occurrence would be unexpected in the southern Kurils.

Distribution patterns between Sakhalin and the Kurils

A wide range of the S-K indices (–1.00 to +1.00) in the Apiaceae is the same as that in the Ericaceae (Takahashi 2006). The extreme high positive S-K index (+1.00), which means the presence in Sakhalin but the absence in the Kurils, is found in six species in the Apiaceae (vs. six species in the Ericaceae). However, the extreme high negative S-K index (–1.00) is found in only one species, *Conioselinum filicinum*, in the Apicaceae (vs. seven species in the Ericaceae). This clear contrast between the Apiaceae and the Ericaceae indicates that the Ericaceae are a main dominant family in the Kuril Archipelago.

Ligusticum scoticum (S+K = 190) and *Tilingia ajanensis* (S+K = 171) represent the two most abundant species of the Apiaceae in these regions. These two species are characterized by somewhat wide species distribution ranges: the former is circumpolar and the latter ranges from E. Siberia to Alaska. The S-K indices of these two dominant species showed negative numerical values, –0.11 and –0.43, which means that the distribution is biased in favor of the Kurils, especially in *T. ajanensis*.

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Appendix

A list of the herbarium specimens of the Apiaceae collected in Sakhalin and the Kurils. All specimens examined were deposited in the following Japanese herbaria; KYO, SAPS, SAPT, TI and TNS. Within each region; Sakhalin or the Kurils, the specimens are listed in order of locality; from north to south. Both Sakhalin and the Kuril Archipelago is divided into three geographic parts; the northern, middle and the southern (see Figs. 1 & 2). Within Sakhalin, the figure between angle brackets indicates the grid on a map (Fig. 1). Four quarters of each grid are recognized further when we can locate the collection site. Within the Kurils, the figure between angle brackets equivalents to the island (Fig. 2). Within each quarter of the grid in Sakhalin or each island in the Kurils, the specimens are listed in order of collection date. Specimens without accurate locality are listed last in each corresponding region or part.

As the spellings in the list follow those written on the herbarium labels, different spellings are sometimes listed for the same locality: e.g., Ohtomari, Ootomari, Ohdomari for Otomari [Korsakov].

APIACEAE

1. *Aegopodium alpestre* Ledeb. [Ezo-bōhū] <SAKHALIN>

NORTH. E coast of Peninsula Schmidt <05-upper l.>, Fukuda, T. 2046, 2001.08.14 (SAPS).

MIDDLE. N. Sakhalin, Hinan-ekisha–Aobaeki <36-lower l.>, Kudo, Y. & Tawewaki, M. 6173, 1922.07.30 (SAPS); Kitanayoshi <41-lower l.>, Ishii (Sugawara 16689), 1943.07.01 (SAPT); Shikka-gun, Mt. Horoto-dake <42-lower r.>, Sugawara, S., 1932.08.08 (KYO); Shikka-gun, Ikeda <44-upper r.>, Yoshimura, B. & Hara, M. 63, 1937.07.13 (TNS 234423); Shikka-shicho, between Yamahana and Ikeda <44-lower r.>, Yoshimura, B. & Hara, M., 1937.07.12 (SAPS); Shikka-shicho, Chirie-gun, Naruko <45-upper r.>, Tawewaki, M. & Takahashi, Y. 22856, 1936.06.26 (SAPS); Shikka-shicho, Chirie-gun, Chirikoro <45-upper r.>, Tawewaki, M. & Takahashi, Y. 22921, 1936.06.28 (SAPS); Shikka-shicho, Chirie-gun, Chirikoro <45-upper r.>, Tawewaki, M. & Takahashi, Y. 23036, 1936.06.30 (SAPS); Shikka Distr., Chirikoro <45-upper r.>, Yoshimura, B., 1936.08.06 (SAPS); Nayoshi-gun, Kitakozawa <46-upper l.>, Hemmi, M., 1942.08.16 (TNS 632052, TUS 108776); Uetonnai <48-lower l.>, Miyabe, K. & Miyagi, T., 1906.07.28 (SAPS); Kyoto Univ. Exp. Forest, Kusunokiyama <48-lower l.>, Shimono, T., 1928.07.20 (TNS 253520); Tomarikishi <48-lower l.>, Ban, S., no date (KYO); Kitashiretoko-hanto, Noto <51-lower l.>, Hoshino, Y. & Okada, S., 1933.07.12 (SAPS); Kitashiretoko-

hanto, Naihuto <51-lower l.>, Hoshino, Y., Okada, S. & Sugiyama, S., 1933.07.30 (SAPS); Usutomanai <52-upper l.>, Miyabe, K. & Miyagi, T., 1906.08.14 (SAPS); W. Coast, Mt. Ushoro <52-upper r.>, Miyake, T., 1907.08.31 (SAPS); Minaminiitōi <54-upper r. ?>, Hara, H. (C1245), 1931.08.04 (TI); Kitashiretoko-hanto, Kitashiretoko-misaki <55-lower r.>, Hoshino, Y., Okada, S. & Sugiyama, S., 1933.07.20 (SAPS); Shikka, Kitashiretoko-misaki <55-lower r.>, Sugawara, S. 16685, 1935.07.26 (SAPT); Shikka, Kitashiretoko-misaki <55-lower r.>, Sugawara, S. 2702, 27198, 1935.07.26 (SAPS).

SOUTH. E. Coast, Makunkotan <57-lower l.>, Miyake, T., 1906.09.15 (SAPS); Mt. Tosso, 8-gome <57-lower l.>, Koidzumi, H. 20940, 1929.07.29 (TNS 920142); Shiritori, Ishiyama <57-upper r.>, Hara, H. (C746), 1931.08.04 (TI); S. Saghal., Kashipo <57-upper r.>, Takee, G., Abumiya, H. & Hoshino, Y., 1932.07.18 (SAPS); W. Coast, Kusunnai <58-upper r.>, Miyake, T., 1906.07.07 (SAPS); Odasamu Univ. Forest <59-lower l.>, Suematsu, S., 1929.07.25 (TI- 2 sheets); Toyoharashicho, Aikawa Tokyo Univ. Forest <61-upper r.>, Honda, M. & Kimura, Y., 1940.08.11 (TI); Aihama-mura <61-upper r.>, Imazeki, R., 1941.07.14 (TNS 87750); Toyohara, Fukakusa <61-lower r.>, Sugawara, S. 173, 1921.07.10 (SAPS); Fukakusa <61-lower r.>, Sugawara, S. 34, 1924.08. (SAPS); Sakaehama <62-upper l.>, Sugawara, S. 16686, 1930.08.20 (SAPT); Sakaehama <62-upper l.>, Ohwi, J., 1932.07.21 (KYO); Ochiai <62-lower l.>, Sugawara, S. 16687, 1930.07.01 (SAPT); Kurokawa <62-lower l.>, Hara, H. (C1086), 1931.07.31 (TI); 20km E of Sokol town, around the mouth of Bakhura River <62-lower r.>, Takahashi, H. 29142, 2001.07.19 (SAPS); Takinosawa <64-upper r.>, Miyake, T., 1906.06.29 (SAPS); Sekiguchitoge <64-upper r.>, Miyake, T., 1906.06.30 (SAPS); Takinosawa <64-upper r.>, Faurie, U. 377, 1908.07.24 (KYO); Vladimirohuka <65-upper l.>, Miyake, T., 1907.07.27 (SAPS); Near Toyohara-machi <65-upper l.>, Momose, G. (Koidzumi, H. 83641), 1927 (TNS 920027); Sussuja <65-upper l.>, Sugawara, S., 1928.07 (KYO); Mt. Susuya <65-upper r.>, Hara, H. (C2592), 1928.08.13 (TI); Mt. Susuya <65-upper r.>, Saito, S., 1929.07.26 (TI); Toyohara-gun, Mt. Susuyadake <65-upper r.>, Sase, H., 1937.09.18 (SAPS); Approx. 8km E of Yuzhno-Sakhalinsk <65-upper r.>, Takahashi, H. 29255, 2001.07.22 (SAPS); Approx. 8km E of Yuzhno-Sakhalinsk <65-upper r.>, Takahashi, H. 29238, 2001.07.22 (SAPS); Mt. Sussujazan <65-upper r.>, Takahashi, S., no date (KYO); Tonnaicha-sando <65-lower r.>, Miyake, T., 1906.10.09 (SAPS); Tonnai-gun, Kamikiminai <65-lower r.>, Sase, H., 1940.08.03 (SAPS- 2 sheets); Mt. Kiyokawa <65-lower r. ?>, Koidzumi, H. 20556, 1927.07.26 (TNS 920074); Airopu <67-lower l.>, Miyabe, K. & Miyagi, T.,

1906.07.31 (SAPS); About 8km N of Shebunino <68-upper l.>, Takahashi, H., Kawahara, T., Kitamura, K. & Taran, A. 33746, 2007.07.10 (SAPS); W. Coast, South-Nayashi <68-lower l.>, Miyake, T., 1907.06.14 (SAPS); Chipisani <71-upper l.>, Miyabe, K., Miyagi, T. & Miyake, T., 1906.07.15 (SAPS); E. Coast, Cheppopo <72-lower l.>, Miyake, T., 1908.07.08 (SAPS); Mt. Omanbetsu <72-lower l.>, Miyake, T., 1908.07.15 (SAPS); Cap. Notoro <73-lower l.>, Miyabe, K. & Miyagi, T., 1906.07.19 (SAPS); Todomoshiri, Mt. Dainan <73-lower l.>, Miyake, T., 1906.07.20 (SAPS); Todomoshiri, Dainanwan <73-lower l.>, Miyake, T., 1906.07.23 (SAPS); Todomoshiri, Shimizutani <73-lower l.>, Miyake, T., 1906.07.23 (SAPS); Todomoshiri, Tomarizawa <73-lower l.>, Miyake, T., 1906.07.23 (SAPS); Isl. Kaibato <73-lower l.>, Komat, S., 1915.08.12 (TI); Isl. Kaibato, Ganpizaka <73-lower l.>, Kimoto, Murayama & Takee, 1931.07.18 (SAPS).

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SOUTH. ITURUP <20>. Furebetsu, Miyabe, K., 1884.07.28 (SAPS); Arimoi, Miyabe, K., 1884.07.29 (SAPS); Rubetsu-mura, Yokoyama, S., 1893.07.09 (SAPS); Shana-Bettobi, Kondo, K. (1933), 1927.07.13 (TI, TNS 688055); Bettobi-Shana, Saito, S., 1928.08.18 (TI- 2 sheets); Shana, Yoshimura, B., 1937.08.08 (SAPS); Shana-Rubetsu, Yoshimura, B., 1939.07.31 (SAPS); Between Arimoe and Rubetsu, Minakawa, N., 1997.07.29 (SAPS). KUNASHIR <21>. Seseki, Tatewaki, M. 3080, 1923.07.20 (SAPS, SAPT); Furukamappu, Matsumura, Y., 1930.07.20 (KYO); Furukamappu lake, Matsumura, Y., 1930.07.22 (KYO); Mt. Harui-dake[?], Koriba, M. & Yoshii, R., 1933.07.29 (KYO); No locality, collector unknown, 1935 (KYO). SHIKOTAN <22>. No locality, Miyabe, K., 1884.07.27 (SAPS); No locality, Kawakami, T., 1898.08 (TI); Between Matsugahama and Poropet, Takeda, H., 1909.07.27 (SAPS); Masuba, Miyabe, Ken. & Tanaka, G., 1910.08.14 (SAPS- 2 sheets); No locality, Abe, A., 1924.07.17 (TNS 429845, 429844); Shakotan, Kondo, K., 1929.08.04 (TI- 4 sheets); Mt. Shakotan, Kondo, K., 1929.08.06 (TI); Notoro, Ohwi, J., 1931.08.08 (KYO); Umanose, Ohwi, J., 1931.08.30 (KYO); Inemoshiri, Tatewaki, M. 20576, 1934.06.20 (SAPS); Shakotan, Tatewaki, M. 20766, 1934.06.28 (SAPS). HABOMAIS <23>. Isl. Yuru, Kondo, K., 1929.08.24 (TI).

2. *Angelica edulis* Miyabe ex Y.Yabe [Ama-nyū]

<SAKHALIN>

SOUTH. Toyohara <65-upper l.>, Muramatsu, S., 1923.07 (TI).

3. *Angelica genuflexa* Nutt. ex Torr. et A.Gray [Ōbasenkyū]

<SAKHALIN>

NORTH. N. Sakhalin, side of Piiri River <04-lower r.>, Kudo, Y. & Ishida, B. 7073, 1923.08.24 (SAPS); 1km N of Val <19-lower l.>, Takahashi, H. 31132, 2003.07.27 (SAPS).

MIDDLE. N. Sakhalin, Ako <28-lower l.>, Okada,

1923.08.19 (TI); Pilewo <36-lower l.>, Miyabe, K. & Miyagi, T., 1906.08.13 (SAPS); Golojikoff <37-lower r.>, Miyake, T., 1906.08.26 (SAPS); Hamdasa <37-lower r.>, Miyake, T., 1906.08.27 (SAPS); About 30km E of Pervomayskoye <39-lower r.>, Fujii, N. F01309, 2002.08.11 (SAPS); Asase <40-lower l.>, Sugawara, S. 16735, 1935.08.02 (SAPT); Nayashi <41-lower l.>, Miyake, T. & Miyagi, T., 1906.08.12 (SAPS); Fūi <43-lower l.>, Miyake, T., 1906.08.22 (SAPS); Shikka Distr., Naruko-Chirikoro <45-upper r.>, Yoshimura, B., 1936.08.16 (SAPS); Shikka Distr., Chirikoro <45-upper r.>, Yoshimura, B., 1936.08.18 (SAPS); Nayoshi-gun, Kitakozawa <46-upper l.>, Hemmi, M., 1941.09.15 (TNS 631316, 631315); Nayoshi-gun, Kitakozawa <46-upper l.>, Hemmi, M., 1942.08.16 (TNS 631318, 631317, 108777); E. Coast, Nayoro <48-lower l.>, Miyake, T., 1906.09.06 (SAPS); Kyoto Univ. Exp. Forest-Kaminairo <48-lower l.>, Kobayashi, Y., 1928.08.01 (TNS 253588); Tomarikishi <48-lower l.>, Koidzumi, G., 1930.08.23 (KYO); Tobani <48-upper r.>, Miyake, T., 1906.08.20 (SAPS); Dawait <49-upper l.>, Miyake, T., 1906.08.15 (SAPS); W. Coast, Naikotoru <52-upper l.>, Miyake, T., 1907.08.26 (SAPS); E. Coast, Shirutoro <54-lower l.>, Miyake, T., 1906.09.13 (SAPS); Kitashiretokohanto, Yoman-Rosoku-iwa <55-upper r.>, Okada, S. & Sugiyama, S., 1933.07.21 (SAPS).

SOUTH. E. Coast, Makunkotan <57-lower l.>, Miyake, T., 1906.09.15 (SAPS); Shiraishizawa-Nupuripo <57-lower l.>, Saito, S., 1929.08.02 (TI); Nupuripo-Shiraishizawa <57-lower l.>, Saito, S. (3628), 1929.08.04 (TI, TNS 755198); E. Coast, Kashipo <57-upper r.>, Miyake, T., 1906.09.14 (SAPS); Kashiho <57-upper r.>, Kitamura, S., 1930.08.25 (KYO); Kasipo, Syokuminti <57-upper r.>, Takee, G., Abumiya, H. & Hosino, Y., 1932.08.08 (SAPS); Buriu <57-lower r.>, Miyake, T., 1906.08.24 (SAPS); E. Coast, Manue <59-upper l.>, Miyake, T., 1906.09.22 (SAPS); Approx. 6km W of Sokol town <61-lower r.>, Takahashi, H. 29179, 2001.07.20 (SAPS); Dobuki <62-upper l.>, Nakahara, G., 1906.08 (TI); Sakaihama <62-upper l.>, Sawada, T., 1923.08.24 (TI); Galkinovlaskoe <62-lower l.>, Miyake, T., 1906.07.11 (SAPS); Maoka <63-upper r.>, Sugawara, S. 16730, 1934.07 (SAPT); Oomagari <64-upper r.>, Miyake, T., 1906.06.30 (SAPS); Sekiguchitoge <64-upper r.>, Miyake, T., 1906.06.30 (SAPS); Toyohara <65-upper l.>, Sawada, T., 1923.08.06 (TI- 2 sheets); Toyohara <65-upper l.>, Koidzumi, G., 1930.08.07 (KYO); Toyohara-gun, Toyokita-mura, Konuma <65-upper l.>, Sase, H., 1937, 08.25 (SAPS- 3 sheets); Kaizuka <65-lower l.>, Sugawara, S. 16700, 1932.08.28 (SAPT); Tonnai-gun, Kamikiminai, Honryu <65-lower r.>, Sase, H., 1940.08.12 (SAPS- 2 sheets); Korsakof <70-upper r.>, Faurie, U. 393, 1908.08 (KYO); Korsakof <70-upper r.>, Faurie, U. 392, 1908.09 (KYO); Korsakof <70-upper r.>, Faurie, U. 391, 1908.09 (KYO- 2 sheets); Ohdomari <70-upper r.>, Koidzumi, H. 82562, 1924.08 (TNS 910530); Ootomari <70-upper r.>, Sugawara, S. 16734, 1937.08.30 (SAPT); Todomoshiri, Tomarizawa

<73-lower l.>, Miyake, T., 1906.07.23 (SAPS).

[No locality] Faurie, U., 1907.10 (KYO).

<THE KURILS>

NORTH. SHUMSHU <2>. S of Pochtareva Cape, Takahashi, H. 23344, 1997.08.08 (SAPS); Babushkina Bay, Takahashi, H. 23535, 1997.08.10 (SAPS). PARAMUSHIR <3>. Kamogawazaki, Kudo, Y. 5198, 1920.07.12 (SAPS); Murakamiwan, Kudo, Y. 5454, 1920.07.23 (SAPS); Shirakawa, Kudo, Y. 5600, 1920.07.30 (SAPS); Nishikawa, Ohwi, J. & Yoshii, R. 6172, 1934.08.10 (KYO); 5km S of Severo-Kuril'sk, Takahashi, H. 20819, 1996.08.01 (SAPS- 2 sheets); 5km S of Severo-Kuril'sk, Takahashi, H. 20761, 1996.08.01 (SAPS); E side of Vasil'yeva Bay, Takahashi, H. 20939, 1996.08.03 (SAPS); Vasil'yeva Cape, Takahashi, H. 23863, 1997.08.16 (SAPS); Tukharka Bay, Takahashi, H. 23923, 1997.08.17 (SAPS).

MIDDLE. URUP <19>. Kobune, Tatewaki, M. 9864, 1927.08.26 (SAPS); Tokotan, lake-side, Tatewaki, M. 9727, 1927.08.28 (SAPS); Swamps along the Yoroigawa, Tatewaki, M. 9943, 1927.09.06 (SAPS); Kobune, Tatewaki, M. & Takahashi, K. 15988, 1929.09.18 (SAPS); Otkrytyy Bay, Takahashi, H. 18510, 1995.08.04 (SAPS- 2 sheets); Novokuril'skaya inlet, Takahashi, H. 18811, 1995.08.08 (SAPS); Smuglyy Bay, Takahashi, H. 19912, 1995.08.24 (SAPS); Barhatnyy Bay, Takahashi, H. 20101, 1995.08.28 (SAPS).

SOUTH. ITURUP <20>. Naibo, Kawakami, T., 1898.09 (TI); Bettobi, Saito, S., 1928.08.17 (TI); Rakkibetsu, Koidzumi, H. 25777, 1930.08.19 (TNS 910529); Shana-Bettobi, Yoshimura, B., 1937.08.13 (SAPS); Shibetoro-Moyoro, Yoshimura, B. & Yokoyama, H., 1938.08.02 (SAPS); Shana, Yoshimura, B., 1939.08.20 (SAPS); Near Kuril'sk, Ilyshko, M. & Zhuravlev, Y., 1995.08.03 (SAPS). KUNASHIR <21>. Zembekotan, Tatewaki, M. 25641, 1936.08.22 (SAPS). SHIKOTAN <22>. Shakotan, Tatewaki, M. 9587, 1927.08.22 (SAPS); Masuba-Notoro, Kondo, K., 1929.09.03 (TI); Yokonemoshiri, Kondo, K., 1929.09.06 (TI); Shakotan, Ono, S.T., 1930.08.24 (SAPS, SAPT); Shakotanzaki, Ohwi, J., 1931.09.03 (KYO); Shakotan, Tatewaki, M. 20870, 1934.07.03 (SAPS); No locality, collector unknown, 1937.08 (TNS 267010).

4. *Angelica gmelinii* (DC.) Pimenov [Ezo-no-shishiudo] <SAKHALIN>

NORTH. Peninsula Schmidt, Gulf of Pomr' <07-lower l.>, Fukuda, T. 1915, 2001.08.10 (SAPS); N. Sakhalin, Chaio <19-lower l.>, Kusano, Y. (Koidzumi, H. 86409), 1921.07 (TNS).

MIDDLE. E. Coast, Kokkyo, Asase <40-lower l.>, Hoshino, Y. & Sugiyama, S., 1933.08.11 (SAPS); Nayoshi-gun, Nayoshi <41-lower l.>, Hemmi, M., 1943.07.04 (TNS 631319); Shikka-shicho, Nimenjo-Yamahana <44-lower l.>, Yoshimura, B. & Hara, M., 1937.07.11 (SAPS); E. Coast, Nayoro <48-lower l.>, Miyabe, K. & Miyagi, T., 1906.07.28 (SAPS); Shisuka <48-upper r.>, Namikawa, I., 1914.08.20

(SAPS); Shikka <48-upper r.>, Otani, H. & Imai, Y., 1930.07.19 (SAPS); Shikka <48-upper r.>, Tobita, H., 1935.07.23 (KYO); Shikka-cho, Otasunomori <48-upper r.>, Imazeki, R., 1941.07.16 (TNS 85021); Shikka-shicho, near Taraika <49-upper r.>, Honda, M. & Kimura, Y., 1940.08.16 (TI); Jimutaki <50-upper r.>, Miyabe, K. & Miyagi, T., 1906.07.24 (SAPS); Kitashiretoko-hanto, Notq <51-lower l.>, Hoshino, Y., Okada, S. & Sugiyama, S., 1933.07.12 (SAPS); Kitashiretoko-hanto, Chirie <51-lower r.>, Hoshino, Y., Okada, S. & Sugiyama, S., 1933.07.15 (SAPS); Kitashiretoko-hanto, Mt. Hokke-yama <51-lower r.>, Hoshino, Y., 1933.07.22 (SAPS); Kitashiretoko-hanto, Kitafunakoshi <51-lower r.>, Hoshino, Y., Okada, S. & Sugiyama, S., 1933.07.23 (SAPS); Usutomanai <52-upper l.>, Miyabe, K. & Miyagi, T., 1906.08.11 (SAPS); Mt. Niitoyama <54-upper l.>, Sugawara, S. 16874, 1934.08 (SAPT); Minaminiitoyama <54-upper r.?>, Hara, H. (C1246), 1931.08.04 (TI).

SOUTH. Mt. Tosso <57-lower l.>, Sugawara, S. 16873, 1927.08.01 (SAPT); Mt. Tosso <57-lower l.>, Koidzumi, H. 20944, 1929.07.30 (TNS 911665); Mt. Tso-zan <57-lower l.>, Hara, H. (C882), 1931.08.05 (TI); Motodomari-shicho, Mt. Tosso-zan <57-lower l.>, Honda, M. & Kimura, Y., 1940.08.12 (TI); About 5km SW of Vostochnyy, Pugacheva <57-lower l.>, Takahashi, H. 31095, 2003.07.25 (SAPS); Mt. Kashipo <57-upper r.>, Hiratsuka, N., 1928.08.07 (SAPS); Kenshindai at Kashipo <57-upper r.>, Takee, G., Abumiya, H. & Hosino, Y., 1932.07.16 (SAPS); Seashore at Kashipo <57-upper r.>, Takee, G., Abumiya, H. & Hosino, Y., 1932.07.24 (SAPS); W. Coast, Kushun'nai <58-upper r.>, Sase, H., 1937.09.10 (SAPS); E. Coast, Dubuki <62-upper l.>, Miyake, T., 1906.07.10 (SAPS); Dubki <62-upper l.>, Miyabe, K. & Miyagi, T., 1906.07.22 (SAPS); Sakaehama <62-upper l.>, Sugawara, S. 10, 1927.07.10 (SAPS); Dobukky near Dolinsk <62-upper l.>, Saito, S., 1929.07.28 (TI- 2 sheets); Sakaehama <62-upper l.>, Koidzumi, G., 1930.08.13 (KYO); Sakaehama <62-upper l.>, Hara, H. (C955), 1931.07.31 (TI); Sakaehama <62-upper l.>, Hara, H. (C989a & b), 1931.07.31 (TI- 2 sheets); E. Coast, mouth of River Naiba <62-upper l.>, Fukuda, T. 1201, 2001.07.23 (SAPS); 20km E of Sokol town, mouth of Bakhura River <62-lower r.>, Takahashi, H. 29092, 2001.07.19 (SAPS- 2 sheets); W. Coast, Mauka <63-upper r.>, Miyake, T., 1906.07.03 (SAPS); Near Maoka <63-upper r.>, Rika-kenkyusyo, 1926.08 (TNS 013989); Mitsuriohuka <65-lower l.>, Miyake, T., 1906.07.13 (SAPS); Perwayapachi <65-lower l.>, Nakahara, G., 1906.08 (TI); Torepachi [Tret'yapad'?] <65-lower l.>, Nakahara, G., 1906.08 (TI- 2 sheets); Kaizuka <65-lower l.>, Momose, G. (Koidzumi, H. 83646), 1927 (TNS 920774); Shinba <65-lower l.>, Koidzumi, G., 1930.08.08 (KYO- 4 sheets); Mt. Susuya <65-upper r.>, Sugawara, S. 16872, 1940.07.25 (SAPT); 30km SE of Yuzhno-

Sakhalinsk, S of Okhotskoye <66-lower l.>, Takahashi, H. 27900, 2000.07.19 (SAPS); Airopu <67-lower l.>, Miyabe, K. & Miyagi, T., 1906.07.31 (SAPS); Rutakagun, Notoro-mura, Dorokawa <69-lower l.>, Koidzumi, G., 1940.09.03 (KYO); Korssakoff <70-upper r.>, Miyabe, K. & Miyagi, T., 1906.07.12 (SAPS); Mereya <70-upper r.>, Miyabe, K., Miyagi, T. & Miyake, T., 1906.07.14 (SAPS); Mereya <70-upper r.>, Faurie, U. 390, 1908.09 (KYO- 2 sheets); Korssakoff <70-upper r.>, Faurie, U. 390, 1908.09 (KYO); 10km E of Korsakov, Prigordnoye <70-upper r.>, Takahashi, H. 30601, 2002.08.15 (SAPS); Cap. Notoro <73-lower l.>, Miyabe, K. & Miyagi, T., 1906.07.19 (SAPS); Todomoshiri, Kamoshima <73-lower l.>, Miyake, T., 1906.07.23 (SAPS); Isl. Kaibato, Kita-kotan <73-lower l.>, Kimoto, Murayama & Takee, 1931.08.05 (SAPS); C. Suryuda <74-upper l.>, Miyabe, K. & Miyagi, T., 1906.08.01 (SAPS).

[No locality] Faurie, U., no date (KYO- 2 sheets).

<THE KURILS>

NORTH. ATLASOVA <01>. Minamiura, Ito, S. & Komori, G., 1926.07.04 (SAPS); Minamiura, Ito, S. & Komori, G., 1926.07.18 (SAPS); Minamiura, Ohwi, J. & Yoshii, R. 5893, 1934.07.31 (KYO); Alaidskaya Bay, Takahashi, H. 23673, 1997.08.12 (SAPS). SHUMSHU <02>. No locality, Gunji, 1898 (SAPS); No locality, Yendo, K., 1903.08 (TI); S of Pochtareva Cape, Takahashi, H. 23231, 1997.08.08 (SAPS). PARAMUSHIR <03>. NE coast, Yokoyama, S., 1893.09.09 (SAPS); Murakami-wan, Kitahara, 1916.07 (TI); Murakami-wan, Kudo, Y. 4956, 1920.07.04 (SAPS); Nishikawa-Atenkeshi, Kudo, Y. 5231, 1920.07.13 (SAPS); Hiratazaki, Kudo, Y. 5394, 1920.07.21 (SAPS); Western coast, collector unknown, 1931 (TI); Kujira-hama, Koidzumi, H. 36939, 1932.07.21 (TNS 919890); Murakami-wan, Koidzumi, H. 40159, 1932.08.20 (TNS 920099); 5km S of Severo-Kuril'sk, Takahashi, H. 20718, 1996.08.01 (SAPS- 2 sheets); E side of Vasil'yeva Bay, Takahashi, H. 20921, 1996.08.03 (SAPS- 2 sheets); E side of Vasil'yeva Bay; Takahashi, H. 21062, 1996.08.03 (SAPS); S of Savushkina Cape, Takahashi, H. 23019, 1997.08.04 (SAPS- 2 sheets). ANTISIFEROVA <04>. NW of island, Takahashi, H. 23794, 1997.08.15 (SAPS).

MIDDLE. ONEKOTAN <06>. Nemo, Tatewaki, M. & Tokunaga, Y. 12594, 1928.08.08 (SAPS); Nemo Bay, Takahashi, H. 21182, 1996.08.04 (SAPS); SW of island, Takahashi, H. 21357, 1996.08.05 (SAPS). KHARIMKOTAN <07>. Inland from Severgina Bay, Takahashi, H. 21473, 1996.08.08 (SAPS). CHIRINKOTAN <08>. E of Cape Ptichy, Takahashi, H. 21586, 1996.08.10 (SAPS). EKARMA <09>. No locality, Tatewaki, M. 11355, 1928.08.11 (SAPS); NW of island, Takahashi, H. 21642, 1996.08.10 (SAPS). SHIASHKOTAN <10>. No locality, Ishikawa, T., 1894.06.23 (SAPS). RAIKOKE <11>. E side of island, Takahashi, H. 21867, 1996.08.13 (SAPS- 2 sheets). RASSHUA <13>. Near Yotsuiwa-hama, Tatewaki, M. & Tokunaga, Y. 12474, 1928.08.06 (SAPS); Sonraku-wan, Tatewaki, M. & Takahashi

12361, 1929.08.04 (SAPS); Sonraku-wan, Tatewaki, M. & Takahashi 15050, 1929.08.04 (SAPS); S of Yoriki-hama, Takahashi, H. 19173, 1995.08.12 (SAPS). USHISHIR-RYPONKICHA <14a>. No locality, Tatewaki, M. & Tokunaga, Y. 12568, 1928.08.11 (SAPS). USHISHIR-YANKICHA <14b>. No locality, Tatewaki, M. & Tokunaga, Y. 12497, 1928.09.01 (SAPS); Onsen-wan, Tatewaki, M. & Takahashi, K. 15843, 1929.09.10 (SAPS); Kraternaya Bay, Takahashi, H. 19280, 1995.08.14 (SAPS); Mountain ridge, Takahashi, H. 22892, 1997.08.01 (SAPS- 2 sheets). KETOI <15>. Kodakigawa, Tatewaki, M. & Takahashi, K. 15256, 1929.08.15 (SAPS). BROUTONA <17>. Nodostupnyy Cape, Ohara, M., 1995.08.23 (SAPS). CHIRPOI <18a>. Peschanaya Bay, Takahashi, H. 19793, 1995.08.23 (SAPS). BRAT CHIRPOEV <18b>. W of Samotuga Cape, Takahashi, H. 24088, 1997.08.20 (SAPS); W of Samotuga Cape, Takahashi, H. 24093, 1997.08.20 (SAPS); Uglovaya Bay, Takahashi, H. 28433, 2000.08.04 (SAPS). URUP <19>. Iwayadomari, Uchida, K., 1891.06.17 (SAPS- 3 sheets); Anama-Yoshino-hama, Uchida, K., 1891.06.17 (SAPS); Iwanagawa-Anama, Uchida, K., 1891.06.18 (SAPS); Iema, Kodama, 1893.05 (SAPS); Tokotan, Lake-side, Tatewaki, M. 10016, 1927.08.28 (SAPS); Near Tokotan, Miyabe, T. 9684, 1927.08.29 (SAPS); Otkrytyy Bay, Takahashi, H. 18415, 1995.08.04 (SAPS- 2 sheets); Otkrytyy Bay, Takahashi, H. 18467, 1995.08.04 (SAPS- 2 sheets); Otkrytyy Bay, Takahashi, H. 18595, 1995.08.05 (SAPS); Inland from Ukromnaya Bay, Takahashi, H. 22127, 1996.08.20 (SAPS); Inland from Ukromnaya Bay, Takahashi, H. 22103, 1996.08.20 (SAPS).

SOUTH. ITURUP <20>. Toro-Naibo, Kambe, M., 1890.08 (SAPS); Rubetsu-mura, Yokoyama, S., 1893.07.06 (SAPS); Shana, Koda, 1895 (SAPS); Mt. Chirippu, Kawakami, T., 1898.08 (TI); Mt. Moyoro, Miyabe, Ken. & Tanaka, Y., 1910.07.17 (SAPS- 2 sheets); Shamanbe, Kondo, K. 2272, 1927.07.14-15 (TI, TNS 716936); Mt. Atoiya, Kondo, K., 1927.07.21 (TI); Shibetoru, Saito, S., 1929.07.28 (TI); Iriebushi, Koidzumi, H. 24343, 1930.08.03 (TNS 920071); Rakko-iwa, Koidzumi, H. 24563, 1930.08.04 (TNS 920138); Kamuikotan, Koriba, M. & Yoshii, R., 1933.08.06 (KYO); Shana, Yoshimura, B., 1937.08.10 (SAPS); Shana-Rubetsu, Yoshimura, B., 1939.07.31 (SAPS); Mouth of Naibo River-Iribubushi, Azuma, T. & al. 3288, 2002.06.19 (SAPT). KUNASHIR <21>. Seseki, Tatewaki, M. 3081, 1923.07.20 (SAPS); Seseki, Tatewaki, M. 3103, 1923.07.20 (SAPS); Chachanupuri, Kondo, K. 2389, 1929.07.20 (TI, TNS 716845); Shiranuka-Chinomichi, Nagai, M. & Shimamura, M., 1929.08.05 (SAPS); Rebun'iso, Koidzumi, H. 21986, 1929.08.14 (TNS 919861); Furukamappu, Matsumura, Y., 1930.07.20 (KYO). SHIKOTAN <22>. Kagenoma, Ohwi, J., 1931.08.02 (KYO); Notoro, Ohwi, J., 1931.08.11 (KYO); Umanose, Ohwi, J., 1931.08.30 (KYO); Matakotan-yama, Tatewaki, M. 20841, 1934.06.30 (SAPS). HABOMAI <23>. Isl. Taraku, Kondo, K., 1929.08.24 (TI).

5. *Angelica maximowiczii* (F.Schmidt) Benth. ex Maxim. [Hosoba-senkyū]
<SAKHALIN>

NORTH. 5km S of Val <19-lower l.>, Takahashi, H. 31125, 2003.07.27 (SAPS); N. Sakhal., Pupni <26-lower l.>, Kudo, Y. & Tatewaki, M. 6356, 1922.08.08 (SAPS).

MIDDLE. Alexandrovskiy <28-lower l.>, Takeo, S., 1905.09 (SAPS); N. Sakhal., Kami-Almdan <28-lower r.>, Kudo, Y. & Tatewaki, M. 6653, 1922.08.24 (SAPS); Luekoff-Adtyimi <33-upper r.>, Kudo, Y. & Tatewaki, M. 6313, 1922.08.06 (SAPS); About 10km E of Palevo <33-upper r.>, Takahashi, H. 30437, 2002.08.09 (SAPS); S. Sakhalin, Anbetsu <36-lower l.>, Tokunaga, Y. & Kawai, K., 1929.09.02 (SAPS); Anbetsu <36-lower l.>, Sugawara, S. 16760, 1933.08.13 (SAPT); Vicinity of R. Jobboroit <37-43>, Miyake, T., 1906.08.30 (SAPS); Hayabusayama <38-lower l.>, Miyake, T., 1906.08.28 (SAPS); Higashiyama <38-lower l.>, Miyake, T., 1906.08.28 (SAPS); E. Coast, Kokkyo, Asase <40-lower l.>, Hoshino, Y. & Sugiyama, S., 1933.08.11 (SAPS); Keton <42-upper r.>, Ohwi, J., 1932.08.10 (KYO); Shikka Distr., Ikeda Takaya-jimusho <44-upper r.>, Yoshimura, B. & Hara, M., 1937.07.13 (SAPS); Shikka-shicho, Chirikoro <45-upper r.>, Hoshino, Y. & Sugiyama, S., 1933.08.08 (SAPS); Shikka Distr., Chirikoro <45-upper r.>, Yoshimura, B., 1936.08.06 (SAPS); Shikka Distr., Naruko-Chirikoro <45-upper r.>, Yoshimura, B., 1936.08.16 (SAPS); Shikka, Aba <48-upper l.?,>, Otani, H. & Imai, Y., 1930.07.31 (SAPS); E. Coast, Nayoro <48-lower l.>, Miyake, T., 1906.09.06 (SAPS); Tomarikishi <48-lower l.>, Koidzumi, G., 1930.08.23 (KYO); Rammoteiuri <48-upper r.>, Miyake, T., 1906.08.15 (SAPS); Amiba <48-upper r.>, Koidzumi, G., 1930.08.18 (KYO); Poronaysk-Leonidovo <48-upper r.>, Takahashi, H. 30542, 2002.08.13 (SAPS); Kitashiretoko-hanto, Noto <51-lower l.>, Hoshino, Y. & Sugiyama, S., 1933.08.02 (SAPS); Shiritoru <54-lower l.>, Sugawara, S. 16754, 1927.08.03 (SAPT); Mt. Shiretori <54-lower l.>, Hiratsuka, N., 1928.08.05 (SAPS).

SOUTH. E. Coast, Makunkotan <57-lower l.>, Miyake, T., 1906.09.15 (SAPS); E. Coast, Mt. Tosso <57-lower l.>, Hiratsuka, N., Iwadare, S. & Nagai, M., 1927.07.23 (SAPS); Mt. Tosso <57-lower l.>, Sugawara, S. 16756, 16757, 1928.08.23 (SAPT-2 sheets); Noboriho <57-lower l.>, Sugawara, S. 16758, 1928.08.24 (SAPT); Shiraishizawa-Nupuripo <57-lower l.>, Saito, S. 340, 1929.08.02 (TI-3 sheets); Motodomari-shicho, Mt. Tosso <57-lower l.>, Honda, M. & Kimura, Y., 1940.08.12 (TI); Motodomari (Vostochnyi) <57-upper r.>, Saito, S. 3712, 1929.08.01 (TI-2 sheets); Shiritoru, Ishiyama <57-upper r.>, Hara, H. (C747), 1931.08.04 (TI); S. Sakhalin, Horotoike at Kashipo <57-upper r.>, Abumiya, H. & Takee, G., 1932.08.10 (SAPS); Mt. Kashipo-dake <57-upper r.>, Sugawara, S. 16753, 1934.08.02 (SAPT); W. Coast, Kusunnai <58-upper r.>, Miyake, T., 1906.07.07 (SAPS); Kusunnai <58-upper r.>, Miyabe, K. & Miyagi,

T., 1906.08.09 (SAPS); E. Coast, Kusunnai <58-upper r.>, Miyake, T., 1906.09.21 (SAPS); E. Coast, Mt. Chikaporonai <59-upper l.>, Miyake, T., 1907.08.12 (SAPS); Manui-sando <59-upper l.>, Sugawara, S. 27, 1925.08.16 (SAPS); W. Coast, Notasan <60-upper l.>, Miyake, T., 1907.06.29 (SAPS); W. Coast, Tokotan <60-lower l.>, Miyake, T., 1907.06.22 (SAPS).

6. *Angelica sachalinensis* Maxim. [Ezo-no-yoroigusa]
<SAKHALIN>

SOUTH. Sakaehama <62-upper l.>, Ex herb. Dr. J. Ito, no date (TNS 120265); Sakaehama <62-upper l.>, Ex herb. Dr. J. Ito, no date (TNS 120242); Galkinovlaskoe <62-lower l.>, Miyake, T., 1906.07.11 (SAPS); Kurokawa <62-lower l.>, Sugawara, S. 16697, 1925.08.20 (SAPT); Kotani <62-lower l.>, Sugawara, S. 16696, 1935.08.25 (SAPT); E. Coast, Rore <62-upper r.>, Miyake, T., 1906.09.27 (SAPS); 20km SE of Dolinsk <62-lower r.>, Takahashi, H. 30112, 2002.07.31 (SAPS); Toyohara <65-upper l.>, Koidzumi, G., 1930.08.06 (KYO-5 sheets); Toyohara <65-upper l.>, Sugawara, S. 16699, 1937.08.05 (SAPT); Toyohara-shicho, near Toyohara <65-upper l.>, Honda, M. & Kimura, Y., 1940.08.19 (TI-2 sheets); Mt. Susuya <65-upper r.>, Miyake, T., 1907.07.27 (SAPS); Approx. 8km E of Yuzhno-Sakhalinsk <65-upper r.>, Takahashi, H. 29250, 2001.07.22 (SAPS-3 sheets); Tonnaicha-sando <65-upper r.>, Miyake, T., 1906.10.08 (SAPS); Tonnaicha-sando <65-lower r.>, Miyake, T., 1906.10.09 (SAPS); Tonnai-gun, Kamikiminai <65-lower r.>, Sase, H., 1940.08.24 (SAPS); E. Coast, Tonnaicha <66-lower l.>, Miyake, T., 1908.06.28 (SAPS); Mereya <70-upper r.>, Miyabe, K., Miyagi, T. & Miyake, T., 1906.07.14 (SAPS-2 sheets); Korsakoff <70-upper r.>, Miyabe, K. & Miyagi, T., 1906.08.04 (SAPS-2 sheets); Korsakof <70-upper r.>, Faurie, U. 394, 1908.08 (KYO); Korsakof <70-upper r.>, Faurie, U. 390, 1908.09 (SAPS); Korsakof <70-upper r.>, Faurie, U. 395, 1908.09 (KYO); Ohtomari <70-upper r.>, Hara, H. (163, 163d), 1928.08.12 (TI-2 sheets).

<KURILS>

SOUTH. ITURUP <20>. Onnebetsu, Ishikawa, T., 1890.08.07 (SAPS); Shana, Yoshimura, B., 1937.08.07 (SAPS-2 sheets). KUNASHIR <21>. Mt. Tomari, Tatewaki, M. 25504, 1936.08.20 (SAPS). SHIKOTAN <22>. Shakotan Harbor, Saito, S., 1925.09.01 (TI); No locality, Kondo, K. 6034, 1927.08.11 (TI, TNS 643065); Horobetsu-Okkaibetsu, Kondo, K., 1929.08.31 (TI); Masuba-Notoro, Kondo, K., 1929.09.03 (TI); Shakotanzaki, Ohwi, J., 1931.09.03 (KYO); No locality, collector unknown, 1933.08.08 (SAPS-3 sheets); Shakotan, Nodoro-Inemoshiri, Saito, S., no year.09.06 (TI). HABOMAI <23>. Isl. Suisho, Kondo, K., 1929.08.24 (TI).

7. *Angelica saxatilis* Turcz. ex Ledeb. [Ezoyama-zengo]
<SAKHALIN>

MIDDLE. Nabilskiy Region, Chamginskiy Pass <34-upper r.>, Barkalov, V.Y. 2439, 2002.08.08 (SAPS).

SOUTH. 80km N of Dolinsk, Mt. Zhdanko

<57-lower l.>, Takahashi, H. 30188, 2002.08.02 (SAPS); Approx. 8km E of Yuzhno-Sakhalinsk, Mt. Chekhova <65-upper r.>, Takahashi, H. 29262, 2001.07.22 (SAPS- 2 sheets).

8. *Angelica ursina* (Rupr.) Maxim. [Ezo-nyū]
<SAKHALIN>

MIDDLE. Kami-Almdan <28-lower r.>, Kudo, Y. & Tatewaki, M. 6654, 1922.08.24 (SAPS); Nayoro <48-lower l.>, Nakahara, G., 1906.08 (TNS 24162); Kyoto Univ. Exp. Forest, Kusunokigawa <48-lower l.>, Kobayashi, Y. 16, 1928.07.19 (TNS 253415); Shisuka <48-upper r.>, Nakahara, G., 1906.08 (TI).

SOUTH. About 5km SW of Vostochnyy, Pugacheva <57-lower l.>, Inoue, K. 3022, 2003.07.25 (SAPS); S. Sakhal., Kashipo, Syokuminti <57-upper r.>, Takee, G., Abumiya, H. & Hosino, Y., 1932.08.08 (SAPS); Tikhaya village <59-upper l.>, Fukuda, T. 2539, 2001.08.29 (SAPS); Habomai, meadows <60-lower l.>, Hara, H. (326), 1928.08.15 (TI); 20km E of Sokol town, mouth of Bakhura River <62-lower r.>, Takahashi, H. 29109, 2001.07.19 (SAPS); Sussuya <65-upper l.>, Nakahara, G., 1906.08 (TI); Toyohara <65-upper l.>, Koidzumi, G., 1930.08.06 (KYO- 8 sheets); Nishikubo near Toyohara <65-upper l.>, Koidzumi, G., 1930.09.04 (KYO); Toyohara-gun, Toyokita-mura, Konuma <65-upper l.>, Sase, H., 1937.09.04 (SAPS- 3 sheets); Rutaka-gun, Notoromura, Dorokawa <69-lower l.>, Koidzumi, G., 1940.09.03 (KYO); Korsakof <70-upper r.>, Faurie, U. 394, 1908.08 (SAPS); Korsakof <70-upper r.>, Faurie, U. 389, 1908.09 (KYO); Korsakof <70-upper r.>, Faurie, U. 390, 1908.09 (KYO- 2 sheets); Chipisani <71-upper l.>, Miyabe, K., Miyagi, T. & Miyake, T., 1906.07.15 (SAPS); Nagahama-gun, Enbuchi-mura <71-upper r.>, Sase, H., 1936.08.04 (SAPS); Todomoshiri, Kotan <73-lower l.>, Miyake, T., 1906.07.24 (SAPS- 2 sheets).

9. *Anthriscus sylvestris* (L.) Hoffm. [Shaku]
<SAKHALIN>

NORTH. Schmidt Pen., E. coast <05-upper l.>, Fukuda, T. 2048, 2001.08.14 (SAPS).

MIDDLE. Pilewo <36-lower l.>, Miyabe, K. & Miyagi, T., 1906.08.13 (SAPS); Anbetsu <36-lower l.>, Sugawara, S. 16789, 1933.08.12 (SAPT); Muika <38-lower l.>, Miyake, T., 1906.08.25 (SAPS); Shikka-shicho, Yamahana-Ikeda <44-lower r.>, Yoshimura, B. & Hara, M., 1937.07.12 (SAPS); Shikka-shicho, Chirie-gun, Funadomari <45-upper r.>, Tatewaki, M. & Takahashi, Y. 22952, 1936.06.29 (SAPS); Shikka Distr., Chirikoro <45-upper r.>, Yoshimura, B., 1936.08.06 (SAPS); E. Coast, Nayoro <48-lower l.>, Miyabe, K. & Miyagi, T., 1906.07.28 (SAPS); Nayoro <48-lower l.>, Namikawa, I., 1914.08.13 (SAPS); Kyoto Univ. Exp. Forest, Kusunokiyama <48-lower l.>, Kobayashi, Y., 1928.07.20 (TNS 253587); Shikka <48-upper r.>, Sugawara, S. 16786, 16787, 1928.06 (SAPT- 2 sheets); Nokoro <50-upper r.>, Sugawara, S. 16788, 1935.07.30 (SAPT); E. Coast, Shikka-shicho, Motomari <51-upper

l.>, Hoshino, Y. & Sugiyama, S., 1933.08.03 (SAPS); Kitashiretoko Pen., Minamifunakoshi <55-upper r.>, Hoshino, Y., 1933.07.20 (SAPS); Kitashiretoko Pen., Yoman-Rosoku-iwa <55-upper r.>, Okada, S. & Sugiyama, S., 1933.07.21 (SAPS).

SOUTH. Kashipo, Tenbodai <57-upper r.>, Takee, G., Abumiya, H. & Hosino, Y., 1932.07.21 (SAPS); E. Coast, Chikaporonai <59-upper l.>, Miyake, T., 1907.08.15 (SAPS); Tonnaikishi <60-lower l.>, Sawada, S., 1930.07.20 (TI- 2 sheets, TNS 24166); Aihama-mura <61-upper r.>, Imazeki, R., 1941.07.13 (TNS 87769, 87768); Sokol, along the bogs and streams <62-lower l.>, Fukuda, T. 1018, 2001.07.17 (SAPS); 30km N of Yuzhno-Sakhalinsk, Sokol <62-lower l.>, Takahashi, H. 29016, 2001.07.17 (SAPS); Sokol, along the Belaya R. <62-lower l.>, Fukuda, T. 1054, 2001.07.18 (SAPS); Approx. 30km N of Yuzhno-Sakhalinsk, Sokol <62-lower l.>, Takahashi, H. 29529, 2001.07.30 (SAPS); 20km SE of Dolinsk <62-lower r.>, Takahashi, H. 30109, 2002.07.31 (SAPS- 2 sheets); Akou <63-lower l.>, Sugawara, S. 16791, 1930.08.16 (SAPT); Neveljsk <63-lower l.>, Sano, S. & Arai, S., 1958.08.13 (SAPS); W. Coast, Mauka <63-upper r.>, Miyake, T., 1906.07.03 (SAPS); W. Coast, Tomaribokeshi <63-upper r.>, Miyake, T., 1906.07.03 (SAPS); Shimizu <64-upper l.>, Miyake, T., 1906.06.30 (SAPS); Oomagari <64-upper r.>, Miyake, T., 1906.06.30 (SAPS); Dalni <65-upper l.>, Miyake, T., 1906.06.29 (SAPS); Vladimirohuka <65-upper l.>, Miyake, T., 1907.07.27 (SAPS); Toyowara <65-upper l.>, Saito, S., 1929.07.25 (TI); Toyohara <65-upper l.>, Hara, H. (C1142 a & b), 1931.07.30 (TI- 2 sheets); Toyohara <65-upper l.>, Sugawara, S. 16792, 1935.07.04 (SAPT); Tamagawa <65-upper l.>, Sugawara, S. 16793, 1935.07.04 (SAPT), Toyohara-gun, Toyokita-mura, Konuma <65-upper l.>, Sase, H., 1937.06.11 (SAPS); Susuya River <65-lower l.>, Nakahara, G., 1906.06 (TI- 2 sheets, TNS 24166); Mt. Susuya <65-upper r.>, Momose, G. (Koidzumi, H. 83643), 1927 (TNS 930180); Mt. Susuya <65-upper r.>, Hara, H. (421), 1928.08.13 (TI); Mt. Susuya <65-upper r.>, Saito, S., 1929.07.26 (TI- 3 sheets); E. Coast, Ochebukha R. <66-upper l.>, Fukuda, T. 1405, 2001.07.29 (SAPS- 2 sheets); Korssakoff, Aniwa Bay <70-upper r.>, Miyake, T., 1906.06.19 (SAPS); Korssakoff <70-upper r.>, Miyabe, K. & Miyagi, T., 1906.07.12 (SAPS); Mereya <70-upper r.>, Miyabe, K., Miyagi, T. & Miyake, T., 1906.07.14 (SAPS); Ootomari, Aniwa Bay <70-upper r.>, Miyake, T., 1907.07.14 (SAPS); Mereya <70-upper r.>, Faurie, U. 380, 1908.08.14 (KYO- 3 sheets); Nagahama-gun, Enbuchi-mura <71-upper r.>, Sase, H., 1936.06.18 (SAPS); Tookushi <73-upper l.>, Sugawara, S. 16790, 1929.08 (SAPT); Cap. Noto <73-lower r.>, Miyabe, K. & Miyagi, T., 1906.07.19 (SAPS- 2 sheets); Mt. Jyuzo (Mt. Shiretoko) <74-upper l.>, Miyake, T., 1908.07.11 (SAPS, TNS 380865).

<THE KURILS>

NORTH. ATLASOVA <01>. Minami-ura, Ito, S. & Komori, G., 1926.07.11 (SAPS); Mt. Alaid, Koidzumi,

H. 40752, 1932.08.13 (TNS 920289); Minamiura, Ohashi, T., 1932.08.16 (KYO); Minamiura-Tokyowan, Ohashi, T., 1932 (KYO); Minamiura, Ohwi, J. & Yoshii, R. 5867, 1934.07.31 (KYO); Alaidskaya Bay, Takahashi, H. 23680, 1997.08.12 (SAPS). SHUMSHU <02>. Near Bettobu, Yokoyama, S., 1893.09.22 (SAPS); No. locality, Seki, S., 1895 (SAPS); No locality, Gunji, S., 1897 (SAPS); No locality, Gunji, S., 1898 (SAPS); No locality, Yendo, K., 1903.07.13 (TI- 2 sheets); No locality, Yendo, K., 1903.08.17 (TI); Bettobi-numa -Bettobi-gyojyo, Ohashi, T., 1932.08.13 (KYO); Near Bessyo-gaoka, Tatewaki, M. 32374, 1941.07.15 (SAPS); Kagenoma, Tatewaki, M. 32455, 1941.07.20 (SAPS); S of Pochtareva Cape, Takahashi, H. 23342, 1997.08.08 (SAPS- 4 sheets); N of Bol'shoje Lake, Takahashi, H. 23457, 1997.08.09 (SAPS- 2 sheets); Babushkina Bay, Takahashi, H. 23539, 1997.08.10 (SAPS); Baikovo, Takahashi, H. 28027, 2000.07.24 (SAPS). PARAMUSHIR <03>. Musashi-wan, Aizawa, M., 1900.06.22 (SAPS); Murakamiwan, Kudo, Y. 4955, 1920.07.04 (SAPS); Kamogawazaki, Kudo, Y. 5199, 1920.07.12 (SAPS); Nishikawa-Atenkeshi, Kudo, Y. 5230, 1920.07.13 (SAPS); Arakawa, Kudo, Y. 5358, 1920.07.15 (SAPS); Tomarizaki, Kudo, Y. 5710, 1920.08.07 (SAPS); Koidzumi, H. 87797, 1924.08 (TNS 911661); Chikuda-dake, Okada, Y., 1931.07.30 (TNS 302674); Arakawa, Ohwi, J. & Yoshii, R. 168, 1934.07.18 (KYO); Murakami-wan, Ohwi, J. & Yoshii, R. 5934, 1934.08.01 (KYO); 5km S of Severo-Kuril'sk, Takahashi, H. 20779, 1996.08.01 (SAPS- 3 sheets). [Island uncertain: Shumshu or Paramushir] Fujita, K., 1944-45 (TNS 383003).

MIDDLE. URUP <19>. Tokotan, Jimbo, K., 1891.06.15-30 (TI); Tokotan, Uchida, K., 1891.06.16-25 (SAPS); Tokotan River, Jimbo, K., 1891.07.04 (SAPS); River of Tokotan, Jimbo, K., 1891.07.04 (TI); Barhatnyy Bay, Takahashi, H. 20081, 1995.08.28 (SAPS- 2 sheets)

SOUTH. ITURUP <20>. Shibetoro, Yokoyama, S., 1893.08.04 (SAPS); Shana, Koda, 1895 (SAPS); Bettofu, Miura, K., 1906.07.16 (SAPS); Shibetoro, Miyabe, Ken. & Tanaka, Y., 1910.07.16 (SAPS); Moyoro, Miyabe, Ken. & Tanaka, Y., 1910.07.17 (SAPS); Bettobi-Porosu, Saito, S., 1928.08.06 (TI- 3 sheets); Shana, Yoshimura, B., 1937.08.10 (SAPS); Shamanbe, Minakawa, N., 1997.07.30 (SAPS); Shibetoro village, mouth of Hiraitogawa River, Azuma, T. & al. 3037, 2002.06.13 (SAPT); Iturup. Tanaka, Nakano, Ishida, Hara & Otani, no date (SAPS- 2 sheets); Toro Lake, Miyazi, D., no date (KYO). KUNASHIR <21>. Seseki, Tatewaki, M. 3068, 1923.07.20 (SAPS); Chinomichi, along the Onnebetsu, Tatewaki, M. 3681, 1923.08.12 (SAPS); Chinomichi, Kondo, K., 1929.07.24 (TI); Furukamappu, Ohwi, J., 1931.08.20 (KYO); No locality, collector unknown, 1935 (KYO). HABOMAI <23>. Isl. Taraku, Kondo, K., 1929.08.24 (TI).

10. *Bupleurum longiradiatum* Turcz. [Hotaru-saiko] <SAKHALIN>

MIDDLE. Northern Sakhalin, Ako <28-lower l.>, Okada, 1923.08.19 (TI); About 10km E of Palevo <33-upper r.>, Takahashi, H. 30402, 2002.08.09 (SAPS); Pilewo <36-lower l.>, Miyabe, K. & Miyagi, T., 1906.08.13 (SAPS); N. Sakhalin, Pjlewo <36-lower l.>, Kudo, Y. & Tatewaki, M. 6110, 1922.07.28 (SAPS); Anbetsu, Kokkyo <36-lower l.>, Ishiyama, T., 1927.07.14 (SAPS); Anbetsu <36-lower l.>, Sugawara, S. 16808, 1933.08.13 (SAPT); Mt. Horotoyama <42-lower r.?>, Nagamatsu, 1930.07.26 (KYO); Nayoshi-gun, Kitakozawa <46-upper l.>, Hemmi, M., 1941.09.15 (TNS 631303, 631305); Nayoshi-gun, Kitakozawa <46-upper l.>, Hemmi, M., 1942.08.09 (TNS 631304); E. Coast, Ehorokofunai <48-lower l.>, Miyake, T., 1906.08.11 (SAPS); E. Coast, Nayoro <48-lower l.>, Miyake, T., 1906.09.09 (SAPS); Shikka <48-upper r.>, Miyabe, K. & Miyagi, T., 1906.07.23 (SAPS); Poronai <48-upper r.>, Nakahara, G., 1906.08 (TI); Telpenia Bay, Shikka <48-upper r.>, Miyake, T., 1906.08.12 (SAPS); Siska <48-upper r.>, Sawada, T., 1923.08.14 (TI); Shikka, downstream of Taran River <48-upper r.>, Hara, H. (c1026), 1931.08.03 (TI); Shikka, Kitashiretoko-misaki <48-upper r.>, Sugawara, S. 27189, 1935.07.26 (SAPS); Gastello - Poronaysk <48-lower r.>, Takahashi, H. 30522, 2002.08.13 (SAPS); Shikka, Higashitaraika <49-upper l.>, Imai, Y., 1930.07.23 (SAPS); Taraika <49-upper r.>, Miyabe, K. & Miyagi, T., 1906.07.27 (SAPS); Telpenia Bay, Taraika <49-upper r.>, Miyake, T., 1906.08.13 (SAPS); Nokoro <50-upper r.>, Sugawara, S. 16807, 1935.07.30 (SAPT); Chirie <51-lower r.>, Sugawara, S. 16806, 1935.07.20 (SAPT); Usutomanai <52-upper l.>, Miyabe, K. & Miyagi, T., 1906.08.11 (SAPS); Kitashiretoko-hanto, Yoman-Rosoku-iwa <55-upper r.>, Okada, S. & Sugiyama, S., 1933.07.22 (SAPS); Kitashiretoko-hanto, Kitashiretoko-misaki <55-lower r.>, Hoshino, Y., 1933.07.20 (SAPS); Kitashiretoko-misaki <55-lower r.>, Sugawara, S. 16805, 1935.07.26 (SAPT).

SOUTH. W. Coast, N of Krasnogorsk <56-upper l.>, Yabe, M., 2001.07.22 (SAPS); W. Coast, 10km N of Il'inskiy <56-lower l.>, Yabe, M., 2001.07.22 (SAPS); E. Coast, Mt. Tosso <57-lower l.>, Hiratsuka, N., Iwadare, S. & Nagai, M., 1927.07.23 (SAPS); E. Coast, Soya <57-upper r.>, Miyake, T., 1906.09.15 (SAPS); Kensindai at Kashipo <57-upper r.>, Takee, G., Abumiya, H. & Hosino, Y., 1932.08.07 (SAPS); Kensindai at Kashipo <57-upper r.>, Takee, G., Abumiya, H. & Hosino, Y., 1932.08.18 (SAPS); 5km S of Vostochnyy <57-lower r.>, Takahashi, H. 31021, 2003.07.24 (SAPS); Tomarioru <58-lower l.>, Ikoma, H. 20, 1935.08.12 (KYO); W. Coast, Kusunnai <58-upper r.>, Miyake, T., 1906.07.07 (SAPS); Kusunnai <58-upper r.>, Miyabe, K. & Miyagi, T., 1906.08.09 (SAPS); E. Coast, Shiraraka <59-upper l.>, Miyake, T., 1906.08.09 (SAPS); E. Coast, Tikhaya village <59-upper l.>, Fukuda, T. 2470, 2001.08.28 (SAPS); Noda, meadows <60-upper l.>, Hara, H. (212a),

1928.08.15 (TI); Tonnaikishi <60-lower l.>, Sawada, S., 1930.07.20 (TI); Habomai <60-lower l.>, Tobita, H., 1935.08.03 (KYO); W. Coast, W side of Kostromskoye <60-lower l.>, Takahashi, H. et al. 33810, 2007.07.12 (SAPS); Sakaehama <62-upper l.>, collector unknown, 1913.08.02 (TI); Sakaehama <62-upper l.>, Narita, Y., 1923.08.24 (TI- 2 sheets); Sakaihama <62-upper l.>, Saito, S., 1929.07.28 (TI); Sakaihama <62-upper l.>, Saito, S., 1929.07.29 (TI); Sakaehama <62-upper l.>, Koidzumi, G., 1930.08.12 (KYO- 2 sheets); Sakaehama <62-upper l.>, Hara, H. (C965a & b), 1931.07.31 (TI- 2 sheets); Sakaehama <62-upper l.>, Sugawara, S. 16804, 1937.07.20 (SAPT); E. Coast, mouth of River Naiba <62-upper l.>, Fukuda, T. 1235, 2001.07.23 (SAPS - 2 sheets); Galkinovlaskoe <62-lower l.>, Miyake, T., 1906.09.26 (SAPS); 20km E of Sokol town <62-lower r.>, Takahashi, H. 29113, 2001.07.19 (SAPS); Maoka-cho <63-upper r.>, Mizukoshi, 1926.08.12 (TNS 013986); Maoka <63-upper r.>, Sugawara, S. 16802, 1932 (SAPT); Maoka-cho, Shinkan-yama <63-upper r.>, Maekawa, M. (Koidzumi, H. 112805), 1942.08.15 (TNS 903715); Rutoka <64-lower r.>, Miyake, T., 1906.10.01 (SAPS); Mt. Susuya-dake <65-upper r.>, Sugawara, S. 16803, 1938.08.30 (SAPT); Tonnaichasando <65-lower r.>, Miyake, T., 1906.10.09 (SAPS); E of Dolinsk, near River Shima <66-upper l.>, Fukuda, T. 2435, 2001.08.27 (SAPS); E of Dolinsk, near River Shima <66-upper l.>, Fukuda, T. 2449, 2001.08.27 (SAPS- 3 sheets); Tonnaicha <66-lower l.>, Namikawa, I., 1914.07.29 (SAPS); 30km SE of Yuzhno-Sakhalinsk, S of Okhotskoye <66-lower l.>, Takahashi, H. 27850, 2000.07.16 (SAPS); Airopu <67-lower l.>, Miyabe, K. & Miyagi, T., 1906.07.31 (SAPS); Korssakoff <70-upper r.>, Miyabe, K. & Miyagi, T., 1906.07.12 (SAPS); Mereya <70-upper r.>, Miyabe, K., Miyagi, T. & Miyake, T., 1906.07.14 (SAPS); Korsakof <70-upper r.>, Faurie, U. 378, 1908.09 (KYO- 3 sheets); Ohtomari <70-upper r.>, Koidzumi, H. 1458. 1921.08.20 (TNS 908961); Ohtomari <70-upper r.>, Sawada, T., 1923.08.08 (TI- 2 sheets); Ohtomari <70-upper r.>, Narita, Y., 1923.08.20 (TI); Ohtomari <70-upper r.>, Narita, Y. 757, 1923.08.26 (TI); Ohtomari <70-upper r.>, Nakamura, M., 1926.07.25 (TNS 71241); Ohtomari <70-upper r.>, Hara, H. (212b), 1928.08.12 (TI); Ohtomari <70-upper r.>, Saito, S., 1929.07.24 (TI- 2 sheets); Ohtomari <70-upper r.>, Hara, H., 1936.07.28 (TI); Nagahama-gun, Enbuchi-mura <71-upper r.>, Sase, H., 1936.08.18 (SAPS); NW shore of Cape Menaputsky <72-lower r.>, Fukuda, T. 2305, 2001.08.21 (SAPS- 2 sheets); Tookushi <73-upper l.>, Sugawara, S. 16800, 1933.07.01 (SAPT); Cap. Notoro <73-lower l.>, Miyabe, K. & Miyagi, T., 1906.07.19 (SAPS); Shiranushi <73-lower l.>, Sugawara, S. 16801, 1933.07.02 (SAPT).

[No locality] Komatsu, no date (TI- 3 sheets); Hiruta, A., no date (TNS 99665). [Locality undetermined] Torestokoi, Nakahara, G., 1906.08 (TI). <THE KURILS>

SOUTH. KUNASHIR <21>. Kometoga-mura, Ichibishinai, Endo, C., 1894.07.27 (SAPS); Seseki,

Tatewaki, M. 3085, 1923.07.20 (SAPS); Nakanokotan, Tatewaki, M. 3155, 1923.07.21 (SAPS); Kunashir, Furukamappu, collector unknown, 1923.09.03 (TNS 269584); Sainokawara, Nagai, M. & Shimamura, M., 1929.07.29 (SAPS); Shiranuka-Atoiya, Nagai, M. & Shimamura, M., 1929.08.01 (SAPS); Tomari, Ohtani, H., 1929.08.09 (SAPS); Furukamappu, Matsumura, Y., 1930.07.20 (KYO); No locality, collector unknown, 1935 (KYO- 2 sheets). SHIKOTAN <22>. No locality, Kawakami, T., 1898.08 (TI); Anama, Takeda, H., 1909.07.20 (SAPS); Anama, Arai, M. 19, 1910.07.09 (SAPS); Anama, Miyabe, Ken. & Tanaka, Y., 1910.08.03 (SAPS); Matsugahama, Miyabe, Ken. & Tanaka, Y., 1910.08.13 (SAPS); Matakotan, Miyabe, Ken. & Tanaka, Y., 1910.08.13 (SAPS); Masuba, Miyabe, Ken. & Tanaka, Y., 1910.08.14 (SAPS); Anama, Arai, M. 84, 1910.09.14 (SAPS); No locality, Koidzumi, H. 87723, 1924.08 (TNS 908976); Mt. Shakotan, Saito, S., 1925.08.30 (TI- 2 sheets); Shakotan Harbor, Saito, S., 1925.09.01 (TI); No locality, Saito, S., 1925.09.01 (TI); Horobetsu, Saito, S., 1925.09.04 (TI- 2 sheets); No locality, Kondo, K. 7907, 1927.08.11 (TI); No locality, Kondo, K. 7896, 1927.08.11 (TI, TNS 643732); Shakotan, Tatewaki, M. 9564, 1927.08.22 (SAPS); Shakotan, Kondo, K., 1929.08.04 (TI); Mt. Shakotan, Kondo, K., 1929.08.06 (TI); Chiboi, Kondo, K., 1929.08.10 (TI- 2 sheets); No locality, Kondo, K., 1929.08.11 (TI); Anama, Kondo, K., 1929.08.28 (TI- 2 sheets); Horobetsu-Okkaibetsu, Kondo, K., 1929.08.31 (TI); Masuba-Notoro, Kondo, K., 1929.09.03 (TI); No locality, Kondo, K., 1929.09.03 (TI); Chiboi-Umanose, Kondo, K., 1929.09.07 (TI); Kagenoma, Ohwi, J., 1931.08.04 (KYO); Notoro, Ohwi, J., 1931.08.11 (KYO); Umanose, Ohwi, J., 1931.08.30 (KYO); Shikotan, Shakotan-Kagenoma, Ohwi, J., 1931.08.31 (KYO); type of *B. shikotanense* M. Hiroe); Boro-zan, collector unknown, 1937.08.10 (TNS 266983).

11. *Bupleurum triradiatum* Adams ex Hoffm. [Rebun-saiko] <SAKHALIN>

NORTH. E coast of Peninsula of Schmidt <05-upper l.>, Fukuda, T. 2116, 2001.08.14 (SAPS- 2 sheets); Peninsula of Schmidt, Taliki River <05-upper l.>, Barkalov, V.Y. 10803, 2001.08.14 (SAPS); S of Peninsula of Schmidt <05-lower r.>, Fukuda, T. 2176, 2001.08.16 (SAPS).

MIDDLE. Nabilskiy Mts., Changinskiy Pass <34-upper r.>, Barkalov, V.Y. 2520, 2002.08.08 (SAPS); Shikka-gun, Ikeda, Mt. Sekkai-yama <39-lower l.>, Yoshimura, B. & Hara, M. (108), 1937.07.15 (SAPS- 2 sheets, TNS 234421); Shikka, Mt. Shirochi-yama <45-upper l.>, Sugawara, S. 29275, 29276, 1935.08.07 (SAPS); Mt. Shirochi-yama <45-upper l.>, Sugawara, S. 16821, 1935.08.07 (SAPT); E. Coast, Funadomari <45-upper r.>, Kawashima, M. 11, 1935.07.16 (SAPS); Shikka, Mt. Kawashima-yama <45-upper r.>, Sugawara, S. 29285, 29286, 1935.08.03 (SAPS); Mt. Kawashima-yama <45-upper r.>, Sugawara, S. 16826, 1935.08.03 (SAPT); Shikka-shicho, Chirie-

gun, Mt. Kawashima-yama <45-upper r.>, Tatewaki, M. & Takahashi, Y. 22718, 1936.06.21 (SAPS); Shikka-shicho, Chirie-gun, Mt. Kawashima-yama <45-upper r.>, Tatewaki, M. & Takahashi, Y. 22998, 1936.06.29 (SAPS); Shikka Distr., Mt. Kawashima <45-upper r.>, Yoshimura, B., 1936.08.09 (SAPS).

SOUTH. Mt. Nupuripo <57-lower l.>, Miyake, T., 1906.08.13 (SAPS); E. Coast, Mt. Nupuripo <57-lower l.>, Miyake, T., 1907.08.13 (SAPS); Mt. Tossozan <57-lower l.>, Sugawara, S. 16828, 1924.07.10 (SAPT); Nuppuripo <57-lower l.>, Sugawara, S. 16, 1925.07.13 (SAPS); Mt. Tosso <57-lower l.>, Kawachi, K., 1926.08.04 (KYO); E. Coast, Mt. Tosso <57-lower l.>, Hiratsuka, N., Nagai, M. & Iwadare, S., 1927.07.23 (SAPS); Mt. Tosso, 9-gome <57-lower l.>, Koidzumi, H. 20936, 1929.07.29 (TNS 920002); Mt. Tosso, peak <57-lower l.>, Koidzumi, H. 20935, 1929.07.29 (TNS 920047); Mt. Nupuripo <57-lower l.>, Saito, S. 249, 1929.08.03 (TI- 3 sheets); Mt. Tosso <57-lower l.>, Hara, H. (C825 b & c), 1931.08.05 (TI- 3 sheets); Mt. Tosso <57-lower l.>, Ohwi, J., 1932.07.22 (KYO); Mt. Nupuripo <57-lower l.>, Sugawara, S. 20, 1940.08.03 (TI); Approx. 80km N of Dolinsk, Tsapko-N peak of Mt. Vladimirovka <57-lower l.>, Takahashi, H. 29579, 2001.08.02 (SAPS); Mt. Nupuripo <57-lower l.>, Takahashi, S., no date (KYO); Shirutori, Ishiyama <57-upper r.>, Sugawara, S. 16829, 1928(or7).08.02 (SAPT); Mt. Kashipo, peak <57-upper r.>, Koidzumi, H. 21397, 1929.08.01 (TNS 920050); Mt. Kashipo-dake <57-upper r.>, Sugawara, S. 16827, 1932.07.12 (SAPT); Mt. Kashipo <57-upper r.>, Ohwi, J., 1932.07.23 (KYO); Horonaipo at Kashipo <57-upper r.>, Takee, G., Abumiya, H. & Hosino, Y., 1932.08.14 (SAPS); Mt. Kashipo <57-upper r.>, Ohwi, J., 1932.08.18 (KYO); Mt. Nodasamu-dake <60-upper r.>, Sugawara, S. 16830, 1934.08 (SAPT); Mt. Susuyadake <65-upper r.>, Sugawara, S. 16825, 1928.09.10 (SAPT); Mt. Ochiho-dake <65-upper r.>, Sugawara, S. 16823, 1933.09.10 (SAPT); Soni (Honto) <73-upper l.>, Kimoto, Murayama & Takee, 1931.08.17 (SAPS); Tookushi <73-upper l.>, Sugawara, S. 16822, 1932.08 (SAPT); Isl. Kaiba-to <73-lower l.>, Sugawara, S. 16824, 1934.09.12 (SAPT).

[No locality] Sugawara, S. (Koidzumi, H. 82463), 1925.07 (TNS 920020).

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SOUTH. SHIKOTAN <22>. Mt. Shakotan, Saito, S., 1925.08.30 (TI- 4 sheets); No locality, Kondo, K. 7908, 1927.08.11 (TI- 3 sheets); Near Shakotan, Tatewaki, M. 9521, 1927.08.23 (SAPS); No locality, Kndo, K., 1929.08.06 (TI); Chiboi, Kondo, K. (6164), 1929.08.10 (TI- 2 sheets, TNS 645198); Anama, Kondo, K., 1929.08.28 (TI- 2 sheets); Chiboi-Umanose, Kondo, K. (5950), 1929.09.07 (TI- 2 sheets, TNS 643131); Shakotan, Ono, S.T., 1930.07.20 (TI); Matakotan, Ohwi, J., 1931.07.19 (KYO); Umanose, Ohwi, J., 1931.08.30 (KYO); Shakotanzaki, Ohwi, J., 1931.09.03 (KYO); Shakotan, Ono, S.T., 1933.07.20 (TI); Mt. Matakotan, Tatewaki, M. 20840, 1934.06.30 (SAPS).

12. *Cicuta virosa* L. [Doku-zeri]

<SAKHALIN>

NORTH. N coast of Peninsula Schmidt <04-upper r.>, Fukuda, T. 1679, 2001.08.06 (SAPS- 2 sheets); Near Piliwo <04-lower r.>, Kudo, Y. & Ishida, B. 7126, 1923.08.25 (SAPS); N. Sakhalin, Parukata, tundra <26-upper r.>, Kudo, Y. & Tatewaki, M. 6425, 1922.08.10 (SAPS).

MIDDLE. N. Sakhalin, Ako-tundra <28-lower l.>, Kudo, Y. & Tatewaki, M. 6097, 1922.07.26 (SAPS); N. Sakhalin, Tsuemoff <33-upper l.>, Kudo, Y. & Tatewaki, M. 6263, 1922.08.03 (SAPS); Golojikoff <37-lower r.>, Miyake, T., 1906.08.26 (SAPS); Hamdasa <37-lower r.>, Miyake, T., 1906.08.27 (SAPS); Poronaimura <37-lower r.>, Miyake, T., 1906.08.29 (SAPS); Mirnyy-Pobedin <38-lower l.>, Fujii, N. F01316, 2002.08.12 (SAPS); Shikka-shicho, Shibunkoro <45-lower r.>, Hoshino, Y. & Sugiyama, S., 1933.08.04 (SAPS); E. Coast, Ehorokofunai <48-lower l.>, Miyake, T., 1906.08.11 (SAPS); Shikka <48-upper r.>, Miyabe, K. & Miyagi, T., 1906.07.23 (SAPS- 2 sheets); Telpenia Bay, Shikka <48-upper r.>, Miyake, T., 1906.08.12 (SAPS); Shikka <48-upper r.>, Miyake, T., 1906.09.02 (SAPS); Shisuka <48-upper r.>, Namikawa, I., 1914.08.12 (SAPS); Siska <48-upper r.>, Sawada, T., 1923.08.14 (TI- 2 sheets); Shikka <48-upper r.>, Sugawara, S. 16855, 1928.08.10 (SAPT); Shisuka <48-upper r.>, Koidzumi, H. 21664, 1929.08.03 (TNS 919922); Shikka <48-upper r.>, Otani, H. & Imai, Y., 1930.07.20 (SAPS); Nishitaraika <49-upper l.>, Ohwi, J., 1932.08.14 (KYO); Telpenia Bay, Taraika <49-upper r.>, Miyake, T., 1906.08.13 (SAPS); Nokoro <50-upper r.>, Sugawara, S. 16848, 1935.07.30 (SAPT); Kitashiretoko-hanto, Naifuto <51-lower l.>, Hoshino, Y., Okada, S. & Sugiyama, S., 1933.07.30 (SAPS); Chirihasan <51-lower r.>, Miyabe, K. & Miyagi, T., 1906.07.25 (SAPS); Kitashiretoko-hanto, Kitafunakoshi <51-lower r.>, Hoshino, Y., Okada, S. & Sugiyama, S., 1933.07.23 (SAPS); E. Coast, Sakukotan <54-upper l.>, Miyake, T., 1906.09.13 (SAPS); E. Coast, Chyakamaushinai <54-lower l.>, Miyake, T., 1906.09.13 (SAPS).

SOUTH. About 5km SW of Vostochnyy, Pugacheva <57-lower l.>, Inoue, K. 3034. 3036. 3018, 2003.07.25 (SAPS); Seashore at Kashipo <57-upper r.>, Takee, G., Abumiya, H. & Hosino, Y., 1932.07.30 (SAPS); 110km N of Dolinsk, Zaozernaya <57-upper r.>, Takahashi, H. 30207, 2002.08.03 (SAPS); Kusunnai <58-upper r.>, Miyake, T., 1906.07.07 (SAPS); W. Coast, Kusunnai <58-upper r.>, Miyabe, K. & Miyagi, T., 1906.08.09 (SAPS- 2 sheets); Manui <59-upper l.>, Saito, S., 1929.08.05 (TI- 3 sheets); Chikahoro <59-upper l.>, Hara, H. (C801), 1931.08.06 (TI); Fukakusa <61-lower r.>, Sugawara, S. 16851, 1923.08.18 (SAPT); Fukakusa <61-lower r.>, Sugawara, S. 99, 1925.07.10 (SAPS); Sakaihama <62-upper l.>, Sawada, T., 1923.08.24 (TI); Sakaehama <62-upper l.>, Koidzumi, G., 1930.08.13 (KYO- 4 sheets); E. Coast, mouth of River Naiba <62-upper l.>, Fukuda, T. 1230, 2001.07.23 (SAPS); North

Saghalien, Ochiai <62-lower l.>, Koidzumi, H. 1460, 1921.08.21 (TNS 920025); Mauka <63-upper r.>, Miyabe, K. & Miyagi, T., 1906.08.17 (SAPS); Maoka <63-upper r.>, Sugawara, S. 16849, 1923.08.05 (SAPT); Approx. 25km W of Yuzhno-Sakhalinsk <64-upper l.>, Takahashi, H. 29406, 2001.07.26 (SAPS); Toyosakae <64-lower l.>, Sugawara, S. 16852, 1930.07.28 (SAPT); Vladimirohuka <65-upper l.>, Miyabe, K. & Miyagi, T., 1906.08.22 (SAPS); Toyohara <65-upper l.>, Saito, S. 943, 1929.07.25 (TI); Toyohara <65-upper l.>, Koidzumi, G., 1930.08.07 (KYO); Toyohara-gun, Toyokita-mura, Konuma <65-upper l.>, Sase, H., 1937.07.27 (SAPS); Hamazi <65-lower l.>, Sugawara, S. 16860, 1928.06.10 (SAPT); Kaizuka <65-lower l.>, Hara, H. (432), 1928.08.17 (TI); Kaizuka <65-lower l.>, Sugawara, S. 16847, 1928.08.19 (SAPT); Shinba <65-lower l.>, Koidzumi, G., 1940.09.02 (KYO); Mereya <70-upper r.>, Miyabe, K., Miyagi, T. & Miyake, T., 1906.07.14 (SAPS); Korsakof <70-upper r.>, Faurie, U. 384, 1908.09 (KYO, SAPS); Ootomari <70-upper r.>, Sugawara, S. 16854, 1930.07.25 (SAPT); Nankei-cho <70-upper r.>, Sugawara, S. 16843, 16845, 16846, 1932.08.28 (SAPT); Ootomari <70-upper r.>, Sugawara, S. 16844, 1932.08.28 (SAPT); E of Korsakov, along River Mereya <70-upper r.>, Fukuda, T. 1332, 2001.07.28 (SAPS); Chipisani <71-upper l.>, Nakahara, G., 1906.08 (TI- 2 sheets, TNS 24171); Nagahama <71-upper r.>, Sugawara, S. 16850, 1929.07.25 (SAPT); Nagahama-gun, Enbuchi-mura <71-upper r.>, Sase, H., 1935.07.18 (SAPS).

[No locality] Faurie, U. 379, 1908.08 [SAPS]; Faurie, U. 379, 1908.09 (KYO- 3 sheets); Komatsu, no date (TI).

<THE KURILS>

SOUTH. ITURUP <20>. Oyachi, Saito, S., 1928.08.11 (TI); Bettobi, Saito, S. 406, 1928.08.17 (TI- 2 sheets); Bettobi, Yoshimura, B., 1937.08.11 (SAPS- 2 sheets); Rubetsu village, mouth of Naibo River-Iribushi, Azuma, T. & al. 3261, 2002.06.19 (SAPT). KUNASHIR <21>. Kaikaramui, Tatewaki, M. 3231, 1923.07.22 (SAPS); Furukamapp, Tatewaki, M. 3369, 1923.07.25 (SAPS, SAPT); Chinomichi, Tatewaki, M. 3533, 1923.08.02 (SAPS); Shiranuka, Nagai, M. & Shimamura, M., 1929.07.29 (SAPS- 2 sheets); Shiranuka, Nagai, M. & Shimamura, M., 1929.07.30 (SAPS); Nikishiro, Nagai, M. & Shimamura, M., 1929.08.13 (SAPS- 3 sheets); Furukamappu-Nikishiro, Matsumura, Y., 1930.07.21 (KYO); Tomari, Tatewaki, M. 25342, 1936.08.17 (SAPS). SHIKOTAN <22>. River Notoro, Ohwi, J., 1931.08.09 (KYO).

13. Conioselinum chinense (L.) Britt., Pogg. et Sterns [Karafuto-ninjin]

<SAKHALIN>

NORTH. N. Sakhalin, Ado <04-upper l.>, Kudo, Y. & Ishida, B. 7012, 1923.09.07 (SAPS); N. Sakhalin, Piliwo <04-lower r.>, Kudo, Y. & Ishida, B. 7125, 1923.08.25 (SAPS); S of Peninsula Schmidt, W coast <07-upper l.>, Fukuda, T. 1887, 2001.08.10 (SAPS- 2 sheets).

MIDDLE. Northern Sakhalin, Ako <28-lower l.>, Okada, 1923.08.19 (TI); Pilewo <36-lower l.>, Miyabe, K. & Miyagi, T., 1906.08.13 (SAPS); Ambetsu <36-lower l.>, Tokunaga, M. & Kawai, K., 1929.09.02 (SAPS); Nayoshi-gun, Nayoshi-mura, Oyau <36-lower l.>, Koidzumi, G., 1940.08.20 (KYO); E. Coast, Kokkyo, Asase <40-lower l.>, Hoshino, Y. & Sugiyama, S., 1933.08.11 (SAPS); Borodo <43-lower l.>, Miyake, T., 1906.09.02 (SAPS); Shikka-shicho, Chirikoro-Chiroyondo <45-upper r.>, Hoshino, Y. & Sugiyama, S., 1933.08.08 (SAPS); Shikka-shicho, Chirikoro <45-upper r.>, Hoshino, Y. & Sugiyama, S., 1933.08.08 (SAPS); Shikka-shicho, Atsunai River <45-upper r.>, Hoshino, Y., Okada, S. & Sugiyama, S., 1933.08.12 (SAPS); Nayoshi-gun, Morotsu <46-upper l.>, Hemmi, M., 1942.09.06 (TNS 108779, 631306); Nayoro <48-lower l.>, Nakahara, G., 1906.08 (TI); E. Coast, Ehorokofunai <48-lower l.>, Miyake, T., 1906.08.11 (SAPS); E. Coast, Nayoro <48-lower l.>, Miyake, T., 1906.09.09 (SAPS); Shikka <48-upper r.>, Miyake, T., 1906.09.02 (SAPS); Sisuka <48-upper r.>, Ishida, S., 1909.08 (TI); Siska <48-upper r.>, Sawada, T., 1923.08.14 (TI); Shikka <48-upper r.>, Kitamura, S., 1930.08.17 (KYO); Shikka, Nishitaraika <49-upper l.>, Otani, H., 1930.08.02 (SAPS); Telpenia Bay, Taraika <49-upper r.>, Miyake, T., 1906.08.13 (SAPS); Shikka-shicho, Nagaiso <51-upper l.>, Hoshino, Y. & Sugiyama, S., 1933.08.03 (SAPS); Kitashiretoko-hanto, Noto <51-lower l.>, Hoshino, Y., Okada, S. & Sugiyama, S., 1933.07.14 (SAPS); E. Coast, Kotankeshi <54-upper r.>, Miyake, T., 1906.09.12 (SAPS); Kitashiretoko-hanto, Yoman-Rosoku-iwa <55-upper r.>, Okada, S. & Sugiyama, S., 1933.07.21 (SAPS); Kitashiretoko-hanto, Kitashiretoko-misaki <55-lower r.>, Hoshino, Y., Okada, S. & Sugiyama, S., 1933.07.19 (SAPS).

SOUTH. E. Coast, Kashipo <57-upper r.>, Miyake, T., 1906.09.14 (SAPS); E. Coast, Soya <57-upper r.>, Miyake, T., 1906.09.15 (SAPS); Motodomari (Vostotschnyi) <57-upper r.>, Saito, S. 3731, 1929.08.01 (TI- 3 sheets, TNS 723784); Seaside of Kasipo <57-upper r.>, Takee, G., Abumiya, H. & Hosino, Y., 1932.07.30 (SAPS); Noda <60-upper l.>, Hara, H. (162), 1928.08.16 (TI); Sakachama <62-upper l.>, Narita, Y. 797, 1923.08.26 (TI); E. Coast, Rore <62-upper r.>, Miyake, T., 1906.09.27 (SAPS); Rutoka <64-lower r.>, Miyake, T., 1906.10.01 (SAPS); Torechapaachi <65-lower l.>, Nakahara, G., 1906.08 (TNS 24174); Kaizuka <65-lower l.>, Hara, H. (162b), 1928.08.17 (TI); Kaizuka <65-lower l.>, Koidzumi, G., 1930.08.08 (KYO); E of Dolinsk, near River Shima <66-upper l.>, Fukuda, T. 2442, 2001.08.27 (SAPS); Aniwa Bay, Korssakoff <70-upper r.>, Miyake, T., 1906.06.19 (SAPS); Mereya <70-upper r.>, Miyabe, K., Miyagi, T. & Miyake, T., 1906.07.14 (SAPS); Ootomari <70-upper r.>, Sugawara, S. 16878, 1940.07.02 (SAPT); Merai <70-upper r.>, Sugawara, S. 16879, 1940.07.05 (SAPT); Chipisani <71-upper l.>, Nakahara, G., 1906.08 (TI); Nagahama-gun, Enbuchi-mura <71-upper r.>, Sase, H., 1937.08.13 (SAPS); Nagahama-gun,

Enbuchi <71-upper r.>, Sase, H., 1937.08.17 (TNS 85022); SE shore of Lagoon Busse <72-upper l.>, Takahashi, H. 30643, 2002.08.16 (SAPS); Nishinotoro–Soni <73-lower l.>, Saito, S., 1929.08.22 (TI- 2 sheets); Isl. Kaibato <73-lower l.>, Koidzumi, H. 108326, 1938.08.18 (TNS 911737); Chiishiya <73-upper r.>, Miyabe, K. & Miyagi, T., 1906.08.18 (SAPS).

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NORTH. ANTSIFEROVA <04>. No locality, Takahashi, H. 23795, 1997.08.15 (SAPS).

MIDDLE. CHIRINKOTAN <08>. E of Cape Ptichy, Takahashi, H. 21592, 1996.08.10 (SAPS). EKARMA <09>. No locality, Tatewaki, M. 11356, 1928.08.11 (SAPS); E of Cape Shpilevoy, Takahashi, H. 21633, 1996.08.10 (SAPS). SHIASHKOTAN <10>. No locality, Ishikawa, T., 1894.06.23 (SAPS- 2 sheets). RAIKOKE <11>. E side of island, Takahashi, H. 21868, 1996.08.13 (SAPS). MATUA <12>. Matua, Banjo-jima, Tatewaki, M. & Tokunaga, Y. 12287, 1928.09.07 (SAPS); Dvoynaya Bay–Aynu Bay, Takahashi, H. 22049, 1996.08.15 (SAPS). RASSHUA <13>. Yoriki-hama, Takahashi, H. 19111, 1995.08.12 (SAPS). USHISHIR-RYPONKICHA <14a>. No locality, Tatewaki, M. & Tokunaga, Y. 12567, 1928.08.11 (SAPS). USHISHIR-YANKICHA <14b>. No locality, Tatewaki, M. & Tokunaga, Y. 12496, 1928.09.01 (SAPS); Onsen-wan, Tatewaki, M. & Takahashi, K. 15840, 1929.09.10 (SAPS); Higashi-wan, Tatewaki, M. & Takahashi, K. 15865, 1929.09.12 (SAPS); Kraternaya Bay, Takahashi, H. 19326, 1995.08.14 (SAPS- 2 sheets); Kraternaya Bay, Takahashi, H. 19272, 1995.08.14 (SAPS); Kraternaya Bay, Takahashi, H. 19332, 1995.08.14 (SAPS). KETOI <15>. No locality, Tatewaki, M. & Tokunaga, Y. 11518, 1928.09.01 (SAPS); Near Ishikuzurehama, Tatewaki, M. & Takahashi, K. 15396, 1929.08.17 (SAPS); Mouth of Stochnyy River, Takahashi, H. 19555, 1995.08.19 (SAPS). SIMUSHIR <16>. Broton Bay, Tatewaki, M. & Tokunaga, Y. 12089, 1928.08.14 (SAPS). BROUTONA <17>. Nodostupnyy Cape, Ohara, M., 1995.08.23 (SAPS- 2 sheets). CHIRPOI <18a>. Peschanaya Bay, Takahashi, H. 19873, 1995.08.23 (SAPS). BRAT CHIRPOEV <18b>. W of Samotuga Cape, Takahashi, H. 24085, 1997.08.20 (SAPS); W of Samotuga Cape, Takahashi, H. 24098, 1997.08.20 (SAPS); Uglovaya Bay, Takahashi, H. 28448, 2000.08.04 (SAPS). URUP <19>. Iwayadomari, Uchida, K., 1891.06.11 (SAPS); Anama, Jimbo, K., 1891.06.18 (SAPS); No locality, Watanabe, K., 1944.06-07 (TI); Barhatnyy Bay, Takahashi, H. 20082, 1995.08.28 (SAPS); Inland from Ukromnaya Bay, Takahashi, H. 22104, 1996.08.20 (SAPS).

SOUTH. ITURUP <20>. Moyoro, Ijinkotan, Yokoyama, S., 1893.07.27 (SAPS); Mariyomai, Kawakami, T., 1898.08 (TI); Shana, Kawakami, T., 1898.09 (TI); Rubetsu, Kawakami, T., 1898.09 (TI); Mt. Hitokappu-yama, Yendo, K., 1903 (TI); Shamanbe, Kondo, K., 1927.07.14-15 (TI); Shana, Saito, S., 1928.09.05 (TI); Rubetsu-kaigan, Koidzumi, H. 24946, 1930.08.06 (TNS 920136); Kamuikotan, Koriba, M.

& Yoshii, R., 1933.08.07 (KYO); Shana, Yoshimura, B., 1939.08.20 (SAPS- 2 sheets). KUNASHIR <21>. Ruyabetsu-mura, Endo, C., 1894.08.15 (SAPS); Chachanupuri, Kondo, K., 1929.07.20 (TI); Chinomichi, Kondo, K., 1929.07.24 (TI); Cape Atoiya, Nagai, M. & Shimamura, M., 1929.08.03 (SAPS); Wennai–Furukamappu, Nagai, M. & Shimamura, M., 1929.08.11 (SAPS); Rebun'iso, Koidzumi, H. 21985, 1929.08.14 (TNS 900622); Zenbekotan, Tatewaki, M. 25640, 1936.08.22 (SAPS). SHIKOTAN <22>. Anama, Takeda, H., 1909.07.21 (SAPS); Anama, Arai, M. (13), 1910.07.09 (SAPS, TNS 29734); No locality, Abe, A., 1924.07.17 (TNS 429834, 429835); Shakotan Harbor, Saito, S. 765, 1925.09.01 (TI- 2 sheets); Shakotan-Horobetsu, Saito, S. 9982, 1925.09.04 (TI); Horobetsu, Saito, S. 6173, 1925.09.04 (TI- 3 sheets); Notoro–Inemoshiri, Saito, S., 1925.09.06 (TI); No locality, Kondo, K., 1927.08.11 (TI); Shakotan, Kondo, K., 1929.08.04 (TI); Anama, Saito, S., 1929.08.28 (TI); Anama, Kondo, K., 1929.08.28 (TI); Notoro – Sendaiwan, Kondo, K., 1929.09.03 (TI); Shakotanzaki, Ohwi, J., 1931.09.03 (KYO).

14. Conioselinum filicinum (H. Wolff) H. Hara [Miyama-senkyū] (“Intermediate plant” means the plants which show the intermediate morphological characters between *Conioselinum chinense* and *C. filicinum*)

<THE KURILS>

MIDDLE. URUP <19>. Kobune, Tatewaki, M. 9756, 1927.08.26 (SAPS; intermediate plant); Tokotan, lake-side, Tatewaki, M. 9743, 1927.08.28 (SAPS; intermediate plant); Kobune, Tatewaki, M. & Takahashi, K. 15983, 1929.09.18 (SAPS; intermediate plant); Smuglyy Bay, Takahashi, H. 19942, 1995.08.24 (SAPS); Inland from Ukromnaya Bay, Takahashi, H. 22174, 1996.08.20 (SAPS; intermediate plant); Inland from Ukromnaya Bay, Takahashi, H. 22181, 1996.08.20 (SAPS); Tetyayeva Bay, Takahashi, H. 28621, 2000.08.08 (SAPS; intermediate plant).

SOUTH. ITURUP <20>. Mt. Atoiya, Kondo, K., 1927.07.21 (TI; intermediate plant); No locality, Koidzumi, H. 24829, 1930.08.05 (TNS 920058; intermediate plant); Tzando, Koidzumi, H. 25003, 1930.08.08 (TNS 920042; intermediate plant); Shibetro, Nikishiro-sando, Koidzumi, H. 25518, 1930.08.17 (TNS 919891; intermediate plant); Toro–Naibo, Kambe, M., 1890.08 (SAPS, TI; intermediate plant); Bettobu, Funayama, Y., 1912.08.20 (SAPS; intermediate plant); Mt. Sashiusu, Saito, S., 1928.08.22 (TI; intermediate plant); Shana, Yoshimura, B., 1937.08.08 (SAPS; intermediate plant); Shibetoro–Moyoro, Yoshimura, B. & Yokoyama, H., 1938.08.02 (SAPS; intermediate plant). KUNASHIR <21>. Mt. Chacha, Koidzumi, H. 22095, 1929.08.19 (TNS 920054).

15. Cryptotaenia japonica Hassk. [Mitsuba] <SAKHALIN>

SOUTH. Tohutsu <60- upper l.>, Hara, H. (422), 1928.08.15 (TI).

<THE KURILS>

SOUTH. KUNASHIR <21>. Chinomichi, Tatewaki, M. 3653, 1923.08.12 (SAPS).

16. Glehnia littoralis F.Schmidt ex Miq. [Hama-böhū]
<SAKHALIN>

NORTH. E. Coast, Gulf of Odoptu <11-upper l.>, Yabe, M. 2613, 2001.08.03 (SAPS); N. Sakhalin, Nyiwo <23-lower l.>, Kudo, Y. & Tatewaki, M. 6682, 1922.08.12 (SAPS).

MIDDLE. Shikka-shicho, Shibunkoro <45-lower r.>, Hoshino, Y. & Okada, S., 1933.08.03 (SAPS); Near Shisuka, Satsukari <48-upper r.>, Namikawa, I., 1914.08.11 (SAPS); Shikka <48-upper r.>, Sugawara, S. 16911, 1927.08.03 (SAPT); Ushiro-mura, near Kotan <52-upper l.>, Hara, H., 1936.07.30 (TI).

SOUTH. W. Coast, Kusunnai <58-upper r.>, Miyake, T., 1906.07.07 (SAPS); E. Coast, Kusunnai <58-upper r.>, Miyake, T., 1906.09.21 (SAPS); Motodomari-gun, Kushun'nai-mura <58-upper r.>, Sase, H., 1937.09.10 (SAPS); Shiraraka <59-upper l.>, Miyake, T., 1906.07.09 (SAPS); Shiraraka <59-upper l.>, Miyake, T., 1906.08.09 (SAPS); Habomai <60-lower l.>, Sugawara, S. 16909, 1929.09.02 (SAPT); W. Coast, Habomai-gen'ya <60-lower l.>, Kurushima, S., 1930.09 (TI); Dubki <62-upper l.>, Miyabe, K. & Miyagi, T., 1906.07.22 (SAPS); Sakaehama (Starodubskove) <62-upper l.>, Saito, S. 3678 and/or 3768, 1929.07.29 (TI, TNS 755151); Sakaehama <62-upper l.>, Koidzumi, G., 1930.08.13 (KYO); Ochiai-gun, Sakaehama-mura <62-upper l.>, Sase, H., 1934.08.05 (SAPS); Mereya <70-upper r.>, Faurie, U. 381, 1908.08.14 (KYO); Lagoon Busse <71-upper r.>, Takahashi, H. 30637, 2002.08.15 (SAPS).

[No locality] Komatsu, no date (TI).

<THE KURILS>

NORTH. SHUMSHU <02>. No locality, Ishikawa, T., 1894.06.29 (SAPS).

MIDDLE. SIMUSHIR <16>. Nakanoura, Yumita, C. 11825, 1928.08 (SAPS). CHIRPOI<18a>. Peschanaya Bay, Takahashi, H. 19880, 1995.08.23 (SAPS). URUP <19>. Tokotan, Jimbo, K., 1891.06.15-30 (SAPS); Tokotan, Uchida, K., 1891.06.16-25 (SAPS); Daibawan, Jimbo, K., 1891.06.30 (SAPS); No locality, Aizawa, M., 1900.07.02 (SAPS); Tokotan, Tatewaki, M. 9622, 1927.08.29 (SAPS); Otkrytyy Bay, Takahashi, H. 18492, 1995.08.04 (SAPS); Tetyayeva Bay, Takahashi, H. 28643, 2000.08.08 (SAPS).

SOUTH. ITURUP <20>. Bettobu, Kambe, M., 1891 (SAPS); Shana, Yoshimura, B., 1937.08.07 (SAPS). KUNASHIR <21>. Kaikaramui, Tatewaki, M. 3222, 1923.07.22 (SAPS); Cape Atoiya, Nagai, M. & Shimamura, M., 1929.08.03 (SAPS); Chinomichi, Koidzumi, H. 21816, 1929.08.13 (TNS 516979); Seseki-Mt. Iwo, Matsumura, Y., 1930.07.24 (KYO); Kotankeshi, Tatewaki, M. 25548, 1936.08.20 (SAPS); Kotankeshi, Tanaka, Nakano, Isida, Hara & Otani, 1939.08.16 (SAPS). SHIKOTAN <22>. No locality, Kawakami, T., 1898.08 (TI); Shakotanzaki, Ohwi, J.,

1931.09.03 (KYO).

17. Heracleum lanatum Michx. [Ō-hanaudo]
<SAKHALIN>

NORTH. E coast of Schmidt Peninsula <05-upper l.>, Fukuda, T. 2071, 2001.08.14 (SAPS).

MIDDLE. About 40km E of Palevo, N of Chamginskiy Pass <34-upper r.>, Takahashi, H. 30368, 2002.08.08 (SAPS- 2 sheets); Anbetsu <36-lower l.>, Sugawara, S. 16921, 1933.08.13 (SAPT); Anbetsu, Kokkyo <36-lower l.>, Hara, H., 1936.08.01 (TI); Hamdasa <37-lower r.>, Miyake, T., 1906.08.27 (SAPS); Mt. Mimizuku-yama <42-lower r.>, Tobita, H., 1926.07.10 (KYO); R. Koruria <43-lower l.>, Miyake, T., 1906.08.22 (SAPS); Shikka-shicho, Chirikoro <45-upper r.>, Hoshino, Y. & Sugiyama, S., 1933.08.08 (SAPS); Shikka, Aba <48-upper l. ?>, Otani, H. & Imai, Y., 1930.07.31 (SAPS); E. Coast, Nayoro <48-lower l.>, Miyake, T., 1906.08.21 (TNS 380137); Kitashiretoko-hanto, Noto <51-lower l.>, Hoshino, Y., Okada, S. & Sugiyama, S., 1933.07.12 (SAPS); Kitashiretoko-hanto, near Lake Chirie <51-lower r.>, Hoshino, Y., Okada, S. & Sugiyama, S., 1933.07.15 (SAPS); Kitashiretoko-hanto, Mt. Hokke-yama <51-lower r.>, Hoshino, Y., 1933.07.22 (SAPS); Kitashiretoko-hanto, Lake Nataruba <51-lower r. ?>, Hoshino, Y., 1933.07.26 (SAPS); Kashipo, Somayoi <54-lower l. ?>, Takee, G., Abumiya, H. & Hosino, Y., 1932.07.20 (SAPS).

SOUTH. E. Coast, Mt. Tosso <57-lower l.>, Hiratsuka, N., Iwadare, S. & Nagai, M., 1927.07.23 (SAPS); Motodomari-shicho, Mt. Tosso-zan <57-lower l.>, Honda, M. & Kimura, Y., 1940.08.12 (TI); About 5km SW of Vostochnyy, Pugacheva <57-lower l.>, Takahashi, H. 31062, 2003.07.25 (SAPS); W. Coast, Kusunnai <58-upper r.>, Miyake, T., 1906.07.07 (SAPS); E. Coast, Chikaporonai <59-upper l.>, Miyake, T., 1907.08.15 (SAPS); Aihama (Tokyo Univ. Forest) <61-upper r.>, Imazeki, R., 1941.07.13 (TNS 80666); Toyohara-gun, Toyokita-mura <62-lower l.>, Sase, H., 1937.08.05 (SAPS- 2 sheets); Sokol <62-lower l.>, Fukuda, T. 1030, 2001.07.17 (SAPS); 20km E of Sokol town, mouth of Bakhura River <62-lower r.>, Takahashi, H. 29093, 2001.07.19 (SAPS- 2 sheets); 20km SE of Dolinsk <62-lower r.>, Takahashi, H. 30111, 2002.07.31 (SAPS- 2 sheets); W. Coast, Semantomari <63-upper r.>, Miyake, T., 1906.07.03 (SAPS); Shimizu <64-upper l.>, Miyake, T., 1906.06.30 (SAPS); Toyohara <65-upper l.>, Muramatsu, S. 976, 977, 1923.07.06 (TI); Toyohara <65-upper l.>, Hara, H., 1931.07.30 (TI); Toyohara <65-upper l.>, Hara, H., 1936.07.28 (TI- 3 sheets); Toyohara <65-upper l.>, Koidzumi, G., 1940.08.14 (KYO- 3 sheets); Approx. 50km SE of Yuzhno-Sakhalinsk, N of Tunaicha Lake <66-lower l.>, Takahashi, H. 29520, 2001.07.29 (SAPS); Aniwa Bay, Korssakoff <70-upper r.>, Miyake, T., 1906.06.19 (SAPS); Korssakoff <70-upper r.>, Miyabe, K. & Miyagi, T., 1906.07.12 (SAPS); Korssakoff <70-upper r.>, Miyabe, K. & Miyagi, T., 1906.08.04 (SAPS); Korsakof <70-upper r.>, Faurie, U. 388, 1908.09 (KYO- 2 sheets); Ohdomari <70-upper

r.>, Saito, S., 1929.07.24 (TI); Chipisani <71-upper l.>, Miyabe, K., Miyagi, T. & Miyake, T., 1906.07.15 (SAPS); Naionnai <72-lower l.>, Miyabe, K. & Miyagi, T., 1906.08.01 (SAPS); Todomoshiri, Tomarizawa <73-lower l.>, Miyake, T., 1906.07.23 (SAPS); Todomoshiri, Mt. Dainan <73-lower l.>, Miyake, T., 1906.07.26 (SAPS); Isl. Kaibato, Kamomegawa <73-lower l.>, Kimoto, Murayama & Takee, 1931.07.29 (SAPS).

<THE KURILS>

NORTH. ATLASOVA <01>. Uomizaki, Ito, S. & Komori, G., 1926.08.04 (SAPS). SHUMSHU <02>. No locality, Yendo, K., 1903.08 (TI); Near Shiraiwa, Kojima, K. 1335, 1932.08 (TNS 182826); S of Pochtareva Cape, Takahashi, H. 23321, 1997.08.08 (SAPS). PARAMUSHIR <03>. Otmai, Tarao, C., 1892.08.15 (SAPS); Arakawa, Kudo, Y. 5359, 1920.07.15 (SAPS); Foot of Mt. Sannohe, Koidzumi, H. 39668, 1932.08.10 (TNS 908674); Arakawa, Ohwi, J. & Yoshii, R. 6246, 1934.08.14 (KYO); Paramushir, 5km S of Severo-Kuril'sk, Takahashi, H. 20829, 1996.08.01 (SAPS- 2 sheets); E side of Vasil'yeva Bay, Takahashi, H. 20909, 1996.08.03 (SAPS); S of Savushkina Cape, Takahashi, H. 23029, 1997.08.04 (SAPS). ANTSIFEROVA <04>. NW of the island, Takahashi, H. 23801, 1997.08.15 (SAPS).

MIDDLE. KHARIMKOTAN <07>. Inland from Severgina Bay, Takahashi, H. 21521, 1996.08.08 (SAPS- 2 sheets). EKARMA <09>. E of Cape Shpilevoy, Takahashi, H. 21658, 1996.08.10 (SAPS). RAIKOKE <11>. E side of the island, Takahashi, H. 21875, 1996.08.13 (SAPS- 2 sheets). MATUA <12>. Banjo-jima, Tatewaki, M. & Tokunaga, Y. 12286, 1928.09.07 (SAPS); Inland from Dvoynaya Bay, Takahashi, H. 21950, 1996.08.14 (SAPS- 2 sheets). RASSHUA <13>. Mikasa, Tatewaki, M. & Tokunaga, Y. 12364, 1928.08.06 (SAPS); Sonrakuwan, Tatewaki, M. & Takahashi, K. 15287, 1929.08.09 (SAPS); Yoriki-hama, Takahashi, H. 19069, 1995.08.12 (SAPS- 2 sheets). USHISHIR-YANKICHA <14b>. Near Onsen-wan, Tatewaki, M. & Takahashi, K. 15838, 1929.09.10 (SAPS); Kraternaya Bay, Takahashi, H. 19283, 1995.08.14 (SAPS- 2 sheets). KETOI <15>. No locality, Nishida, T., 1928.05.06 (SAPS); Near Shimizugawa, Tatewaki, M. & Takahashi, K. 15656, 1929.08.30 (SAPS); Cape Storozheva, Takahashi, H. 19415, 1995.08.15 (SAPS). CHIRPOI <18a>. Peschanaya Bay, Takahashi, H. 19788, 1995.08.23 (SAPS). BRAT CHIRPOEV <18b>. W of Samotuga Cape, Takahashi, H. 24091, 1997.08.20 (SAPS); Uglovaya Bay, Takahashi, H. 28436, 2000.08.04 (SAPS). URUP <19>. Anama-Yoshino-hama, Uchida, K., 1891.06.17 (SAPS); Yoshinohama, Uchida, K., 1891.06.18 (SAPS); Near Onsenzaki, Tatewaki, M. 10053, 1927.09.09 (SAPS); Otkrytyy Bay, Takahashi, H. 18414, 1995.08.04 (SAPS- 2 sheets); Inland from Ukromnaya Bay, Takahashi, H. 22105, 1996.08.20 (SAPS).

SOUTH. ITURUP <20>. Mt. Atoiya, Kondo, K., 1927.07.21 (TI); Sokiya-Shibetoru, Saito, S.,

1928.08.08 (TI); Shana, Yoshimura, B., 1937.08.07 (SAPS). KUNASHIR <21>. Chachanupuri, Kondo, K. (2389), 1929.07.20 (TI- 3 sheets, TNS 716820); River Onnebetsu, Kondo, K., 1929.07.26 (TI); Mt. Chacha-nupuri, Okada, Y., 1929.08.03 (TNS 386273); Shiranuka-Chinomichi, Nagai, M. & Shimamura, M., 1929.08.05 (SAPS); Rurui, Shirahama, K. & Takahashi, Y., 1935.07.20 (SAPS). SHIKOTAN <22>. No locality, Kawakami, T., 1898.08 (TI); No locality, Kondo, K. 7910, 1927.08.11 (TI); Riv. Notoro, Ohwi, J., 1931.08.09 (KYO); Shakotan-Kagenoma, Ohwi, J., 1931.08.31 (KYO).

18. *Hydrocotyle ramiflora* Maxim. [Ō-chidome]
[No specimens in Japanese herbaria]

19. *Ligusticum scoticum* L. [Maruba-tōki]
<SAKHALIN>

NORTH. N. Sakhalin, Asukasai <?>, Okada, 1923.08.30 (TI); W coast of Peninsula Schmidt <04-lower l.>, Fukuda, T. 1859, 2001.08.09 (SAPS); N coast of Peninsula Schmidt <04-upper r.>, Fukuda, T. 1613, 2001.08.05 (SAPS); N coast of Peninsula Schmidt <05-upper l.>, Fukuda, T. 1832, 2001.08.08 (SAPS); S of Peninsula Schmidt, E coast <05-lower r.>, Fukuda, T. 2185, 2001.08.16 (SAPS); N end of Gulf Pomr' <07-upper l.>, Fukuda, T. 1890, 2001.08.10 (SAPS); N. Sakhalin, Urta-wan <07-lower r.>, Kudo, Y. & Ishida, B. 7252, 1923.09.01 (SAPS).

MIDDLE. Alexandrovski <28-lower l.>, Takamatsu, M., 1905.07.30 (SAPS); N. Sakhalin, Ako <28-lower l.>, Kudo, Y. & Tatewaki, M. 6018, 1922.07.23 (SAPS); Sokorai <36-lower l.>, Miyabe, K. & Miyagi, T., 1906.08.13 (SAPS); Pilewo <36-lower l.>, Miyabe, K. & Miyagi, T., 1906.08.13 (SAPS); N. Sakhalin, Hantuza <37-lower r.>, Okada, 1923.08.31 (TI); E. Coast, Kokkyo, Asase <40-lower l.>, Hoshino, Y. & Sugiyama, S., 1933.08.11 (SAPS); Shikka Distr., Chirikoro <45-upper r.>, Yoshimura, B., 1936.08.06 (SAPS- type specimen of f. *incisa* Miyabe & Tatewaki); Nayoshi-gun, Kitakozawa <46-upper l.>, Henmi, M., 1941.09.15 (TNS 631302, 631301, 631300); E. Coast, Ehorokofunai <48-lower l.>, Miyake, T., 1906.08.11 (SAPS); E. Coast, Nayoro <48-lower l.>, Miyake, T., 1906.09.06 (SAPS); Tomarikishi-kaigan <48-lower l.>, Chono, T., 1928.07.20 (TNS 253567); Shikka <48-upper r.>, Miyabe, K. & Miyagi, T., 1906.07.23 (SAPS); Telpenia Bay, Shikka <48-upper r.>, Miyake, T., 1906.08.12 (SAPS); Shisuka <48-upper r.>, Namikawa, I., 1914.08.07 (SAPS); Siska <48-upper r.>, Sawada, T., 1923.08.14 (TI); Shikka <48-upper r.>, Otani, H. & Imai, Y., 1930.07.18 (SAPS); Shikka <48-upper r.>, Kitamura, S., 1930.08.20 (KYO); Taraika River <49-upper l.>, Hara, H. (C1065), 1931.08.03 (TI); Taraika <49-upper r.>, Miyabe, K. & Miyagi, T., 1906.07.27 (SAPS); Jimutaki <50-upper r.>, Miyabe, K. & Miyagi, T., 1906.07.24 (SAPS); Kitashiretoko-hanto, Noto <51-lower l.>, Hoshino, Y., Okada, S. & Sugiyama, S., 1933.07.12 (SAPS); Kitashiretoko-hanto, Chirie <51-lower r.>, Hoshino,

Y., Okada, S. & Sugiyama, S., 1933.07.15 (SAPS); Kitashiretoko-hanto, Kitafunakoshi <51-lower r.>, Hoshino, Y. & Sugiyama, S., 1933.07.23 (SAPS); Chirie <51-lower r.>, Sugawara, S. 16946, 1935.07.29 (SAPT); Ushiro-mura, near Kotan <52-upper l.>, Hara, H., 1936.07.30 (TI); Kitashiretoko-hanto, near Enton <55-upper l.>, Hoshino, Y., 1933.07.21 (SAPS); Kitashiretoko-hanto, Yoman-Rosoku-iwa <55-upper r.>, Okada, S. & Sugiyama, S., 1933.07.21 (SAPS); Kitashiretoko-hanto, Kitashiretoko-misaki <55-lower r.>, Hoshino, Y., Okada, S. & Sugiyama, S., 1933.07.20 (SAPS).

SOUTH. W. Coast, Raichisuka <56-upper l.>, Miyake, T., 1907.09.06 (SAPS); W. Coast, N of Krasnogorsk, SE of Aynskoye Lake <56-upper l.>, Yabe, M., 2001.07.22 (SAPS); Makunkotan <57-lower l.>, Miyabe, K. & Miyagi, T., 1906.07.22 (SAPS); E. Coast, Mt. Tosso <57-lower l.>, Hiratsuka, N., Iwadare, S. & Nagai, M., 1927.07.23 (SAPS); Mt. Tosso <57-lower l.>, Hiratsuka, N., 1927.07.23 (TI); Approx. 80km N of Dolinsk, Tsapko <57-lower l.>, Takahashi, H. 29541, 2001.08.01 (SAPS); About 5km SW of Vostochnyy, Pugacheva <57-lower l.>, Takahashi, H. 31065, 2003.07.25 (SAPS); About 5km SW of Vostochnyy, Pugacheva <57-lower l.>, Inoue, K. 3045, 2003.07.25 (SAPS); About 5km SW of Vostochnyy, Pugacheva <57-lower l.>, Inoue, K. 3007, 2003.07.25 (SAPS); Seaside of Kashipo <57-upper r.>, Takee, G., Abumiya, H. & Hosino, Y., 1932.07.24 (SAPS); W. Coast, SW of Penzenskoye <58-upper l.>, Yabe, M., 2001.07.24 (SAPS); Kusunnai <58-upper r.>, Miyabe, K. & Miyagi, T., 1906.08.09 (SAPS); E. Coast, Chikaporonai <59-upper l.>, Miyake, T., 1907.08.15 (SAPS); Tofutsu <60-upper l.>, Hara, H. (183c), 1928.08.15 (TI); Habomai, sea coast <60-lower l.>, Hara, H. (183a), 1928.08.15 (TI); W. Coast, Habomai-gen'ya <60-lower l.>, Kurushima, S., 1930.09 (TI); E. Coast, Naibuchi <62-upper l.>, Miyake, T., 1906.09.26 (SAPS); Naibuchi <62-upper l.>, Komatsu, S., 1913.08.02 (TI); Sakaehama <62-upper l.>, Hara, H. (C972), 1931.07.31 (TI- 2 sheets); E. Coast, near mouth of River Naiba <62-upper l.>, Fukuda, T. 2576, 2001.07.23 (SAPS); Naibuchi River, near Ochiai <62-lower l.>, Narita, Y., 1923.08.25 (TI); E. Coast, Rore <62-upper r.>, Miyake, T., 1906.09.27 (SAPS); 20km E of Sokol town, mouth of Bakhura River <62-lower r.>, Takahashi, H. 29094, 2001.07.19 (SAPS); Maoka-cho, Kumekomai <63-upper r.>, Mizukoshi, 1926.07.31 (TNS 014022); Maoka-cho, Arakai <63-upper r.>, Mizukoshi, 1926.08.03 (TNS 014021); Maoka-cho, Shinkan-yama <63-upper r.>, Maekawa, M. (Koidzumi, H. 112804), 1942.08.15 (TNS 903714); Solowiyohuka <65-lower l.>, Miyake, T., 1906.10.12 (SAPS); Kaizuka <65-lower l.>, Hara, H. (183b), 1928.08.17 (TI); Kaizuka <65-lower l.>, Koidzumi, G., 1930.08.08 (KYO); Aniwa Bay, Korssakoff <70-upper r.>, Miyake, T., 1906.06.19 (SAPS); Mereya <70-upper r.>, Miyabe, K., Miyagi, T. & Miyake, T., 1906.07.14 (SAPS); Korsakof <70-upper r.>, Faurie, U. 382, 1908.09 (KYO- 3 sheets); Otomari

<70-upper r.>, Muramatsu, S., 1923.07.04 (TI); Otomari <70-upper r.>, Narita, Y., 1923.08.20 (TI); Otomari <70-upper r.>, Hara, H. (183e), 1928.08.12 (TI); Otomari <70-upper r.>, Hara, H. (183d), 1928.08.17 (TI); 10km E of Korsakov, Prigorodnoye <70-upper r.>, Takahashi, H. 30586, 2002.08.15 (SAPS); 10km E of Korsakov, Prigorodnoye <70-upper r.>, Fujii, N. F01394, 2002.08.15 (SAPS); Prigorodnoye, E side of River Mereya <70-upper r.>, Fujii, N. F01433, 2002.08.16 (SAPS); Chipisani <71-upper l.>, Nakahara, G., 1906.08 (TI); E of Korsakov, Ozerskiy village <71-upper l.>, Fukuda, T. 1355, 2001.07.28 (SAPS); Yenbuchi, lake-side <71-upper r.>, Ohta, 1925.08.05 (SAPS); Nagahama-gun, Enbuchi-mura <71-upper r.>, Sase, H., 1935.09.15 (SAPS); Cap. Notoro <73-lower l.>, Miyabe, K. & Miyagi, T., 1906.07.19 (SAPS); Todomoshiri, Dainanwan <73-lower l.>, Miyake, T., 1906.07.23 (SAPS); Shiranushi <73-lower l.>, Miyabe, K. & Miyagi, T., 1906.08.07 (SAPS); Isl. Kaibato <73-lower l.>, Komat, S., 1915.08.12 (TI); Isl. Kaibato, Tomarisara <73-lower l.>, Kimoto, Murayama & Takee, 1931.07.22 (SAPS).

[No locality] Narita, Y., 1923.08 (TI); Komatsu, no date (TI).

<THE KURILS>

NORTH. ATLASOVA <01>. Sekinezaki, Ito, S. & Komori, G., 1926.07.06 (SAPS); Minamiura, Ito, S. & Komori, G., 1926.08.10 (SAPS); Minamiura, Ohwi, J. & Yoshii, R. 5859, 1934.07.31 (KYO); Alaidskaya Bay, Takahashi, H. 23664, 1997.08.12 (SAPS). SHUMSHU <02>. Near Bettobu, Yokoyama, S., 1893.09.22 (SAPS); No locality, Ishikawa, T., 1894.06.29 (SAPS- 2 sheets); No locality, Hoko-gikai, 1895 (SAPS); No locality, Gunji, S., 1897 (SAPS); No locality, Yendo, K., 1903.08 (TNS 24185); No locality, Yendo, K., 1903.08.17 (TI); No locality, Yendo, K., 1903.08.18 (TI); Kokutan-zaki-Numajiri, Okada, Y., 1931.08.17 (TNS 306772); S of Pochtareva Cape, Takahashi, H. 23214, 1997.08.08 (SAPS); N of Bol'shoie Lake, Takahashi, H. 23412, 1997.08.09 (SAPS). PARAMUSHIR <03>. Otmal, Tarao, C., 1892.08.15 (SAPS); Kashiwabarawan, Kudo, Y. 5057, 1920.07.09 (SAPS); Yotsuiwahana, Kudo, Y. 5175, 1920.07.12 (SAPS); Arakawa, Kudo, Y. 5360, 1920.07.15 (SAPS); Hiratozaki, Kudo, Y. 5393, 1920.07.21 (SAPS); Shirakawa, Kudo, Y. 5602, 1920.07.30 (SAPS); No locality, Koidzumi, H. 87798, 1924.08 (TNS 917911); No locality, Ohashi, T., 1932.08 (KYO); Nishikawa, Ohwi, J. & Yoshii, R. 6144, 1934.08.10 (KYO); 5km S of Severo-Kuril'sk, Takahashi, H. 20703, 1996.08.01 (SAPS- 2 sheets); E side of Vasil'yeva Bay, Takahashi, H. 21078, 1996.08.03 (SAPS); S of Savushkina Cape, Takahashi, H. 23009, 1997.08.04 (SAPS). ANTSIFEROVA <04>. NW of the island, Takahashi, H. 23788, 1997.08.15 (SAPS); NW of the island, Takahashi, H. 23796, 1997.08.15 (SAPS).

MIDDLE. MAKANRUSHI <05>. No locality, Tatewaki, M. 11288, 1928.08.09 (SAPS); Inland of Zakat Bay, Takahashi, H. 23931, 1997.08.18 (SAPS). ONEKOTAN <06>. Nemo, Tatewaki, M. 11003, 1928.08.08 (SAPS); Nemo Bay, Takahashi,

H. 21167, 1996.08.04 (SAPS); Onekotan, SW part of the island, Takahashi, H. 21290, 1996.08.05 (SAPS). KHARIMKOTAN <07>. Inland from Severgina Bay, Takahashi, H. 21503, 1996.08.08 (SAPS). CHIRINKOTAN <08>. E of Cape Ptichy, Takahashi, H. 21597, 1996.08.10 (SAPS). SHIASHKOTAN <10>. Ishikawa, T., 1894.06.23 (SAPS- 2 sheets); Zakatnaya Bay, Takahashi, H. 21748, 1996.08.11 (SAPS). RAIKOKE <11>. E side of the island, Takahashi, H. 21865, 1996.08.13 (SAPS). MATUA <12>. No locality, Cap. Uzawa, 1927.09.02 (SAPS); Inland from Dvoynaya Bay, Takahashi, H. 22024, 1996.08.14 (SAPS). RASSHUA <13>. Mikasa, Tatewaki, M. & Tokunaga, Y. 12415, 1928.08.06 (SAPS); Yoriki-hama, Takahashi, H. 19072, 1995.08.12 (SAPS). USHISHIR-RYPONKICHA <14a>. SW side, Takahashi, H. 22940, 1997.08.02 (SAPS). USHISHIR-YANKICHA <14b>. Kraternaya Bay, Takahashi, H. 19271, 1995.08.14 (SAPS). KETOI <15>. No locality, Tatewaki, M. & Tokunaga, Y. 11519, 1928.09.01 (SAPS); Near Ishikuzurehama, Tatewaki, M. & Takahashi, K. 15395, 1929.08.17 (SAPS); Cape Storozheva, Takahashi, H. 19350, 1995.08.15 (SAPS). SIMUSHIR <16>. Kitoboynaya Bay, Takahashi, H. 18931, 1995.08.10 (SAPS). CHIRPOI <18a>. Peschanaya Bay, Takahashi, H. 19789, 1995.08.23 (SAPS). BRAT CHIRPOEV <18b>. No locality, Tarao, C., 1892.06.18 (SAPS); W of Samotuga Cape, Takahashi, H. 24094, 1997.08.20 (SAPS); Uglovaya Bay, Takahashi, H. 28525, 2000.08.04 (SAPS). URUP <19>. Tokotan, Jimbo, K., 1891.06.15-30 (SAPS); Tokotan, Uchida, K., 1891.06.16 (SAPS); E of Ahuruimoi, Jimbo, K., 1891.06.25 (SAPS); Tokotan, Ishikawa, T., 1894.07.23 (SAPS); Kobune, Tatewaki, M. 9869, 1927.08.26 (SAPS); Tokotan, lake-side, Tatewaki, M. 10024, 1927.08.28 (SAPS); Otkrytyy Bay, Takahashi, H. 18409, 1995.08.04 (SAPS); Inland from Ukromnaya Bay, Takahashi, H. 22100, 1996.08.20 (SAPS- 3 sheets).

SOUTH. ITURUP <20>. Shana, Fujimura, S., 1890.08 (SAPS); Onnebetsu, Ishikawa, T., 1890.08.07 (SAPS); Rubetsu-mura, Naibo, Yokoyama, S., 1893.07.03 (SAPS); Rubetsu, Kawakami, T., 1898.09 (TI); Bettoufu, Miura, K., 1906.07.16 (SAPS); Toro, Miura, K., 1906.07.24 (SAPS); Mt. Moyoro, Tanaka, G. & Miyabe, Ken., 1910.07.17 (SAPS); Moyoro coast, Tanaka, G. & Miyabe, Ken., 1910.07.18 (SAPS); Shibetoro-Moyoro, Tanaka, G. & Miyabe, Ken., 1910.07.18 (SAPS); Shamanbe, Kondo, K., 1927.07.14-15 (TI); Shibetoru, Saito, S., 1928.08.10 (TI); Rubetsu-kaigan, Koidzumi, H. 24945, 1930.08.06 (TNS 917828); Shana, Yoshimura, B., 1937.08.07 (SAPS); Settlement Kitovyy, Ilyushko, M. & Zhuravlev, Y., 1995.08.03 (SAPS- 4 sheets). KUNASHIR <21>. Seseki, Tatewaki, M. 3107, 1923.07.20 (SAPS, SAPT); Nikishiro, Tatewaki, M. 3443, 1923.07.27 (SAPS); Furukamappu, Osaki, Wakamatsu, 1923.09.03 (SAPS); Chinomichi, Kondo, K., 1929.07.24 (TI); Sainokawara, Nagai, M. & Shimamura, M., 1929.07.29 (SAPS); Cape Atoiya, Nagai, M. & Shimamura, M., 1929.08.03

(SAPS- 2 sheets); Shiranuka-Chinomichi, Nagai, M. & Shimamura, M., 1929.08.05 (SAPS); Tomari, Ohtani, H., 1929.08.09 (SAPS); Nikishiro, Nagai, M. & Shimamura, M., 1929.08.13 (SAPS); Furukamappu, Matsumura, Y., 1930.07.20 (KYO); Seseki, Matsumura, Y., 1930.07.24 (KYO); Mt. Rurui-dake, Koriba, M. & Yoshii, R., 1933.07.31 (KYO); No locality, collector unknown, 1935 (KYO); Kotankeshi, Tatewaki, M. 25542, 1936.08.20 (SAPS); Around Yuzhno-Kuril'skiy, Ilyushko, M. & Zhuravlev, Y., 1995.08.02 (SAPS- 2 sheets). SHIKOTAN <22>. No locality, Kawakami, T., 1898.08 (TI); Debari, Takeda, H., 1909.07.26 (SAPS); Tokkarimasuba, Takeda, H., 1909.07.28 (TNS 29735); Shakotan, Tanaka, G. & Miyabe, Ken., 1910.08.10 (SAPS); No locality, Abe, A., 1924.07.17 (TNS 429821, 429819, 429818); Mt. Shakotan, Saito, S., 1925.09 (TI); Shakotan harbor, Saito, S., 1925.09.01 (TI); Shakotan-Horobetsu, Saito, S., 1925.09.04 (TI); No locality, Kondo, K. 6037, 1927.08.11 (TI, TNS 643066); Mt. Shakotan, Kondo, K., 1929.08.06 (TI); Anama, Kondo, K., 1929.08.28 (TI- 2 sheets); Chiboi-Umanose, Kondo, K., 1929.09.07 (TI); Notoro, Ohwi, J., 1931.08.08 (KYO); Shakotan-Kagenoma, Ohwi, J., 1931.08.31 (KYO). HABOMAIS <23>. Isl. Taraku, Kondo, K., 1929.08.24 (TI); Isl. Yuru, Kondo, K., 1929.08.24 (TI).

20. *Oenanthe javanica* (Blume) DC. [Seri] <SAKHALIN>

SOUTH. Toyohara-gun, Toyokita-mura <62-lower l. ~ 65-upper l.>, Sase, H., 1937.09.07 (SAPS); Honto <63-lower l.>, Saito, S. 999, 1929.08.24 (TI); Toyohara <65-upper l.>, Sugawara, S. 16953, 1936.09.23 (SAPT); Okusuzuya <65-upper l.>, Sugawara, S. 16954, 1938.07.10 (SAPT); Otomari <70-upper r.>, Hara, H., 1928.08.17 (TI); Isl. Kaiba-to <73-lower l.>, Morimoto (Sugawara 16955), 1930.07.10 (SAPT); Moneron Isl. <73-lower l.>, Stepanova, K. & Voroschilov, V., 1974.08.01 (TNS 9025148); Isand Moneron <73-lower l.>, Barkalov, V.Y. 11154, 2001.08.23 (SAPS).

<THE KURILS>

SOUTH. ITURUP <20>. Seseki, Kawakami, T., 1898.09 (TI); Seseki, Kawakami, T., 1898.09.09 (SAPS); No locality, Koidzumi, H. 87765, 1924.09.07 (TNS 912358); Rubetsu, Saito, S. 6257, 1928.09.03 (TI- 2 sheets, TNS 643746); Shana, Yoshimura, B. & Yokoyama, H., 1938.08.11 (SAPS). KUNASHIR <21>. Tomari-mura, near Zenbekotan, Tanaka, H., 1895 (SAPS); Kaikaramui, Tatewaki, M. 3226, 1923.07.22 (SAPS, SAPT); Near Lake Ichibishinai, Ponto, Tatewaki, M. 25469, 1936.08.20 (SAPS); Rausu-misaki, Tanaka, Nakano, Isida, Hara & Otani, 1939.08.14 (SAPS).

21. *Osmorhiza aristata* (Thunb.) Rydb. [Yabu-ninjin] <SAKHALIN>

MIDDLE. Anbetsu <36-lower l.>, Ishii (Sugawara 16961), 1943.06.13 (SAPT); Nayoshi-gun, Kitakozawa <46-upper l.>, Henmi, M., 1943.06.12 (TNS 631322, 631320, 631321); Mt. Shikka-dake <47-upper l.>,

Sugawara, S. 16962, 1934.07.16 (SAPT); Shikka <48-upper r.>, Sugawara, S. 16963, 1927.08.03 (SAPT); Mt. Kamabuse-yama <52-lower r.>, Sugawara, S. 16960, 1934.08.10 (SAPT); Shiritoru <54-lower l.>, Sugawara, S. 16964, 1927.08.02 (SAPT); Kashipo, Somayoi <54-lower l. ?>, Takee, G., Abumiya, H. & Hosino, Y., 1932.07.20 (SAPS).

SOUTH. E. Coast, Makunkotan <57-lower l.>, Miyake, T., 1906.09.15 (SAPS); E. Coast, Nupuripo <57-lower l.>, Miyake, T., 1906.09.18 (SAPS); E. Coast, Mt. Tosso <57-lower l.>, Hiratsuka, N., Iwadare, S. & Nagai, M., 1927.07.23 (SAPS); Approx. 89km N of Dolinsk, Tsapko–N peak of Mt. Vladimirovka <57-lower l.>, Takahashi, H. 29585, 2001.08.02 (SAPS); Mt. Kashipo-yama <57-upper r.>, Sugawara, S. 16965, 1931.06.20 (SAPT); University Forest, Odasamu <59-lower l.>, Suematsu, S., 1929.07.21 (TI); Fukakusa <61-lower r.>, Sugawara, S. 16968, 1921.07.10 (SAPT); Miho <61-lower r.>, Sugawara, S. 16967, 1922.07.20 (SAPT); Ochiai <62-lower l.>, Sugawara, S. 16966, 1921.09.02 (SAPT); Dolinsk region, Sokol <62-lower l.>, Barkalov, V.Y. 2659, 2002.08.15 (SAPS); E of Dolinsk, along River Anna <62-lower r.>, Fukuda, T. 2424, 2001.08.27 (SAPS); 20km SE of Dolinsk <62-lower r.>, Takahashi, H. 30105, 2002.07.31 (SAPS); W. Coast, Mt. Mauka <63-upper r.>, Miyake, T., 1907.06.04 (SAPS); Takinosawa <64-upper r.>, Miyake, T., 1906.06.29 (SAPS); Sussuja <65-upper l.>, Sugawara, S., 1928.07 (KYO); Aniwa Bay, Sorowiyofuka <65-lower l.>, Miyake, T., 1907.07.16 (SAPS); Mt. Susuya <65-upper r.>, Miyake, T., 1907.07.27 (SAPS); Merea <70-upper r.>, Nakahara, G., 1906.08 (TI).

<THE KURILS>

SOUTH. ITURUP <20>. Naibo, Kawakami, T., 1898.09 (TI); Sokiya–Shibetoru, Saito, S. 4018, 1928.08.08 (TI- 2 sheets, TNS 717131); Rubetsu village, mouth of Naibo River–Iribushi, Azuma, T. & al. 3260, 2002.06.19 (SAPT). KUNASHIR <21>. Nikishiro-sando, Tatewaki, M. 3425, 1923.07.27 (SAPS); Furukamappu–Nikishiro, Matsumura, Y., 1930.07.21 (KYO); No locality, collector unknown, 1935 (KYO).

22. *Peucedanum terebinthaceum* (Fisch. ex Spreng.)

Fisch. ex Turcz. [Kawara-bōhū]

<SAKHALIN>

MIDDLE. Sokorai <36-lower l.>, Miyabe, K. & Miyagi, T., 1906.08.13 (SAPS); Anbetsu <36-lower l.>, Sugawara, S. 17000, 1933.08.13 (SAPT); Nayoshi-gun, Nayoshi-mura, Oyau <36-lower l.>, Koidzumi, G., 1940.08.20 (KYO- 2 sheets); Shikka-shicho, Mt. Sekkai-yama <39-lower l.>, Yoshimura, B. & Hara, M., 1937.07.15 (SAPS); Nayoshi-gun, Yokunai <41-upper l.>, Hara, H., 1936.08.01 (TI- 2 sheets); Kitanayoshi <41-lower l.>, Sugawara, S. 17003, 1943.06.20 (SAPT); Mt. Mimizuku-yama <42-lower r.>, Tobita, H., 1926.07.10 (KYO); Mt. Horoto <42-lower r. ?>, Nagamatsu, 1930.07.26 (KYO); Shikka, Chirikoro-ichishiryu <45-upper r.>,

Sugawara, S. 27724, 1935.08.02 (SAPS); Shikka, Mt. Kawashima-yama <45-upper r.>, Sugawara, S. 29041, 1935.08.03 (SAPS); Shikka Distr., Mt. Chonosuke <45-upper r. ? >, Yoshimura, B., 1936.08.10 (SAPS- 2 sheets); Mt. Shikka-dake <47-upper l.>, Sugawara, S. 16994, 1934.07.16 (SAPT); Upstream of Niitōi River <47-lower l.>, Sugawara, S. 16998, 1934.07.21 (SAPT); S. Sakhalin, Anbetsu <47-upper r.>, Tokunaga, Y. & Kawai, K., 1929.09.02 (SAPS); Apporx. 25km W of Poronaysk, Leonidovka River <47-upper r.>, Takahashi, H. 29610, 2001.08.03 (SAPS); Tomarikishi <48-lower l.>, Ban, S., no date (KYO); S. Sakhalin, Shikka-shicho, Motomari <51-upper l.>, Hoshino, Y. & Sugiyama, S., 1933.08.03 (SAPS); Shikka-shicho, Karuho – Chirie <51-lower r.>, Kawashima, M., 1935.08.15 (SAPS); Mt. Isara-yama <52-lower l.>, Sugawara, S. 16995, 1934.08 (SAPT); Shiritori <54-lower l.>, Sugawara, S. 1, 1927.08.07 (SAPS).

SOUTH. Mt. Kashipo, peak <57-upper r.>, Koidzumi, H. 21390, 1929.08.01 (TNS 900536); Mt. Kashipo, rocky mountain <57-upper r.>, Koidzumi, H. 21386, 1929.08.01 (TNS 920098); Shiritori, Ishiyama <57-upper r.>, Hara, H. (C741a, b), 1931.08.04 (TI- 2 sheets); S. Sakhalin, Mt. Kashipo <57-upper r.>, Takee, G., Abumiya, H. & Hosino, Y., 1932.07.22 (SAPS); Mt. Kashipo <57-upper r.>, Ohwi, J., 1932.08.18 (KYO); Mt. Kashipo-dake <57-upper r.>, Sugawara, S. 16999, 1935.08 (SAPT); 115km N of Dolinsk, Mt. Ostrovskaya <57-upper r.>, Fujii, N. F01129, 2002.08.03 (SAPS); 115km N of Dolinsk, Mt. Ostrovskaya <57-upper r.>, Takahashi, H. 30196, 2002.08.03 (SAPS).

<THE KURILS>

NORTH. PARAMUSHIR <03>. No locality, Koidzumi, H. 87799, 1924.08 (TNS 918172).

SOUTH. ITURUP <20>. Shana–Sashiusu, Saito, S., 1928.08.20-2 (TI). KUNASHIR <21>. Kometogamura, Ichibishinai, Endo, C., 894.07.27 (SAPS); Nikishiro, Tatewaki, M. 3568, 1923.07.29 (SAPS). SHIKOTAN <22>. Shakotan, Miura, K., 1906.07.26 (SAPS- 2 sheets); Anama, Takeda, H., 1909.07.20 (SAPS); Shikotan, Anama, Arai, M., 1910.07.15 (SAPS); Anama, Kondo, K., 1929.08.28 (TI); Notoro, Ohwi, J. 730, 1931.08.08 (TNS 234399); Notoro, Ohwi, J., 1931.08.11 (KYO); Shakotan–Kagenoma, Kimura, A. & Kimura, H., 1933.08.06 (SAPS).

23. *Phlojodicarpus villosus* (Turcz. ex Fisch. et C.A.Mey.) Ledeb. [Takasu-zeri]

<SAKHALIN>

NORTH. N. Sakhalin, Ado <04-upper l.>, Kudo, Y. & Ishida, B. 7573, 1923.09.07 (SAPS); N coast of Peninsula Schmidt <05-upper l.>, Fukuda, T. 1777, 2001.08.07 (SAPS- 2 sheets); E coast, S of Peninsula Schmidt <05-lower r.>, Fukuda, T. 2146, 2001.08.16 (SAPS).

SOUTH. Miho, Mt. Kabuto-yama <61-lower l.>, Sugawara, S. 16940, 16941, 16942, 16943, 1932.08.24 (SAPT); A branch of Naibuchi River, on rocky cliffs <61-lower l.>, Sugawara, S., 1932.08.24 (KYO).

24. *Pleurospermum austriacum* (L.) Hoffm. subsp. *uralense* (Hoffm.) Sommier [Ō-kasamochi]

<SAKHALIN>

MIDDLE. N. Sakhalin, Pjlewo <36-lower l.>, Kudo, Y. & Tatewaki, M. 6107, 1922.07.29 (SAPS); Kokkyo, Anbetsu <36-lower l.>, Ishiyama, T., 1927.07.14 (SAPS); Nayoshi-gun, Yokunai <41-upper l.>, Hara, H., 1936.08.01 (TI- 2 sheets); Shikka-shicho, Chirie-gun, Chirikoro <45-upper r.>, Tatewaki, M. & Takahashi, Y. 22968, 1936.06.29 (SAPS); Nayoshi-gun, Kitakozawa <46-upper l.>, Henmi, M., 1942.08.09 (TNS 631307); E. Coast, Ehorokofunai <48-lower l.>, Miyake, T., 1906.08.11 (SAPS); E. Coast, Nayoro <48-lower l.>, Miyake, T., 1906.09.09 (SAPS); Shisuka <48-upper r.>, Namikawa, I., 1914.08.09 (SAPS); Kitashiretoko-hanto, Noto <51-lower l.>, Hoshino, Y. & Okada, S., 1933.07.12 (SAPS); Kitashiretoko-hanto, Yoman-Rosoku-iwa <55-upper r.>, Okada, S. & Sugiyama, S., 1933.07.21 (SAPS).

SOUTH. Kashipo, Tenbodai <57-upper r.>, Takee, G., Abumiya, H. & Hosino, Y., 1932.08.10 (SAPS); E. Coast, Chikaporonai <59-upper l.>, Miyake, T., 1907.08.15 (SAPS); Fukakusa-mura <61-lower r.>, Koidzumi, H. 1331, 1921.08.20 (TNS 918206); Sakaehama <62-upper l.>, Saito, S. (365), 1929.07.28 (TI- 3 sheets, TNS 688127); Sakaehama <62-upper l.>, Hara, H. (C971a), 1931.07.31 (TI- 2 sheets); Sakaehama <62-upper l.>, Ex herb. Dr. T. Ito, no date (TNS 120240); Ochiai <62-lower l.>, Sugawara, S. 17030, 1927.08.15 (SAPT); 20km E of Sokol town, mouth of Bakhura River <62-lower r.>, Takahashi, H. 29108, 2001.07.19 (SAPS- 2 sheets); W. Coast, Mauka <63-upper r.>, Miyake, T., 1906.07.03 (SAPS); Ryutoka River <64-lower r.>, Nakahara, G., 1906.07.09 (TI- 2 sheets); Kaizuka <65-lower l.>, Sugawara, S. 8, 1927.07.03 (SAPS); Kaizuka <65-lower l.>, Sugawara, S. 17029, 1928.07.20 (SAPT); Kaizuka <65-lower l.>, Koidzumi, G., 1930.08.08 (KYO); Fukakusa <65-upper r.>, Sugawara, S. 35, 1924.08 (SAPS); Mt. Susuyadake <65-upper r.>, Sugawara, S. 17028, 1927.08.10 (SAPT); Tonnai-gun, Kamikiminai, Mt. Horoto-yama <65-upper r.>, Sase, H., 1939.08.30 (SAPS); Tonnai-gun, Kamikiminai <65-lower r.>, Sase, H., 1940.07.21 (SAPS); Aniwa Bay, Ootomari <70-upper r.>, Miyake, T., 1907.07.10 (SAPS); Korsakof <70-upper r.>, Faurie, U. 385, 1908.08 (KYO- 2 sheets); Korsakof <70-upper r.>, Faurie, U. 386, 1908.09 (KYO); Chipisani <71-upper l.>, Miyabe, K., Miyagi, T. & Miyake, T., 1906.07.15 (SAPS); Nagahama-gun, Enbuchimura <71-upper r.>, Sase, H., 1937.08.15 (SAPS); Todomoshiri, Tomarizawa <73-lower l.>, Miyake, T., 1906.07.23 (SAPS); Todomoshiri, Kotan <73-lower l.>, Miyake, T., 1906.07.24 (SAPS); Todomoshiri, Mt. Dainan <73-lower l.>, Miyake, T., 1906.07.26 (SAPS); Isl. Kaibato, Kita-kotan <73-lower l.>, Kimoto, Murayama & Takee, 1931.07.29 (SAPS).

<THE KURILS>

NORTH. SHUMSHU <02>. Babushkina Bay, Takahashi, H. 23581, 1997.08.10 (SAPS). PARAMUSHIR <03>. Kashiwabarawan, Kudo, Y.

5058, 1920.07.09 (SAPS); Nagaiwasaki, Kudo, Y. 5131, 1920.07.11 (SAPS); Ruesan, Kudo, Y. 5672, 1920.08.05 (SAPS); Suribachi-wan, Koidzumi, H. 40397, 1932.08.30 (TNS 911921); Ruesan, Tatewaki, M. 32683, 1941.07.29 (SAPS); S of Savushkina Cape, Takahashi, H. 23025, 1997.08.04 (SAPS); Turkharka Bay, Takahashi, H. 23919, 1997.08.17 (SAPS- 2 sheets).

MIDDLE. RASSHUA <13>. Mikasa, Tatewaki, M. & Tokunaga, Y. 12337, 1928.08.06 (SAPS); Nakadomari, Tatewaki, M. & Takahashi, K. 14955, 1929.08.03 (SAPS); S of Yoriki-hama, Takahashi, H. 19168, 1995.08.12 (SAPS). KETOI <15>. Near Ashizaki, Tatewaki, M. & Takahashi, K. 15453, 1929.08.18 (SAPS). SIMUSHIR <16>. Broton Bay, Tatewaki, M. & Tokunaga, Y. 11731, 1928.08.15 (SAPS); Malaya inlet, Takahashi, H. 19541, 1995.08.18 (SAPS). CHIRPOI <18a>. Peschanaya Bay, Takahashi, H. 19829, 1995.08.23 (SAPS). BRAT CHIRPOEV <18b>. W of Samotuga Cape, Takahashi, H. 24115, 1997.08.20 (SAPS); Ugl'ovaya Bay, Takahashi, H. 28452, 2000.08.04 (SAPS). URUP <19>. Iwanadomari, Uchida, K., 1891.06.17 (SAPS); Kobune, Tatewaki, M. 9858, 1927.08.26 (SAPS); Tokotan, Tatewaki, M. 10018, 1927.08.28 (SAPS); Mishima, Tatewaki, M. & Takahashi, K. 15974, 1929.07.24 (SAPS); Otkrytyy Bay, Takahashi, H. 18446, 1995.08.04 (SAPS); Inland from Ukromnaya Bay, Takahashi, H. 22134, 1996.08.20 (SAPS).

SOUTH. ITURUP <20>. Shibetoro-Moyoro, Tanaka, G. & Miyabe, Ken., 1910.07.18 (SAPS); Shamanbe, Kondo, K. 2312, 1927.07.14-15 (TI, TNS 716821); Shibetoru, Saito, S., 1928.08.10 (TI- 2 sheets); Porosu-Sokiya, Yoshimura, B. & Yokoyama, H., 1938.07.30 (SAPS); Shibetoro village, near mouth of Hiraitogawa River, Azuma, T. & al. 3017, 2002.06.13 (SAPT); Shana, Bettobi, Chishima-chosasho, no date (SAPS- 2 sheets). KUNASHIR <21>. Seseki, Tatewaki, M. (3075), 1923.07.20 (SAPS, SAPT); Atoiya, Nagai, M. & Shimamura, M., 1929.08.03 (SAPS- 3 sheets); Furukamappu-Nikishiro, Matsumura, Y., 1930.07.21 (KYO). SHIKOTAN <22>. Anama, Arai, M. 41, 1910.08.05 (SAPS); No locality, Abe, A., 1924.07.17 (TNS 429836); Shakotan, Kondo, K., 1929.08.04 (TI); Mt. Shakotan, Kondo, K., 1929.08.06 (TI); Chiboi-Umanose, Kondo, K., 1929.09.07 (TI); Noto, Ohwi, J., 1931.08.11 (KYO); Umanose, Ohwi, J., 1931.08.30 (KYO).

25. *Sanicula chinensis* Bunge [Umano-mitsuba]

<SAKHALIN>

SOUTH. Soriofka <65-lower l.>, Faurie, U. 376, 1908.09.02 (KYO).

<THE KURILS>

SOUTH. KUNASHIR <21>. Furukamapp, Tatewaki, M. 3313, 1923.07.25 (SAPS); Shiranuka <21>, Nagai, M. & Shimamura, M., 1929.07.27 (SAPS); Shiranuka, Nagai, M. & Shimamura, M., 1929.07.30 (SAPS); Furukamappu-Nikishiro, Matsumura, Y.,

1930.07.21 (KYO); Furukamappu, Ohwi, J., 1930.08.20 (KYO); Rebaus, Shirahama, K. & Takahashi, Y., 1935.07.26 (SAPS); Kotankeshi, Chishima-chosajyo, no date (SAPS).

26. *Seseli condensatum* (L.) Rchb.f. [No Japanese name]

[No specimens in Japanese herbaria]

27. *Sium suave* Walter [Numa-zeri]

<SAKHALIN>

NORTH. N. Sakhalin, Pomeri-Moskaliwo <06-lower r.>, Kudo, Y. & Ishida, B. 7332, 1923.08.31 (SAPS); Ozhinskiy Region, Moskaliwo <06-lower r.>, Barkalov, V.Y. 10657, 2001.08.13 (SAPS).

MIDDLE. Poronai-mura <37-lower r.>, Miyake, T., 1906.08.29 (SAPS- 2 sheets); Shikka, Aba <48-upper l. ?>, Otani, H., 1930.07.31 (SAPS); Poronai <48-upper r.>, Nakahara, G., 1906.08 (TI- 2 sheets); Ramotteiuri <48-upper r.>, Miyake, T., 1906.08.15 (SAPS- 2 sheets); Shisuka <48-upper r.>, Namikawa, I., 1914.08.09 (SAPS); Dawait <49-upper l.>, Miyake, T., 1906.08.15 (SAPS); Taraika <49-upper r.>, Sugawara, S. 16862, 1927.08.03 (SAPT); Lake Solenuiya <51-lower r.>, Miyabe, K. & Miyagi, T., 1906.07.26 (SAPS); Kitashiretoko, Funakoshi <51-lower r.>, Sugawara, S. 17049, 1927.08.13 (SAPT); Kitashiretoko-hanto, Chirie <51-lower r.>, Hoshino, Y., Okada, S. & Sugiyama, S., 1933.07.15 (SAPS); Kitashiretoko-hanto, Kitafunakoshi <51-lower r.>, Hoshino, Y. & Sugiyama, S., 1933.07.23 (SAPS).

SOUTH. W. Coast, N of Krasnogorsk, SE of Aynskoye Lake <56-upper l.>, Yabe, M., 2001.07.22 (SAPS); About 5km SW of Vostochnyy, Pugacheva <57-lower l.>, Takahashi, H. 31085, 2003.07.25 (SAPS); About 5km SW of Vostochnyy, Pugacheva <57-lower l.>, Inoue, K. 3012, 2003.07.25 (SAPS); Kashipo <57-upper r.>, Miyake, T., 1906.09.12 (SAPS); E. Coast, Shikka, Kashipo <57-upper r.>, Miyake, T., 1906.09.14 (SAPS); Kashiho <57-upper r.>, Kitamura, S., 1930.08.25 (KYO); Kashipo, seaside <57-upper r.>, Takee, G., Abumiya, H. & Hosino, Y., 1932.07.30 (SAPS); E. Coast, Kusunnai <58-upper r.>, Miyake, T., 1906.09.21 (SAPS- 2 sheets); W. Coast, Kusunnai <58-upper r.>, Miyake, T., 1907.09.16 (SAPS- 2 sheets); Kushunnai <58-upper r.>, Saito, S., 1929.08.07 (TI); Tomarioro-gun, Kushun'nai-mura <58-upper r.>, Sase, H., 1937.09.10 (SAPS); Mt. Manui-yama, Dohozawa <59-upper l.>, Sugawara, S. 17050, 1926.08.06 (SAPT); Maoka-gun, Randomari, Habomai <60-lower l.>, Yamada, G., 1937.08.12 (KYO); Solowiyohuka <65-lower l.>, Miyabe, K. & Miyagi, T., 1906.08.23 (SAPS); Kaizuka <65-lower l.>, Koidzumi, G., 1930.08.08 (KYO); Tonaichan <66-lower l.>, Faurie, U. 375, 1908.09.18 (KYO- 2 sheets); Aniwa Bay, Chipisani <71-upper l.>, Miyake, T., 1908.07.19 (SAPS); About 8km SE of Ozerskiy, Arakul River <71-upper r.>, Takahashi, H. 30612, 2002.08.15 (SAPS).

<THE KURILS>

SOUTH. KUNASHIR <21>. Chinomichi, Koidzumi, H. 21817, 1929.08.13 (TNS 919932).

28. *Sphallerocarpus gracilis* (Bess. ex Trev.) K.-Pol. [Zūe-so]

<SAKHALIN>

MIDDLE. Handa <37-lower r.>, Sugawara, S. 17057, 17058, 17059, 1931.08.10 (SAPT).

29. *Tilingia ajanensis* Regel [Shirane-ninjin]

<SAKHALIN>

NORTH. E. Coast, S of Peninsula Schmidt <05-lower r.>, Fukuda, T. 2276, 2001.08.16 (SAPS); E. Coast, E of Gulf of Piltun, Vstrechnaya <11-upper l.>, Fukuda, T. 1509, 2001.08.04 (SAPS); N. Sakhalin, Chaio-kaigan <19-lower l.>, Kusano, Y., 1921.05.06 (SAPS); E. Coast, Chaio <19-lower l.>, Kusano, Y. (Koidzumi, H. 86407), 1921.07 (TNS 705017); N. Sakhalin, Nyiwo <23-lower l.>, Kudo, Y. & Tatewaki, M. 6510, 1922.08.13 (SAPS).

MIDDLE. E coast of Telpenia Bay, Mirkunai <40-lower r.>, Sudo, I., 1909.08.02 (SAPS); Mt. Mimizuku-yama <42-lower r.>, Tobita, H., 1935.07.26 (KYO); Mt. Horoto-yama <42-lower r. ?>, Nagamatsu, 1930.07.26 (KYO); Mt. Asase-yama <44-upper r.>, Sugawara, S. 17083, 1935.08.07 (SAPT); Shikka Distr., the upper Naruko <45-upper l. ?>, Yoshimura, B., 1936.08.14 (SAPS); Shikka, Mt. Kawashima <45-upper r.>, Sugawara, S., 1935.08.03 (SAPS); Mt. Kawashima-yama <45-upper r.>, Sugawara, S. 17085, 17086, 1935.08.03 (SAPT); Shikka Distr., Mt. Kawashima <45-upper r.>, Yoshimura, B., 1936.08.09 (SAPS); S. Sakhalin, Shikka-shicho, Shibunkoro <45-lower r.>, Hoshino, Y. & Sugiyama, S., 1933.08.06 (SAPS); S. Sakhalin, Shikka-shicho, Motomari <51-upper l.>, Hoshino, Y. & Sugiyama, S., 1933.08.03 (SAPS); Ooutori <54-upper r.>, Sugawara, S. 17079, 1935.08.19 (SAPT).

SOUTH. E. Coast, Mt. Nupuripo <57-lower l.>, Miyake, T., 1907.08.13 (SAPS); Mt. Tosso-zan <57-lower l.>, Yamada, G., 1926.08.04 (KYO); Mt. Tosso <57-lower l.>, Hiratsuka, N., 1927.07.20 (TI); E. Coast, Mt. Tosso <57-lower l.>, Hiratsuka, N., Iwadare, S. & Nagai, M., 1927.07.23 (SAPS); Mt. Tosso-zan <57-lower l.>, Sugawara, S. 17078, 1927.08.01 (SAPT); Mt. Tosso <57-lower l.>, Koidzumi, H. 20942, 1929.07.29 (TNS 900357); Mt. Tosso, 9-gome <57-lower l.>, Koidzumi, H. 20941, 1929.07.29 (TNS 900611); Mt. Nupuripo <57-lower l.>, Saito, S. 247, 1929.08.03 (TI- 2 sheets, TNS 687787); Mt. Tosso-zan <57-lower l.>, Hara, H. (C860), 1931.08.05 (TI- 2 sheets); Mt. Tosso-zan <57-lower l.>, Sato, M., 1932.07.24 (TI); Motodomari-shicho, Mt. Tosso-zan <57-lower l.>, Honda, M. & Kimura, Y., 1940.08.12 (TI- 4 sheets); Approx. 80km N of Dolinsk, Tsapko -N peak of Mt. Vladimirovka <57-lower l.>, Takahashi, H. 29552, 2001.08.02 (SAPS); Mt. Kashipo <57-upper r.>, Hiratsuka, N., 1928.08.07 (SAPS); Mt. Kashipo, peak <57-upper r.>, Koidzumi, H. 21390, 1929.08.01 (TNS 900536; the same sheet with

Peucedanum); S. Sakhalin, Mt. Kashipo <57-upper r.>, Takee, G. & Abumiya, H., 1932.08.05 (SAPS); Mt. Kashipo-yama <57-upper r.>, Sugawara, S. 17081, 1934.08 (SAPT); E. Coast, Chikaporonai <59-upper l.>, Miyake, T., 1907.08.08 (SAPS- 2 sheets); E. Coast, Mt. Chikaporonai <59-upper l.>, Miyake, T., 1907.08.12 (SAPS- 2 sheets); E. Coast, village Tikhaya <59-upper l.>, Fukuda, T. 2475, 2001.08.28 (SAPS); Mt. Susuya <65-upper r.>, Miyake, T., 1907.07.31 (SAPS- 2 sheets); Mt. Susuya <65-upper r.>, Sugawara, S., 1927.07.23 (TI); Mt. Susuya-dake <65-upper r.>, Sugawara, S. 17061, 1928.07.20 (SAPT); Mt. Susuya-yama <65-upper r.>, Sugawara, S. 17082, 1928.08.10 (SAPT); Mt. Susuya <65-upper r.>, Hara, H. (325a, b); 1928.08.13 (TI- 2 sheets); Mt. Ochiho-yama <65-upper r.>, Sugawara, S. 17084, 1934.08.02 (SAPT); Mt. Horoto-yama <65-upper r.>, Tashiro, Z., 1939.09.03 (KYO- 2 sheets); Approx. 8km E of Yuzhno-Sakhalinsk <65-upper r.>, Takahashi, H. 29282, 2001.07.22 (SAPS); Approx. 8km E of Yuzhno-Sakhalinsk <65-upper r.>, Takahashi, H. 29276, 2001.07.22 (SAPS); Peak Chekhov <65-upper r.>, Fukuda, T. 1185, 2001.07.22 (SAPS); Peak Chekhov <65-upper r.>, Fukuda, T. 1177, 2001.07.22 (SAPS); Todomoshiri, Dainanwan <73-lower l.>, Miyake, T., 1906.07.23 (SAPS- 2 sheets); Isl. Kaibato <73-lower l.>, Komat, S., 1915.08.12 (TI); Isl. Kaibato, Osaki <73-lower l.>, Kimoto, Murayama & Takee, 1931.08.01 (SAPS).

<THE KURILS>

NORTH. ATLASOVA <01>. Uomizaki, Ito, S. & Komori, G., 1926.08.15 (SAPS). SHUMSHU <02>. Kataoka-Bettobi, Endo, K., 1903.08.24 (SAPS); No locality, Yendo, K., 1903.08.24 (TI); No locality, Koidzumi, H. 41772, 1932.08.27 (TNS 900585); Shiroya, Ohashi, T., 1932.08.28 (KYO); Shiomi River, Ohwi, J. & Yoshii, R. 5722, 1934.07.29 (KYO). PARAMUSHIR <03>. Nagaiwasaki, Kudo, Y. 5130, 1920.07.11 (SAPS); Yotsuiwahama, Kudo, Y. 5176, 1920.07.12 (SAPS); Yotsuiwahana, Kudo, Y. 5303, 1920.07.14 (SAPS); Shirakawa, Kudo, Y. 5601, 1920.07.30 (SAPS); Ruesan, Kudo, Y. 5671, 1920.08.05 (SAPS); Tomarizaki, Kudo, Y. 5772, 1920.08.06 (SAPS); Tomarizaki, Kudo, Y. 5779, 1920.08.08 (SAPS); No locality, Koidzumi, H. 87800, 1924.08 (TNS 902760); No locality, Numajiri, K., 1927.08 (KYO); Kujira-wan, Koidzumi, H. 36936, 1932.07.21 (TNS 900356); Kujira-wan, near Mt. Kyozuka, Ohashi, T., 1932.07.27-29 (KYO- 2 sheets); Mt. Murakami-dake, 5-gome, Koidzumi, H. 38704, 1932.07.29 (TNS 900566); No locality, Ohashi, T., 1932.08 (KYO- 2 sheets); Eastern coast, Ohashi, T., 1932.08.05 (KYO); Suribachi-wan, Ohashi, T., 1932.08.30 (KYO); Kujirahama, Kojima, K. 1338, 1932 (TNS 182841); Kashiwabara-wan, Ohwi, J. (& Yoshii, R.) 5964, 1934.08.02 (KYO, SAPS); Raisha, Ohwi, J. & Yoshii, R. 6013, 1934.08.06 (KYO); E side of Vasil'yeva Bay, Takahashi, H. 21021, 1996.08.03 (SAPS); NW of Severo-Kurilsk, NE side of Mt. Ebeko, Kuwahara, Y. 121, 1997.08.05 (SAPS); NW of Severo-Kurilsk, NE

side of Mt. Ebeko, Takahashi, H. 23158, 1997.08.05 (SAPS- 2 sheets); Utesnaya Bay, Takahashi, H. 23621, 1997.08.11 (SAPS- 2 sheets); Krashennikova Bay, Takahashi, H. 23746, 1997.08.14 (SAPS).

MIDDLE. MAKANRUSHI <05>. Inland of Zakat Bay, Takahashi, H. 24001, 1997.08.18 (SAPS). ONEKOTAN <06>. Nemo, Tatewaki, M. 11018, 1928.08.08 (SAPS); Nemo Bay, Takahashi, H. 21209, 1996.08.04 (SAPS); Nemo Bay, Kuwahara, Y., 1996.08.04 (SAPS); Mussel Bay-Kol'tsevoye Lake, Takahashi, H. 21400, 1996.08.07 (SAPS). KAHKIMKOTAN <07>. Inland from Severgina Bay, Takahashi, H. 21541, 1996.08.08 (SAPS); NW side of the island, Takahashi, H. 28148, 2000.07.28 (SAPS). EKARMA <09>. No locality, Tatewaki, M. 11357, 1928.08.11 (SAPS); E of Cape Shpilevoy, Takahashi, H. 21660, 1996.08.10 (SAPS). SHIASHKOTAN <10>. Inland from Zakatnaya Bay, Takahashi, H. 21826, 1996.08.12 (SAPS); Zakatnaya Bay, Takahashi, H. 28232, 2000.07.29 (SAPS- 2 sheets). MATUA <12>. Inland from Dvoynaya Bay, Takahashi, H. 22006, 1996.08.14 (SAPS). RASSHUA <13>. Nakadomari, Tatewaki, M. & Takahashi 14956, 1929.08.03 (SAPS); Onuma, Tatewaki, M. & Takahashi 15164, 1929.08.05 (SAPS); Chotozan, Tatewaki, M. & Takahashi 15338, 1929.08.10 (SAPS); S of Yoriki-hama, Takahashi, H. 19147, 1995.08.12 (SAPS). KETOI <15>. No locality, Tatewaki, M. & Tokunaga, Y. 11521, 1928.09.01 (SAPS); Near Ashizaki, Tatewaki, M. & Takahashi, K. 15435, 1929.08.18 (SAPS); Near Ashizaki, Tatewaki, M. & Takahashi, K. 15452, 1929.08.18 (SAPS); Isozaki, Tatewaki, M. & Takahashi, K. 15581, 1929.08.24 (SAPS); Near Shimizugawa, Tatewaki, M. & Takahashi, K. 15660, 1929.08.30 (SAPS); Nishiura, Tatewaki, M. & Takahashi, K. 15677, 1929.09.04 (SAPS); Mouth of Stochnyy River, Takahashi, H. 19599, 1995.08.19 (SAPS). SIMUSHIR <16>. Broton Bay, Kodama, 1893.06 (SAPS); Malaya inlet, Takahashi, H. 19479, 1995.08.18 (SAPS); Nakatomari Bay, Takahashi, H. 19777, 1995.08.22 (SAPS). CHIRPOI <18a>. Peschanaya Bay, Takahashi, H. 19807, 1995.08.23 (SAPS). BRAT CHIRPOEV <18b>. Uglovaya Bay, Takahashi, H. 28460, 2000.08.04 (SAPS). URUP <19>. Anama, Jimbo, K., 1891.06.18 (SAPS); Megane, Kitahara, T., 1895.08.1-9 (SAPS); Kobune, Tatewaki, M. 9806, 1927.08.26 (SAPS); Near Tokotan, Tatewaki, M. 9609, 1927.08.29 (SAPS); Otkrytyy Bay, Takahashi, H. 18454, 1995.08.04 (SAPS- 2 sheets); Otkrytyy Bay, Takahashi, H. 18589, 1995.08.05 (SAPS); Natalii Bay, Takahashi, H. 18757, 1995.08.07 (SAPS); Novokuril'skaya inlet, Takahashi, H. 18833, 1995.08.08 (SAPS); About 15km NE of Van-Der-Lind Cape, Ohara, M., 1995.08.26 (SAPS); Barhatnyy Bay, Takahashi, H. 20135, 1995.08.28 (SAPS- 2 sheets); Barhatnyy Bay, Takahashi, H. 20118, 1995.08.28 (SAPS); Negodnaya Bay, Takahashi, H. 20145, 1995.08.29 (SAPS); Inland from Ukromnaya Bay, Takahashi, H. 22180, 1996.08.20 (SAPS); Tetyayeva Bay, Takahashi, H. 28622, 2000.08.08 (SAPS).

SOUTH. ITURUP <20>. Onnebetsu, Ishikawa,

T., 1890.08.07 (SAPS); Rubetsu-mura, Yokoyama, S., 1893.07 (SAPS); Moyoroyama, Yokoyama, S., 1893.07.27 (SAPS); Mt. Atoiya, Kawakami, T., 1898.08.11 (TI); Toshiruri, Kawakami 393, 1898.09 (SAPS); Shibetoru (Shibetoro), Miura, K., 1906.07.21 (SAPS- 2 sheets); Shibetoro–Moyoro, Tanaka, G. & Miyabe, Ken., 1910.07.18 (SAPS); Shana, Kondo, K., 1927.07.09 (TI); Shana, Kondo, K., 1927.07.11 (TI); Shamanbe, Kondo, K. (1898), 1927.07.14-15 (TI- 2 sheets, TNS 688061); Porosu–Sokiya, Kondo, K., 1927.07.18 (TI); Mt. Atoiya, Kondo, K., 1927.07.21 (TI- 2 sheets); Porosu–Sokiya, Saito, S. 3986, 1928.08.07 (TI- 2 sheets); Mt. Sashiusu, Saito, S., 1928.08.22 (TI); Toshimoe–Guya, Saito, S., 1928.08.27 (TI); Rubetsu, Saito, S. (6247), 1928.09.04 (TI- 2 sheets, TNS 645285); Rakko-iwa, Koidzumi, H. 24561, 1930.08.04 (TNS 900355); Porosu, Koidzumi, H. 25240, 1930.08.12 (TNS 902756); Moyoro-sando, Koidzumi, H. 25642, 1930.08.18 (TNS 902820); Mt. Hitokappu, Koriba, M. & Yoshii, R., 1933.08.14 (KYO); Shana, Yoshimura, B., 1937.08.07 (SAPS); Shana village, nera wetland of Yanketou, Azuma, T. & al. 3314, 2002.06.24 (SAPT). KUNASHIR <21>. Mt. Chacha-nupuri, Okada, Y., 1929.08.01 (TNS 386345, 386343); Atoiya, Nagai, M. & Shimamura, M., 1929.08.03 (SAPS); Atoiya, Nagai, M. & Shimamura, M., 1929.08.03 (SAPS- 2 sheets); Mt. Chacha-nupuri, Okada, Y., 1929.08.03 (TNS 386344); Chachanupuri, Koriba, M. & Yoshii, R., 1933.07.23 (KYO); Mt.

Tomari, Tatewaki, M. 25507, 1936.08.20 (SAPS); Mt. Chacha, Ito, K., 1939.08 (SAPS). SHIKOTAN <22>. No locality, Miyabe, K., 1884.07.27 (SAPS); Anama, Takeda, H., 1909.07.20 (TNS 29733); Masuba, Miyabe, Ken. & Tanaka, G., 1910.08.14 (SAPS); Mt. Shakotan, Saito, S., 1925.08.30 (TI- 2 sheets); Shakotan, Saito, S., 1925.09.02 (TI); Shakotan–Horobetsu, Saito, S., 1925.09.05 (TI); Mt. Okkaibetsu, Saito, S., 1925.09.05 (TI- 2 sheets); No locality, Kondo, K. 7898, 1927.08.11 (TI- 2 sheets); No locality, Kondo, K. 7909, 1927.08.11 (TI- 2 sheets); Near Shakotan, Tatewaki, M. 9522, 1927.08.23 (SAPS); Shakotan, Kondo, K. 300, 1929.08.04 (TI- 3 sheets); Chiboi, Kondo, K., 1929.08.10 (TI); Anama, Kondo, K. 335, 1929.08.28 (TI- 2 sheets, TNS 688153); Horobetsu–Okkaibetsu, Kondo, K., 1929.08.31 (TI); Masuba–Notoro, Kondo, K., 1929.09.03 (TI); Notoro–Kiridoshi, Kondo, K. 298, 1929.09.03 (TI- 2 sheets); Mt. Tomari, Kondo, K. 5952, 1929.09.05 (TI, TNS 643133); Chiboi–Umanose, Kondo, K. 5949, 1929.09.07 (TI- 2 sheets); Umanose, Ohwi, J., 1931.08.30 (KYO); Shakotan–Kagenoma, Ohwi, J., 1931.08.31 (KYO); Shakotan, Ono, S.T., 1933.08.07 (TI); Notoro–Inemoshiri, Saito, S., no year.09.06 (TI).

30. *Torilis japonica* (Houtt.) DC. [Yabu-jirami]
[No specimens in Japanese herbaria]

Additions to Chromosome Numbers for Vascular Plants from Sakhalin and the Kurile Islands (1)

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Abstract As a supplement to chromosome information published in the book entitled “Caryology of the flora of Sakhalin and the Kurile Islands” (Probatova, Barkalov, Rudyka 2007), the chromosome numbers for 57 vascular plant species from Sakhalin and the Kurile Islands (44 genera, 21 families), are presented here. Twenty-two species were added to the Annotated list in the book mentioned above. Chromosome numbers are reported for the first time in the following six species: *Cardamine sachalinensis*, *Elymus franchetii*, *Minuartia barkalovii*, *Oxytropis calcareorum*, *Persicaria extremiorientalis*, *Popoviocodonia stenocarpa* (the first chromosome information for the genus *Popoviocodonia*). Additionally, new cytotypes are revealed in three species: *Lathyrus pilosus*, *Oxytropis hidakamontana*, and *Potentilla matsumurae*.

Key words: chromosome numbers, vascular plants, Sakhalin, the Kurile Islands, taxonomy, phytogeography

Introduction

This is our first contribution since the publication of the book “Caryology of the flora of Sakhalin and the Kurile Islands. Chromosome numbers, taxonomic and phytogeographical comments” (Probatova *et al.* 2007). The book is the first of a series devoted to studies on chromosome numbers in the flora of individual subregions of the Russian Far East. The book contains the chromosome numbers data for 536 vascular plant species that were studied on Sakhalin, Moneron and (or) on the Kurile Islands. During the caryological studies of the island flora that have been underway since 1960 we obtained information for: 356 species from Sakhalin (23.4 % of the total number of vascular plant species), 257 species from the Kuriles (18.4 % of the total vascular flora), and 48 species from Moneron Island. The chromosome number data are accompanied with information on ecology and phytogeography, as well as species distribution on the islands. For many species, caryotaxonomic and phytogeographical comments are also given. Chromosome numbers were considered in the context of available global species data. For 184 plant species, the chromosome numbers were obtained from natural protected areas. Among the leading families of the flora studied, the greatest

number of species (98 spp.) are from Poaceae; among them, the prevalence of polyploids (72 %, against 28% of diploids) is revealed. On the contrary, in the next largest family, Asteraceae (65 spp. studied), the prevalence of diploids is pronounced (57%, against 43% of polyploids). Chromosome numbers from the majority of species are constant, and only a few species are characterized by intraspecific polymorphism. In some groups, isolation of the insular populations is expressed to a greater or lesser degree. A second book, with chromosome numbers for the flora of the continental part of the Sea of Japan area and the islands of Peter the Great Bay (the Primorsky Territory), is now in the process of compilation.

This paper contains new chromosome counts on the vascular plants from the Kurile Islands and Sakhalin. Three papers have been published in Japan since 2000 (Probatova *et al.* 2000a), two of them were in the series “Biodiversity and Biogeography of Kuril Islands and Sakhalin”, vols. 1 and 2 (Probatova *et al.* 2004a; Probatova *et al.* 2006a). In the present paper, chromosome counts for 57 species are given. For six species there was no previously published information on the chromosome numbers, and for three species new chromosome numbers (new cytotypes) are reported.

Materials and Methods

Counts were primarily made by E.G. Rudyka (R.), with assistance from Z.V. Kozhevnikova (K.), on squashed preparations of root tips fixed with Carnoy's solution. The root tips were taken from seedlings grown from seeds obtained from herbarium specimens, which were collected by V.Yu. Barkalov. Preparations were stained with iron hematoxylin. First counts are indicated with an asterisk (*). Introduced (alien) species are indicated with a (+). Voucher specimens are preserved in the Herbarium VLA, Vladivostok. The plants were identified by V.Yu. Barkalov. The plant names and geographical distribution of the species studied are, in most cases, given according to "Vascular Plants of the Soviet Far East", Vols. 1–8 (Kharkevich 1985–1996), Cherepanov (1995), and "Flora of the Russian Far East. Addenda et corrigenda ..." (Kozhevnikov and Probatova 2006). For some species, new data on island distributions were provided by Barkalov. The species notes and manuscript, including English translation, were prepared by N.S. Probatova.

Annotated List of Plants with Chromosome Numbers Studied

FAMILY APIACEAE

1. *Kitagawia terebinthacea* (Fisch. ex Spreng.) M. Pimen.

(*Peucedanum terebinthacea* (Fisch. ex Spreng.) Ledeb.; *P. deltoideum* Makino et Yabe; *P. paishanense* Nakai)

Chromosome number. $2n=22$ (K.).

Voucher specimen. VLA 10868, Kuriles, Shikotan Island, Del'fin Bay, on the rocks, 31.VIII. 2007, coll. V. Barkalov.

Distribution. Sakhalin, South Kuriles; south of the Russian Far East, East Siberia; China, Korea, Japan. Mountains, coastal rocks.

Note. This species was studied in the Amur R. basin, in the Primorsky Territory, as well as in China, Korea and Japan: everywhere $2n=22$, under different species names (see Bolkhovskikh *et al.* 1969; Goldblatt 1981, 1988; Agapova *et al.* 1990; Goldblatt and Johnson 1994, 2003).

FAMILY ASTERACEAE

2. +*Arctium tomentosum* Mill.

Chromosome number. $2n=36$ (R.).

Voucher specimen. VLA 10791, Kuriles, Shikotan Island, in vicinity of Krabozavodskoye settlement, Anamka R., roadside, 5. IX. 2007, coll. V. Barkalov.

Distribution. Sakhalin, South Kuriles; Eurasia (but introduced in the Russian Far East).

Note. The chromosome number in *A. tomentosum* has not been studied in the Kuriles before. It was previously known from the environs of Vladivostok ($2n=36$ – Probatova *et al.* 1991). Many authors give the same chromosome number ($2n=36$) for *A. tomentosum*

(see Bolkhovskikh *et al.* 1969; Goldblatt 1981, 1984, 1985, 1988; Agapova *et al.* 1990; Goldblatt and Johnson 1990, 1994, 2003, 2006).

3. *Arnica unalaschcensis* Less.

Chromosome number. $2n=38$ (R.).

Voucher specimen. VLA 10847, Kuriles, Shikotan Island, Notoro Mt., meadow near the top of the mountain, 25.VIII. 2007, coll. V. Barkalov.

Distribution. Kuriles; North Pacific area (insular territories). Mostly – in mountain meadows.

Note. The chromosome number ($2n=38$) in *A. unalaschcensis* was also studied from Simushir, Urup and Iturup Islands (Probatova *et al.* 2000a, 2007). It was studied much earlier on Bering Island, the Commander Islands (Sokolovskaya 1968). Also $2n=38$ and $2n=c.40$ have been reported from Japan (see Bolkhovskikh *et al.* 1969; Nishikawa 1986).

4. *Eupatorium glehnii* Fr. Schmidt ex Trautv.

Chromosome number. $2n=20$ (R.).

Voucher specimen. VLA 10846, Kuriles, Shikotan Island, Tzerkovnaya Bay, tall herbs community on the slope, 2.IX.2007, coll. V. Barkalov.

Distribution. Sakhalin (south), South Kuriles; Japan. Forest edges, bush.

Note. This species has been studied in Japan ($2n=20$ – Kawano 1961; Watanabe *et al.* 1990).

5. *Leontopodium kurilense* Takeda

Chromosome number. $2n=26$ (R.).

Voucher specimen. VLA 10844, Kuriles, Shikotan Island, Shikotan Mt., on the rocks, 23.VIII. 2007, coll. V. Barkalov.

Distribution. South Kuriles (Iturup and Shikotan Islands). Endemic. Mountains, coastal rocks.

Note. In the literature, we found only one report for this species: $2n=26$ (Sakai 1934). The chromosome number $2n=48$ for "*L. kurilense*", from Chukotka and from the south of Magadansky Region, Nagayevo Bay (see Agapova *et al.* 1990), as well as $2n=52$ – from Anujskoye Plateau (Zhukova and Petrovsky 1987), belong to other species, but not to *L. kurilense*, because the latter does not occur there, according to Barkalov (1992). *L. kurilense* was described from Shikotan Island.

6. *Lepidotheca suaveolens* (Pursh) Nutt.

Chromosome number. $2n=18$ (R.).

Voucher specimen. VLA 10812, Kuriles, Shikotan Island, middle course of Gorobets R., roadside, 5.IX.2007, coll. V. Barkalov.

Distribution. Sakhalin, Moneron, Kuriles; East Asia, North America; expanded throughout the world as alien.

Note. We obtained the chromosome number ($2n=18$) for *L. suaveolens* on Moneron Island and from the Lower Amur R. basin (Probatova and Sokolovskaya 1990; Probatova *et al.* 2007). There is the only one chromosome number for this species in the literature,

sometimes reported under different species names: *Matricaria matricarioides* (Less.) Porter, *M. discoidea* DC. etc. (see Bolkhovskikh *et al.* 1969; Goldblatt 1981, 1984, 1988; Agapova *et al.* 1990; Goldblatt and Johnson 2003).

7. *Picris japonica* Thunb.

Chromosome number. $2n=10$ (R.).

Voucher specimen. VLA 10790, Kuriles, Shikotan Island, Anamka R., forest edge, roadside, 5. IX.2007, coll. V. Barkalov.

Distribution. Sakhalin, South Kuriles; the Amur River basin (downstream from Khabarovsk), the Primorsky Territory; Korea, Japan. Meadows.

Note. The species has been thoroughly investigated in the Russian Far East: its chromosome number ($2n=10$) is known from Sakhalin, Moneron and the Kuriles, Anuchina Island (Probatova *et al.* 2007), as well as from Primorsky Territory and Amur R. basin, in China and Japan (see Bolkhovskikh *et al.* 1969; Agapova *et al.* 1990; Goldblatt and Johnson 1991, 1998, 2006).

8. *Solidago dahurica* Kitag.

(? *S. decurrens* Lour.)

Chromosome number. $2n=18$ (K.).

Voucher specimen. VLA 10871, Kuriles, Shikotan Island, the middle course of Gorobets R., meadow on the slope, 5. IX. 2007, coll. V. Barkalov.

Distribution. Sakhalin, South Kuriles; Far East, Siberia. Forests and wetlands.

Note. This species was studied in Sakhalin and in the Primorsky Territory, also there were many reports of its chromosome number ($2n=18$) from East Siberia (see Agapova *et al.* 1990; Probatova *et al.* 2007).

FAMILY BRASSICACEAE

9. *Cardamine regeliana* Miq.

Chromosome number. $2n=32$ (R.).

Voucher specimen. VLA 10808, Kuriles, Shikotan Island, Zvezdnaya Bay, maritime slope, near the stream, 30.VIII. 2007, coll. V. Barkalov.

Distribution. Sakhalin, Kuriles; North Pacific. Moist meadows, along the streams.

Note. Chromosome number ($2n=32$) in *C. regeliana* was reported recently from the Kuriles (Simushir, Kharimkotan, Brat Chirpojev Islands) in Probatova *et al.* (2007). This species has also been studied from Kamchatka and Sakhalin (see Agapova *et al.* 1990). We have not found more chromosome reports for *C. regeliana* in the literature; perhaps they were under "*C. scutata* Thunb." (e.g., $2n=32$ – in Lihová and Kučera 2007, from Japan).

10. *Cardamine sachalinensis* Miyabe et Miyake

Chromosome number. $2n=32^*$ (R.).

Voucher specimen. VLA 8880, Sakhalin, Vostochno-Sakhalinskiye Mts., Nabiljsky Range, Chamginsky Pass, the spot elevation "1511 m", along the rivulet, in moss community, 8. VIII. 2002, coll. V.

Barkalov.

Distribution. Sakhalin; endemic. Montane meadows, near the streams.

Note. This specimen was misidentified as *C. yezoensis* Maxim. in Probatova *et al.* (2007), as has now been established by V.Yu. Barkalov. *C. sachalinensis* was reported in the Russian Far East by Woroshilov (1982). There was no previous chromosome information for *C. sachalinensis*.

11. *Cardamine* sp.

(cfr. *C. appendiculata* Franch. et Savat.)

Chromosome number. $2n=16^*$ (R.).

Voucher specimen. VLA 10432, Kuriles, Kunashir Island, the nature reserve "Kurilsky", Ozernaya R., on the slope, near the waterfall, 9. IX. 2006, coll. V. Barkalov.

Distribution. South Kuriles (Kunashir Island). Only known hitherto in the locality indicated above.

Note. The plants, collected in autumn, had half-dry stems without seeds (crumbled). Plants appeared to be ready for dormancy and were almost lying on the surface of the moist soil (melkozem) with thick (up to 8 mm) green rhizome-like stems (10–15 cm long), and small rosettes of very small leaves in the place of the buds. From these "rhizomes" we cultivated plants in the greenhouse in Vladivostok, and Barkalov wrote the following short description. Stems in lower part, as well as the leaves, pubescent, leaflets in 2–3 pairs, sessile, ovoid, sparse pubescent, edge dentate, the last leaflet not larger than the lateral ones. Flowers white, petals ca.7 mm long. It might represent a distinct species, as was mentioned by Woroshilov (1982) in his Note to *C. yezoensis* Maxim., however it is hardly a close relative of *C. schinziana* O.E. Schulz, and is (most probably) more closely related to *C. appendiculata* Franch. et Savat., distributed in Japan (Honshu). Further study of these plants is needed.

12. *Cardaminopsis lyrata* (L.) Hiit.

Chromosome number. $2n=16$ (R.).

Voucher specimen. VLA 10807, Kuriles, Shikotan Island, Zvezdnaya Bay, maritime slope, at the stream, 30.VIII. 2007, coll. V. Barkalov.

Distribution. Sakhalin, Kuriles; North Pacific. Rocks and screes.

Note. The chromosome number ($2n=16$) was known earlier for *C. lyrata* from North Sakhalin (Schmidt Peninsula) and from the Kuriles, Urup Island (Probatova *et al.* 2006a, 2007). The species has also been studied in Chukotka, Kamchatka and near Magadan, Koni Peninsula, under different names: *Arabidopsis lyrata* subsp. *kamtschatica* (Fisch. ex DC.) O'Kane et Al-Shehbaz; *Arabis lyrata* L.; *A. kamtschatica* (Fisch.) Ledeb. However, the authors report two chromosome numbers (two ploidy levels) – $2n=2x=16$ and $2n=4x=32$, from North America – $2n=16$ (see Bolkhovskikh *et al.* 1969; Ornduff 1968; Goldblatt 1984, 1985; Agapova *et al.* 1990; Goldblatt and Johnson 2003). The geographical distribution of

these two cytotypes in *C. lyrata* seems to be of great interest.

13. *Draba kurilensis* (Turcz.) Fr. Schmidt
(*Draba borealis* auct., p.p.)

Chromosome number. $2n=32$ (R.).

Voucher specimen. VLA 10863, Kuriles, Shikotan Island, Del'fin Bay, on the rocks, 31.VIII. 2007, coll. V. Barkalov.

Distribution. Sakhalin, Kuriles; Japan. Sea coasts, on the rocks.

Note. *D. kurilensis* with $2n=16$ (2x) was known from Sakhalin, and with $2n=32$ (4x) – from Moneron and the Kuriles: Matua and Shishkotan Islands (see Agapova *et al.* 1990; Probatova *et al.* 2004a, 2006a, 2007). This species belongs to the North Pacific complex *D. borealis* DC. aggr., and some authors do not recognize *D. kurilensis* as a species. However, very high chromosome numbers have been reported for *D. borealis* s str.: $2n=64$ (8x) from East Chukotka, $2n=80$ (10x) – from North America (see Bolkhovskikh *et al.* 1969; Agapova *et al.* 1990). We believe the chromosome numbers provide additional reasons to consider *D. kurilensis* as a separate species, one that occupies a more ancient part of the *D. borealis* aggr. area of distribution (Probatova *et al.* 2007). It is noteworthy that the ploidy levels in *D. borealis* aggr. rise to the north. Typically, *D. kurilensis* occurs in the South Kuriles. The geographical distribution of cytotypes within *D. borealis* aggr. needs to be clarified.

14. *Draba ussuriensis* Pohle

Chromosome number. $2n=16$ (R.).

Voucher specimen. VLA 10586, Sakhalin, Poronajsky District, Vostochno-Sakhalinskiye Mts., Vaida Mt., the upper course of Vitnitsa R., near the limestone rocks, 20.VIII. 2006, coll. V. Barkalov.

Distribution. Sakhalin; West Pacific area. Near sea coasts.

Note. *D. ussuriensis* is poorly investigated cytologically. There were only two chromosome reports, both from the environs of Magadan city, the coast of the Sea of Okhotsk: $2n=16$ (under "*D. villosula* Tolm.") and $2n=32$ (see Agapova *et al.* 1990). The diploid cytotype found in Sakhalin is probably a relict.

FAMILY CAMPANULACEAE

15. *Popoviocodonia stenocarpa* (Trautv. et C. A. Mey.) Fed.

(*P. uyemurae* Kudo; *Campanula stenocarpa* Trautv. et C. A. Mey., *C. uyemurae* (Kudo) Miyabe et Tatew.)

Chromosome number. $2n=34^*$ (R.).

Voucher specimen. VLA 10600, Sakhalin, Vostochno-Sakhalinskiye Mts., Nabiljsky Range, the environs of Chamginsky Pass, the spot elevation "1511 m", stony slope, near the ridge of watershed, ca. 1400 m above sea level, tundra vegetation, 15. VIII. 2006, coll. V. Barkalov, V. Yakubov.

Distribution. Sakhalin; Sea of Okhotsk area (south),

Sikhote-Alinj Mts. Mountain tundras, rocks.

Note. There was no chromosome information for this species in the literature. The genus *Popoviocodonia* is monotypic, and it is endemic to the Russian Far East. The diploid chromosome number $2n=34$ (2x) is also common for many species of the related genus *Campanula* L.

FAMILY CARYOPHYLLACEAE

16. *Dianthus superbus* L.

Chromosome number. $2n=30$ (K.)

Voucher specimen. VLA 10853, Kuriles, Shikotan Island, meadow on the stony slope, 23.VIII. 2007, coll. V. Barkalov.

Distribution. Sakhalin, South Kuriles; Eurasia. Stony slopes and meadows.

Note. The very polymorphic species *D. superbus* was studied from Moneron Island, $2n=30$ (Probatova *et al.* 2007) and from the Khabarovsk Territory, Botchinsky nature reserve, $2n=30$ (Probatova *et al.* 2006c). Most authors report $2n=30$ for *D. superbus*, e.g., from Siberia, as well as from Japan, Hokkaido (Nishikawa 1985) and from Korea (Lee 1967), but sometimes $2n=60$ and 90 are also reported (see Bolkhovskikh *et al.* 1969; Agapova *et al.* 1990; Goldblatt 1981, 1985, 1988; Goldblatt and Johnson 1990, 1991, 1996, 2000, 2003).

17. *Minuartia barkalovii* N.S. Pavlova

(*M. arctica* auct.)

Chromosome number. $2n=26^*$ (K.)

Voucher specimen. VLA 10835, Kuriles, Iturup Island, Stokap volcano, on volcanic scoria slide-rocks near the top, 11.VIII.2007, coll. V. Barkalov.

Distribution. Sakhalin, South Kuriles; Japan (?). Stony slopes and rocks in the mountains.

Note. *M. barkalovii* was described by Pavlova (1996) from the Stokap volcano on Iturup Island. We studied its chromosome number in the "*locus classicus*" of the species. *M. barkalovii* is related to *M. arctica* (Stev. ex Ser.) Graebn.: for *M. arctica* $2n=22, 26, 38, 52$ are known, from Siberia (see Agapova *et al.* 1990).

18. *Minuartia verna* (L.) Hiern

Chromosome number. $2n=24$ (R.).

Voucher specimen. VLA 10591, Sakhalin, Vostochno-Sakhalinskiye Mts., Nabiljsky Range, near Chamginsky Pass, the spot elevation "1511 m", mountain tundra belt, on the rocks, 15. VIII. 2006, coll. V. Barkalov, V. Yakubov.

Distribution. Sakhalin; Holarctic. Rocky slopes.

Note. This is the second chromosome count for *M. verna* in the Russian Far East (and in Sakhalin). The first one was made from the Schmidt Peninsula ($2n=24$ – Probatova *et al.* 2004a). There is a series of chromosome numbers within this species reported in the international literature: $2n=24, 26, 48, 78, 120$ (see Bolkhovskikh *et al.* 1969; Goldblatt 1981, 1984,

1985; Goldblatt and Johnson 1990, 1996, 1998, 2000). However, the most common diploid cytotype is ($x=12$).

19. *Stellaria ruscifolia* Pall. ex Schlecht.

Chromosome number. $2n=26$ (R.).

Voucher specimen. VLA 10834, Kuriles, Iturup Island, Stokap volcano, on volcanic scoria slide-rocks near the top, 11.VIII.2007, coll. V. Barkalov.

Distribution. Sakhalin (north), Kuriles; North Pacific area. Coastal rocks.

Note. This is the second chromosome count for *S. ruscifolia* from the Kuriles. The first one was made from Ekarma Island ($2n=26$ – Probatova *et al.* 2000a). The same chromosome number $2n=26$ is known in *S. ruscifolia* from the environs of Magadan, in the Sea of Okhotsk (Zhukova and Petrovsky 1987). However, $2n=c.50$ has been reported for *S. ruscifolia* from North America (see Bolkhovskikh *et al.* 1969), this probably is $2n=52$.

FAMILY CHENOPODIACEAE

20. *Atriplex subcordata* Kitag.

(*A. gmelinii* auct., p.p.)

Chromosome number. $2n=36$ (R.).

Voucher specimen. VLA 10824, Kuriles, Shikotan Island, Tserkovnaya Bay, sandy seashore, 2.IX.2007, coll. V. Barkalov.

Distribution. Sakhalin, Kuriles. West Pacific area. Sea coasts.

Note. This is the first chromosome count for *A. subcordata* from the Kuriles. Earlier we reported $2n=36$ for *A. subcordata* from Sakhalin (Probatova *et al.* 2006a). Two chromosome numbers (two ploidy levels) were published for *A. subcordata* from Japan, $2n=36$ (see Bolkhovskikh *et al.* 1969) and $2n=54$, from Hokkaido (Nishikawa 1981). Later, Nishikawa (1986) reported $2n=36$ for “*Atriplex gmelinii*” from Hokkaido. In the Primorsky Territory, $2n=36$ was also known in *A. subcordata* (Probatova and Sokolovskaya 1990). *A. subcordata* has more of a distribution in the southern area than *A. gmelinii* C. A. Mey. According to Ignatov (1988), in the South Kuriles and Primorsky Territory only *A. subcordata* occurs. The existence of hexaploid cytotype $2n=54$ in *A. subcordata* needs more evidence.

21. *Chenopodium glaucum* L.

Chromosome number. $2n=18$ (R.).

Voucher specimen. VLA 10815, Kuriles, Shikotan Island, Del’fin Bay, seashore, 31.VIII.2007, coll. V. Barkalov.

Distribution. Sakhalin (south), South Kuriles; nearly cosmopolitan.

Note. *Ch. glaucum* is well studied caryologically, as shown in the international literature, and is reported almost everywhere as $2n=18$ (see Bolkhovskikh *et al.* 1969; Goldblatt 1981, 1985, 1988; Agapova *et al.* 1990; Goldblatt and Johnson 1991, 1994, 1998, 2000, 2003, 2006); only once was $2n=36$ reported (see Goldblatt 1984).

FAMILY FABACEAE

22. *Lathyrus japonicus* Willd.

(*L. maritimus* auct.)

Chromosome number. $2n=14$ (R.).

Voucher specimen. VLA 10861, Kuriles, Shikotan Island, Zvezdnaya Bay, maritime slope, meadow, 30.VIII.2007, coll. V. Barkalov.

Distribution. Sakhalin, Kuriles; North Pacific area. Sea shores.

Note. The chromosome number in *L. japonicus* ($2n=14$) was studied from Sakhalin, Kamchatka, Chukotka, North Koryakia, the Primorsky Territory, Japan and elsewhere (see Bolkhovskikh *et al.* 1969; Goldblatt 1988; Agapova *et al.* 1990; Goldblatt and Johnson 1991, 1994, 2003, 2006; Probatova *et al.* 2007).

23. *Lathyrus pilosus* Cham.

(*L. palustris* var. *pilosus* (Cham.) Ledeb.)

Chromosome number. $2n=56^*$ (R.).

Voucher specimen. VLA 10814, Kuriles, Shikotan Island, Anamka R., along the edge of a moist meadow, 5.IX.2007, coll. V. Barkalov.

Distribution. Sakhalin, Kuriles; Russian Far East; Siberia; Arctic and East Europe, China, Japan, North America. In damp forests and wetlands.

Note. *L. pilosus* belongs to a small group, *L. palustris* aggr., peculiar because of its rather frequent polyploidy, which is not common at all for the genus *Lathyrus* L. The most frequent variables in the polymorphic species *L. pilosus* are hairiness and width of the leaflets (Pavlova 1989). Plants from Sakhalin and the South Kuriles, with broad leaflets (up to 15 (23) mm wide), have been described as *L. miyabei* Matsum. (*L. pilosus* var. *miyabei* (Matsum.) Hara). For *L. pilosus* and *L. palustris* (the latter is absent in the Russian Far East), beside $2n=14$ (many reports), several authors give $2n=42$, mostly under the name “*L. palustris* var. *pilosus*”, and from various parts of its area of distribution including: Finland, Slovakia, China, Japan, North America (see Bolkhovskikh *et al.* 1969 – for “*L. palustris*”; Goldblatt 1981, 1988; Goldblatt and Johnson 1991, 1998, 2006). There is a paper on hexaploid *L. palustris* (Khawaja *et al.* 1995), where it is considered as a natural autohexaploid. We revealed for the first time a new, octoploid ($8x$) cytotype in *L. pilosus* (*L. palustris* aggr.). The taxonomic status of *L. miyabei* requires revision.

24. *Oxytropis calcareorum* N. S. Pavlova

Chromosome number. $2n=32^*$ (R.).

Voucher specimen. VLA 10583, Sakhalin, Poronajsky District, Vostochno-Sakhalinskyye Mts., Vaida Mt., the upper course of Vitnitsa R., near the limestone rocks, 20.VIII.2006, coll. V. Barkalov.

Distribution. Sakhalin (north). Endemic. Rocks, mountain tundras. Calciphyte.

Note. Previously, no chromosome information existed for this species. According to Pavlova (1989),

O. calcareorum might be identical to *O. rukutamensis* Sugawara, but the latter name was invalid.

25. *Oxytropis hidakamontana* Miyabe et Tatew.

(*O. retusa* auct., p. p.)

Chromosome number. $2n=64^*$ (R.).

Voucher specimens. VLA 10800, Kuriles, Shikotan Island, Shikotan Mt., rocks in the top of the mountain, 8. IX. 2007, coll. V. Barkalov; VLA 10802, Kuriles, Shikotan Island, Notoro Mt., near the top of the mountain, on the rocks, 24.VIII.2007, coll. V. Barkalov.

Distribution. South Kuriles; Japan. Stony slopes, coastal rocks.

Note. Only one chromosome report for this species existed, $2n=16$, in Pavlova *et al.* (1989). It is also from Shikotan Island (Gorobets Bay, near Krabozavodsk). It was previously published as "*Oxytropis retusa*", in Gurzenkov and Pavlova (1984). We have now received two specimens (from two different mountains) that are not diploid, but octoploid (8x), with chromosome number $2n=64$. According to Pavlova (1989), the plants from the South Kuriles do not agree well with *O. hidakamontana*, and they might belong to a separate species. The situation with these plants in Shikotan Island needs to be clarified, and further chromosome studies on this group are also needed.

26. *Oxytropis sachalinensis* Miyabe et Tatew.

Chromosome number. $2n=16$ (R.).

Voucher specimens. VLA 10796, Sakhalin, Schmidt Peninsula, Taliki R., meadow on the slope of the mountain, 14.VIII. 2001, coll. V. Barkalov; VLA 10798, Sakhalin, Schmidt Peninsula, Boljshaya Longri R., mountainside, 16. VIII. 2001, coll. V. Barkalov.

Distribution. Sakhalin (north and east). Endemic. Mountain tundras, meadows and rocks.

Note. The chromosome number in *O. sachalinensis* was counted previously on Sheltinga Cape, Sakhalin (east), $2n=16$ (Probatova *et al.* 2006a). This species is a relative of *O. ajanensis* (Regel et Til.) Bunge (Pavlova 1989), which also has $2n=16$ (Yurtsev and Zhukova 1972).

FAMILY GERANIACEAE

28. *Geranium erianthum* DC.

Chromosome number. $2n=28$ (R.).

Voucher specimen. VLA 8341, Kuriles, Paramushir Island, Vassiljeva Peninsula, in vicinity of Pernatoye Lake, meadow, 25.VII. 2000, coll. V. Barkalov.

Distribution. Sakhalin, Kuriles; North Pacific area. Meadows.

Note. This species was studied from Shumshu Island: $2n=28$ (Probatova *et al.* 2000a), as well as from Chukotka and from North America. $2n=30$ was reported in Japan (see Bolkhovskikh *et al.* 1969; Goldblatt 1984; Agapova *et al.* 1990).

FAMILY HEMEROCALLIDACEAE

29. *Hemerocallis yezoensis* Hara

Chromosome number. $2n=22$ (R.).

Voucher specimen. VLA 10448, Kuriles, Kunashir Island, Sea of Okhotsk coast, near the mouth of Ozernaya R., marine terrace, grass meadow, 6.IX. 2006, coll. V. Barkalov.

Distribution. South Kuriles (Kunashir Island); Japan. Meadows on sea coasts.

Note. The chromosome number for *H. yezoensis* ($2n=22$) was determined from Japan (see Bolkhovskikh *et al.* 1969; Goldblatt and Johnson 1991).

FAMILY HYPERICACEAE

30. *Hypericum kamtschaticum* Ledeb.

(*H. paramushiriense* Kudo)

Chromosome number. $2n=16$ (R.).

Voucher specimen. VLA 10653, Kuriles, Kunashir Island, north-east part, the caldera of Tyatya Volcano, meadow, 14.IX.2006, coll. V. Barkalov.

Distribution. Kuriles; West Pacific area. Mostly sea coasts (rocks and meadows).

Note. This species is poorly studied. Its chromosome number was hitherto known only from Japan: $2n=16$ (Kogi 1984; Nishikawa 1985). The same chromosome number $2n=16$ has also been revealed in two relative species: *H. yezoense* Maxim., from Moneron Island, and *H. attenuatum* Choisy, from the south of the Primorsky Territory (see Agapova *et al.* 1990; Probatova *et al.* 2004a; Probatova *et al.* 2006b).

31. *Hypericum yezoense* Maxim.

Chromosome number. $2n=16$ (K.).

Voucher specimen. VLA 10860, Kuriles, Shikotan Island, Zvezdnaya Bay, maritime stony slope, meadow, 30.VIII.2007, coll. V. Barkalov.

Distribution. Sakhalin (south), South Kuriles; Japan. Rocks and meadows.

Note. The chromosome number in *H. yezoense* was studied for the first time not long ago, on Moneron Island: $2n=16$ (Probatova *et al.* 2004a).

FAMILY JUNCACEAE

32. *Juncus bufonius* L.

Chromosome number. $2n=34$ (R.).

Voucher specimen. VLA 10870, Kuriles, Shikotan Island, Del'fin Bay, sand banks by the lakeside, 31.VIII. 2007, coll. V. Barkalov.

Distribution. Sakhalin, Kuriles; Holarctic (as alien – in South America and Australia). Sandbanks, uliginose banks.

Note. The species was previously studied in the South Kuriles, Kunashir Island: $2n=50, 54, 56$ (Probatova *et al.* 2000a). From Chukotka, $2n=34$ and 52 were reported (Zhukova and Petrovsky 1987; Agapova *et al.* 1990). This is a very polymorphic species, with $2n=30, 34, 52, c.60, c.70, 80, c.100, 106,$

108, 110, 120 (see Bolkhovskikh *et al.* 1969; Goldblatt 1981, 1984; Goldblatt and Johnson 1994, 1998).

FAMILY LAMIACEAE

33. +*Galeopsis tetrahit* L.

Chromosome number. $2n=32$ (R.).

Voucher specimen. VLA 10787, Kuriles, Shikotan Island, Zvezdnaya Bay, sea shore, near the rivulet, 29.VIII. 2007, coll. V. Barkalov.

Distribution. South Kuriles (Shikotan Island); Europe; as alien – in the Primorsky Territory (near Vladivostok, very rare) and in North America.

Note. This alien species is reported for the first time from the Kuriles. There are many reports of $2n=32$ for *G. tetrahit* in the literature (see Bolkhovskikh *et al.* 1969; Goldblatt 1981, 1984, 1985, 1988; Goldblatt and Johnson 1991, 1998, 2000, 2003), but $2n=30$ was found once from Baikal Siberia (see Agapova *et al.* 1990) which, most probably, is incorrect.

FAMILY ONAGRACEAE

34. *Epilobium fastigiato-ramosum* Nakai

Chromosome number. $2n=36$ (R.).

Voucher specimen. VLA 10854, Kuriles, Shikotan Island, Zvezdnaya Bay, marine terrace, small bog with herbs and mosses, 30.VIII. 2007, coll. V. Barkalov.

Distribution. South Kuriles (Shikotan Island, first report for the Kuriles!); south of the Russian Far East; South Siberia; Mongolia, China, Korea, Japan. Forest edges, wetlands.

Note. We only found one chromosome report in the literature for *E. fastigiato-ramosum*, from China ($2n=36$, Chen C.-J. *et al.* 1992).

35. +*Oenothera biennis* L.

Chromosome number. $2n=14$ (R.).

Voucher specimen. VLA 10811, Kuriles, Shikotan Island, Del'fin Bay, coastal sand dunes, roadside, 31.VIII.2007, coll. V. Barkalov; VLA 10869, Kuriles, Shikotan Island, Ostrovnoy Peninsula, sand dunes in roadside, 31.VIII. 2007, coll. V. Barkalov.

Distribution. Sakhalin (south), South Kuriles, introduced (naturalized in the Russian Far East); Japan; native in North America; as alien – almost cosmopolitan.

Note. This species was studied in Sakhalin ($2n=14$, Probatova and Rudyka 1981). For *O. biennis* many authors give $2n=14$ (see Agapova *et al.* 1993; Goldblatt 1981, 1988; Goldblatt and Johnson 1990, 1991, 1994, 2000, 2003), in the old literature $2n=28$ was found (see Bolkhovskikh *et al.* 1969).

FAMILY ORCHIDACEAE

36. *Oreorchis patens* (Lindl.) Lindl.

Chromosome number. $2n=c.48$ (R.).

Voucher specimen. VLA 9096, Sakhalin, Dolinsky District, the environs of Sokol settlement, on the slope

of a hill, mixed forest, 16. VII. 2003, coll. V. Barkalov.

Distribution. Sakhalin (south), South Kuriles; West Pacific area. In forests.

Note. The chromosome number ($2n=48$) was already revealed from Sakhalin, Moneron and the Kuriles, Urup Island (Probatova and Sokolovskaya 1995; Probatova *et al.* 2007). In Japan there were reports $2n=48$ and, sometimes, $2n=50$ (see Bolkhovskikh *et al.* 1969; Goldblatt and Johnson 1991).

FAMILY PAPAVERACEAE

37. *Chelidonium asiaticum* (Hara) Krachulkova

Chromosome number. $2n=10$ (R.).

Voucher specimen. VLA 10822, Kuriles, Shikotan Island, Malokuriljskoye settlement, near the buildings, 6.IX. 2007, coll. V. Barkalov.

Distribution. Sakhalin, South Kuriles; south of the Russian Far East; China, Korea, Japan. Forest edges, sandbanks. Described from Japan.

Note. This is the first chromosome count for this species in the Kuriles. *Ch. asiaticum* is the only native species to East Asia, its chromosome number, $2n=10$, has been revealed many times in the Primorsky Territory, in the Amur River basin and in Sakhalin (Probatova and Sokolovskaya 1986; Probatova *et al.* 1996, 1998, 2000c, 2006a; Shatalova 2000). All reports of $2n=10$ for “*Ch. majus* L.” (instead of $2n=12$) from the Russian Far East, China, Korea and Japan (see Bolkhovskikh *et al.* 1969; Goldblatt 1984, 1985; Goldblatt and Johnson 1991, 1998, 2003; Agapova *et al.* 1993), as well as “*Ch. majus* var. *asiaticum*”, must be referred to *Ch. asiaticum*.

FAMILY PINACEAE

38. *Picea glehnii* (Fr. Schmidt) Mast.

Chromosome number. $2n=24$ (R.).

Voucher specimen. VLA 10433, Kuriles, Kunashir Island, in vicinity of Goryachyi Plyazh settlement, along the road, 11. IX. 2006, coll. V. Barkalov.

Distribution. Sakhalin (south), South Kuriles; Japan. Forests.

Note. The chromosome number in *P. glehnii* was studied from Sakhalin, $2n=24$, and from Japan, $2n=24+0-5B$ (see Goldblatt and Johnson 1991, 2006).

FAMILY POACEAE

39. *Agrostis flaccida* Hack.

Chromosome number. $2n=14$ (K.).

Voucher specimen. VLA 10833, Kuriles, Shikotan Island, Tomari Mt., meadow near the mountain top, 26.VIII.2007, coll. V. Barkalov.

Distribution. Sakhalin, Kuriles; Japan; West Pacific area (mostly insular). Meadows.

Note. *A. flaccida* has been studied in Sakhalin and the Kuriles (Paramushir, Iturup and Kunashir Islands) and found to be $2n=14$ (see Agapova *et al.* 1993;

Probatova *et al.* 1989; Rudyka 1990; Probatova *et al.* 2000a). As for other chromosome numbers, $2n=21$, 28, 56, from Japan, for "*A. flaccida*" (see Bolkhovskikh *et al.* 1969; Goldblatt, 1988; Goldblatt and Johnson 1990) they might belong to some other species or represent hybrids of *A. flaccida*.

40. *Agrostis matsumurae* Hack. ex Honda
(*A. clavata* subsp. *matsumurae* (Hack. ex Honda) Tateoka; ?*A. macrothyrsa* Hack.)

Chromosome number. $2n=42$ (R.).

Voucher specimen. VLA 10865, Kuriles, Shikotan Island, the slope of Ploskaya Mt., forest stream bank, 27.VIII. 2007, coll. V. Barkalov.

Distribution. Sakhalin, Kuriles; Japan. In forests, near the rivulets.

Note. Sometimes *A. matsumurae* is considered as conspecific with *A. macrothyrsa* Hack. or with *A. clavata* Trin. There are some chromosome counts from Sakhalin and the Kuriles (Paramushir, Iturup Islands) of $2n=42$ (Probatova *et al.* 2007 – as *A. clavata*). For *A. matsumurae* from Japan, $2n=28$ and 42 were reported (see Bolkhovskikh *et al.* 1969).

41. *Deschampsia macrothyrsa* (Tatew. et Ohwi) Kawano

Chromosome number. $2n=26$ (R.).

Voucher specimen. VLA 8612, Sakhalin, northwards from Pomrj Bay, in vicinity of the former Mujzma settlement, 10.VIII. 2001, coll. V. Barkalov.

Distribution. Sakhalin, South Kuriles; the Sea of Japan area. Sea coasts. Salt marches and meadows.

Note. The species has received little study. The only chromosome report was given by A.P. Sokolovskaya in Probatova (1984), from the "*locus classicus*" of *D. macrothyrsa* (Solovyovka, or "Soriofka"), in the south of Sakhalin (see Probatova *et al.* 2007).

42. *Elymus franchetii* Kitag.

Chromosome number. $2n=42^*$ (K.).

Voucher specimen. VLA 10841, Kuriles, Shikotan Island, the middle coarse of Gorobets R., on the edge of *Alnus hirsuta* forest, by the road, 24.VIII.2007, coll. V. Barkalov.

Distribution. Sakhalin, South Kuriles; south of the Russian Far East; China, Korea, Japan (?).

Note. This species was described from China and belongs to *E. dahuricus* aggr. According to Acad. N.N. Tzvelyov's opinion (his personal communication to Probatova), *E. franchetii* occupies the "intermediate" position between *E. dahuricus* Turcz. ex Griseb. s. str. and *E. excelsus* Turcz. ex Griseb., but the morphological features distinguishing it from the coastal species *E. woroschilovii* Probat. are not clear. No published chromosome information was found for *E. franchetii*.

43. *Festuca ovina* L.

Chromosome number. $2n=14$ (R.).

Voucher specimen. VLA 10864, Kuriles, Shikotan Island, the upper course of Ostrovnaya R., rubbly-melkozem slide-rocks on the slope of the mountain, 25.VIII. 2007, coll. V. Barkalov.

Distribution. Sakhalin, South Kuriles; Holarctic. Steppes and meadows.

Note. *F. ovina* was studied in Sakhalin and the Kuriles (Iturup and Shikotan Islands), as well as in various regions of the Far East and all of Russia: $2n=14$ (Alexeev *et al.* 1990). Chromosome counts other than $2n=14$ in the extensive literature (especially in old sources) are likely not to belong to *F. ovina* s. str.

44. *Milium effusum* L.

Chromosome number. $2n=28$ (R.).

Voucher specimen. VLA 10842, Kuriles, Shikotan Island, Tserkovnaya Bay, on the edge of *Alnus hirsuta* forest with tall herbs, 3.IX.2007, coll. V. Barkalov.

Distribution. Sakhalin, Kuriles; Holarctic (?). Forests, tall herbs communities.

Note. The chromosome number in *M. effusum* was studied in Sakhalin and the Kuriles (Urup, Iturup, Kunashir Islands), $2n=28$ (Probatova *et al.* 2000a, 2007). In the Amur R. basin (Russian part), in the Primorsky Territory, as well as in the other regions of Russia, this species have been studied many times ($2n=28$ – Probatova and Sokolovskaya 1981; Probatova *et al.* 2000b, 2001, 2004b and unpublished data). In the literature for *M. effusum* many authors report $2n=28$, rarely $2n=28+0-1B$ or $2n=26$ (see Bolkhovskikh *et al.* 1969; Goldblatt 1981, 1984, 1985, 1988; Goldblatt and Johnson 1994, 1996, 2003; Agapova *et al.* 1993). There is only one report of $2n=14$ from European Arctic of Russia (Khibinskiye Mts.) which is obviously an error; moreover, the voucher specimen was not found in LEU Herbarium.

45. *Poa palustris* L.

Chromosome number. $2n=28$ (R.).

Voucher specimen. VLA 10803, Kuriles, Shikotan Island, Del'fin Bay, lakeside, *Salix* community, 31.VIII.2007, coll. V. Barkalov.

Distribution. Sakhalin, Kuriles; Holarctic. Wet meadows.

Note. Polymorphic species. Its chromosome number was studied in Sakhalin and the Kuriles (Simushir, Iturup, Kunashir Islands), $2n=28$ (see Agapova *et al.* 1993; Probatova *et al.* 2000a). Also $2n=28$ was revealed for *P. palustris* in Kamchatka, the Amur R. basin and the Primorsky Territory. Most authors report $2n=28$ for *P. palustris* (see Bolkhovskikh *et al.* 1969; Goldblatt 1981, 1984; Goldblatt and Johnson 1990, 1991, 1994; Agapova *et al.* 1993; Shatalova 2000), but $2n=42$ (and especially $2n=14$) seem not to belong to this species.

46. ***Poa trivialis*** L.

Chromosome number. $2n=14$ (R.).

Voucher specimen. VLA 10858, Kuriles, Shikotan Island, Anamka R., *Alnus hirsuta* forest, with tall herbs near the rivulet, 5.IX. 2007, coll. V. Barkalov.

Distribution. Sakhalin, South Kuriles (introduced, also in Kamchatka and the Primorsky Territory); Europe, Siberia, Central Asia; naturalized in many regions. Moist places along roads, disturbed meadows, near the rivulets.

Note. *P. trivialis* was studied on Sakhalin and the Kuriles, Shikotan Island, near Krabozavodsk and has a count of $2n=14$ (see Agapova *et al.* 1993). For *P. trivialis* most authors report $2n=14$ (sometimes with 1-4B-chromosomes), but rarely $2n=28$, but the latter chromosome number, most probably, does not belong to this species (see Bolkhovskikh *et al.* 1969; Goldblatt 1981, 1984, 1985, 1988; Goldblatt and Johnson 1990, 1991, 1994, 1996, 1998, 2003; Agapova *et al.* 1993).

FAMILY POLYGONACEAE

47. ***Acetosella angiocarpa*** (Murb.) A. Löve

(*Rumex angiocarpus* Murb.)

Chromosome number. $2n=42$ (R.).

Voucher specimen. VLA 10836, Kuriles, Shikotan Island, Tserkovnaya Bay, along the abandoned road near seashore, 3.IX. 2007, coll. V. Barkalov.

Distribution. Sakhalin, Kuriles (introduced ?); not reported for the rest of the Russian Far East; almost cosmopolitan. Roadsides, disturbed habitats.

Note. This species was studied in Sakhalin and the Kuriles, Iturup Island, $2n=42$ (Probatova and Sokolovskaya 1989; Probatova *et al.* 1996). In the literature we found $2n=14, 15, 28, 42$ (see Bolkhovskikh *et al.* 1969; Goldblatt 1984, 1985).

48. ***Persicaria extremiorientalis*** (Worosch.) Tzvel.

Chromosome number. $2n=22^*$ (R.).

Voucher specimen. VLA 10823, Kuriles, Shikotan Island, Del'fin Bay, sea shore, 1.IX. 2007, coll. V. Barkalov.

Distribution. Sakhalin (south), South Kuriles; Sea of Japan area; introduced (?) to some countries of South and South-East Asia. Riverbanks, roadsides. Described from Moneron Island.

Note. No chromosome data were known up to this point for *P. extremiorientalis*. According to Tzvelyov (1989), the species might be of hybrid origin.

49. ***Persicaria scabra*** (Moench) Mold.

(*Polygonum scabrum* Moench)

Chromosome number. $2n=22$ (R.).

Voucher specimen. VLA 10856, Kuriles, Shikotan Island, the middle course of Gorobets R., moist place on the edge of a bog, along the roadside, 5.IX. 2007, coll. V. Barkalov.

Distribution. Sakhalin, Kuriles; Holarctic. Riverbanks, roadsides.

Note. *P. scabra* was studied on Sakhalin and

the Kuriles, Kunashir Island, $2n=22$ (Probatova and Sokolovskaya 1989). In the literature we found $2n=22$ and 44 for this species (see Bolkhovskikh *et al.* 1969; Goldblatt 1988; Agapova *et al.* 1993; Goldblatt and Johnson 1994, 2003).

50. ***Rumex crispus*** L.

Chromosome number. $2n=60$ (R.).

Voucher specimen. VLA 10805, Kuriles, Shikotan Island, the valley of Gorobets R., roadside, 5.IX. 2007, coll. V. Barkalov.

Distribution. Sakhalin (south), South Kuriles; Holarctic; introduced to other regions.

Note. The species was studied from Vladivostok ($2n=60$, Probatova and Sokolovskaya 1989). For *R. crispus* the chromosome number $2n=60$ is unanimously reported in the literature (see Bolkhovskikh *et al.* 1969; Goldblatt 1981, 1985, 1988; Goldblatt and Johnson 1990, 1991, 1994, 1998, 2000, 2003, 2006; Agapova *et al.* 1993).

FAMILY ROSACEAE

51. ***Fragaria nipponica*** Makino

(*F. nipponica* var. *yezoensis* (Hara) Kitam.; *F. yezoensis* Hara)

Chromosome number. $2n=14$ (R.).

Voucher specimen. VLA 10788, Kuriles, Shikotan Island, the bottom of Shikotan Mt., in vicinity of Malokuril'skoye settlement, alder forest (*Alnus hirsuta*), near the stream, 23. VIII. 2007, coll. V. Barkalov.

Distribution. Sakhalin (south), South Kuriles; Japan. Forest edges, meadows.

Note. The species was studied previously on the Kuriles (Simushir, Matua, Kunashir Islands), $2n=14$ (under "*F. yezoensis*", in Probatova *et al.* 1989, 2000a). This chromosome number also is known from Japan (see Bolkhovskikh *et al.* 1969; Goldblatt and Johnson 1991, 1994). The tetraploid chromosome number $2n=28$, reported in some cases, probably does not belong to this species.

52. ***Potentilla dickinsii*** Franch. et Savat.

Chromosome number. $2n=14$ (R.).

Voucher specimen. VLA 10840, Kuriles, Shikotan Island, Tserkovnaya Bay, on the rocks along the mountain ridge, 3.IX. 2007, coll. V. Barkalov.

Distribution. South Kuriles (Shikotan Island; also reported from Kunashir, in Woroschilov 1982); Korea, Japan. Described from Japan. Coastal slopes and rocks.

Note. This species is poorly investigated. There were two chromosome reports for *P. dickinsii*, one from Korea and one from Japan, and both stated $2n=14$ (Kawano 1963; Lee 1967).

53. ***Potentilla matsumurae*** Th. Wolf

Chromosome number. $2n=14^*$ (R.).

Voucher specimen. VLA 10820, Kuriles, Shikotan Island, Shikotan Mt., on the rocks, 23.VIII. 2007, coll. V.

Barkalov.

Distribution. Sakhalin (south), Kuriles; Japan; Sea of Japan area (?). Mountain tundras, alpine meadows, stony slopes and rocks.

Note. We found the only one chromosome report, from Japan, for *P. matsumurae* of $2n=28$ (Shimotomai 1929). We revealed a new, diploid ($2x$) cytotype in this species. Further studies are needed.

54. *Potentilla megalantha* Takeda

(*P. fragiformis* subsp. *megalantha* (Takeda) Hult.)

Chromosome number. $2n=70$ (R.).

Voucher specimen. VLA 10644, Kuriles, Kunashir Island, the Sea of Okhotsk coast, westwards of Golovnina Volcano, stony slope of marine terrace, 6.IX. 2006, coll. V. Yakubov.

Distribution. Sakhalin, Kuriles; West Pacific. Coastal rocks.

Note. *P. megalantha* was previously studied several times on the Kuriles, from Shumshu, Ushishir, and the Urup Islands ($2n=70$, Probatova *et al.* 2000a, 2006a). From Japan there were counts made by Shimotomai (1930a, b) of $2n=70$. In its closely related species, the North Pacific *P. fragiformis* Willd. ex Schlecht., two cytotypes were known, $2n=42$ and 56, according to many reports in the literature (see Agapova *et al.* 1993). Moreover, we recently revealed $2n=28$ in *P. fragiformis* from the Shantarskye Islands, in the Sea of Okhotsk (unpublished). Taking all these data into consideration, we have complementary evidence to consider *P. megalantha* as a separate species with a constant, decaploid ($10x$) chromosome number of $2n=70$.

FAMILY RUBIACEAE

55. *Galium trifidum* L.

Chromosome number. $2n=24$ (R.).

Voucher specimen. VLA 10885, Kuriles, Shikotan Island, Tserkovnaya Bay, seashore, along the edge of Picea wood, 3.IX. 2007, coll. V. Barkalov.

Distribution. Sakhalin, Kuriles; Holarctic. Damp forests, bogs and wetlands.

Note. This is the only chromosome number reported for *G. trifidum* in the literature. This species was studied from Chukotka, as well as in Japan and in North America ($2n=24$, see Bolkhovskikh *et al.* 1969; Goldblatt 1981, 1985; Agapova *et al.* 1993). We also obtained this chromosome number for *G. trifidum* from the Amur R. basin, the Khabarovsk Territory (unpublished).

FAMILY SCROPHULARIACEAE

56. *Scrophularia grayana* Maxim. ex Kom.

Chromosome number. $2n=20$ (R.).

Voucher specimen. VLA 10825, Kuriles, Shikotan Island, Tserkovnaya Bay, seashore, 2.IX. 2007, coll. V. Barkalov.

Distribution. Sakhalin (south), South Kuriles; Sea of Japan area. Coastal rocks and meadows.

Note. Not long ago we revealed the diploid chromosome number $2n=20$ in *S. grayana* from the Kuriles (Iturup Island), and from Moneron (Probatova *et al.* 2006a), but $2n=40$ in the south continental coast of the Primorsky Territory (Probatova *et al.* 2006b). We assume the insular part of *S. grayana*'s area of distribution to be more ancient than the continental one.

57. *Veronica schmidtiana* Regel

Chromosome number. $2n=34$ (R.).

Voucher specimen. VLA 10859, Kuriles, Shikotan Island, Shikotan Mt., maritime slope, on the screes with melkozem, 6.IX. 2007, coll. V. Barkalov.

Distribution. Sakhalin, Moneron, South Kuriles; Japan. Coastal rocks and screes.

Note. *V. schmidtiana* was studied from Moneron Island (Probatova *et al.* 2006a), and earlier from Japan (see Bolkhovskikh *et al.* 1969). In all cases $2n=34$.

General remarks

Twenty-two species now make up the addition to the list of the species from Sakhalin and the Kuriles with studied chromosome numbers. They are: *Arctium tomentosum*, *Cardamine sachalinensis*, *Cardamine sp.*, *Chenopodium glaucum*, *Draba ussuriensis*, *Elymus franchetii*, *Epilobium fastigiataramosum*, *Eupatorium glehnii*, *Galeopsis tetrahit*, *Galium trifidum*, *Hemerocallis yezoensis*, *Hypericum kamtschaticum*, *Kitagawia terebinthacea*, *Lathyrus pilosus*, *Leontopodium kurilense*, *Minuartia barkalovii*, *Oxytropis calcareorum*, *Persicaria extremiorientalis*, *Popoviocodonia stenocarpa*, *Potentilla dickinsii*, *P. matsumurae*, *Rumex crispus*. Thus, the total number of species, with chromosome numbers obtained on local material, is equal to $536 + 22 = 558$ spp. studied (in Sakhalin $356 + 4 = 360$ spp., in the Kuriles $257 + 29 = 286$ spp.).

This study represents the first caryological investigation of the representatives of the genera *Arctium*, *Atriplex*, *Chelidonium*, *Chenopodium*, *Dianthus*, *Eupatorium*, *Galeopsis*, *Galium*, *Kitagawia*, *Lathyrus*, *Leontopodium*, *Lepidotheca*, *Minuartia*, *Oenothera*, *Solidago*, *Vicia* – in the Kuriles, and the first caryological report on the genus *Popoviocodonia*, from Sakhalin.

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Comments on the Geography of Liverworts in the Kuril Islands with a List of Additions to the Liverwort Flora of Kunashir and Iturup of the Southern Kurils

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Abstract A gradual shift in liverwort flora from Subarctic to South Temperate elements occurs across the entire reach of the Kuril Island Chain. The study of different groups of organisms, including liverworts, reveals this pattern. Thirty-two hepatic species found on the Kuril Islands show the southern limit of their distribution; most of these species belong to arctic, arctic-boreal and, less often, boreal floristic elements. The Kuril Islands represent a northern distribution boundary for 50 taxa that belong to southern temperate or even subtropical floristic elements. Liverwort flora at the northern and southern extremes of the Kuril Island Chain are qualitatively different as demonstrated by their affiliation with different floristic provinces.

Key words: liverworts, geography of bryophytes, Kuril Islands

Introduction

The Kuril Island Chain is the only island chain on the earth that crosses a regional floristic border: East Asian and Circumboreal (Takhtajan 1986). Biogeography of the Kuril Island has been repeatedly analyzed and described based on the study of vascular plants. As early as the late 19th century and continuing into the mid 20th century, primarily Japanese researchers identified and illustrated descriptively the basic patterns that are characteristic of the change in the flora of these islands, and a change occurs along a latitudinal gradient.

Earlier studies (Miyabe 1890; Tatewaki 1933; etc.) noted differences in vegetation cover and floristic composition on the Kuril Islands. Kudo (1922, citation from Barkalov 2002), based on the heterogeneity of the vegetation cover of the Kuril Islands, divided the islands into two areas, at the Friz Strait between Urup and Iturup Islands. The northern half of the Kurils belongs to the Subarctic Region, and the southern to the Temperate East Asian Region. Tatewaki (1933) named this border the Miyabe-line. Tatewaki (1957) later divided the Kurils flora into three and not two districts: northern, central and southern. Hultén (1933) set the border between the Kamchatka and Japanese floristic provinces in the region of Kotoi and Ushishir Islands. Even so, he pointed out a gradual shift between two distinctly different floras in the central part of the Kurils.

Takhtajan (1986), in his well-known *Floristic Regions of the World*, drew the boundary for the East

Asian and Circumboreal Regions along the central Kurils. In his system, the Northern Kurils belong to the Okhotsk-Kamchatka Province and the southern (the largest islands Urup, Iturup, Kunashir and Shikotan) are combined into the Sakhalin-Hokkaido Province that encompass, aside from these islands, the southern portion of Sakhalin Island and Hokkaido Island. Qian *et al.* (2003), in examining the phytogeography of northeast Asia (farther north than 38° north latitude) combines the Northern Kurils, the southern part of the Kamchatka Peninsula and the Commander Islands into a single region. The authors considered the southern Kurils as a part of the single region that is combined with the southern part of Sakhalin Island. Barkalov (2002), based on an analysis of the latest data on the distribution of vascular plant species, set the border between East Asian and Circumboreal floristic regions between Urup and Simushir Islands, identifying five floristic districts in the Kuril Islands. Krestov (2006) divides the East Asian and Circumboreal floristic regions along central Sakhalin and Ekaterina Strait, the latter located between Iturup and Kunashir islands.

Although all the aforementioned systems claim to be general phytogeographic systems, in fact they are based on an analysis of the vascular plant distribution only, and this when the number of vascular plant species on Kamchatka is 1.5 times higher than that of bryophytic species and the number of lichens exceeds the taxonomic diversity of the vascular plants by at least 2.5 times. The only known map of the Kuril Islands that is based on a distribution of bryophytes is a modification of the world system of floristic

kingdoms and regions that was proposed by Takhtajan (1986) and that was published by Schofield (1992). He combined, without any further detail, all the islands of the Japanese archipelago, southern Sakhalin, northeast China and the Kuril Islands into a single Southeast Asian Region.

The History of Liverwort Research on the Kuril Islands

The Japanese bryologist Horikawa played a leading role in the study of liverworts in the Kurils. He wrote two specialized works, one of which is dedicated to the bryophytes of the northern Kurils (Horikawa 1934), the other describing the mosses and liverworts of Shikotan, an island at the southern end of the Kurils (Horikawa 1940). Russian botanists published a series of notes in the second half of the 20th century that contain new information on liverworts (Abramova 1960; Korotkevich 1963; Ladyzhenskaya 1964, etc). Nyushko and Potemkin (2005) summarized the information as about 40 liverwort species found on the Kurils. As one might expect, the results obtained over the course of a century poorly reflect current liverwort flora. The flaw in the research is that the collections available for analysis were gathered, in the best instances, by botanists whose interest was in vascular plants alone or, as has often been the case, these collections are the product of non-professional botanists.

I began my exploring study of liverwort flora on the Kuril Islands, in 2004, Paramushir and Shumshu that are located at the northern extreme of the chain. In 2005 I studied Iturup and in 2006 – Kunashir. Following an identification of the specimens contained in available collections, the number of liverwort species on the islands increased by 4.5 times and today 204 liverwort species are known to exist on the Kurils. An adequately detailed description of liverwort flora is available for the northern islands only (Bakalin and Cherdantseva 2006). A description of liverwort flora for the southern Kurils has not been published yet. These facts set the stage for a discussion of the Kuril Island phytogeography, based on existing liverwort flora data. The aim of this paper is to describe the floristic composition of liverworts across the full extent of the Kuril Islands along a latitudinal gradient.

Results and Discussion

The Kuril archipelago stretches from the shores of Hokkaido to the Kamchatka Peninsula. In a phytogeographic sense, it is better to view Kamchatka as an island system separate from the Asian continent. The flora of Kamchatka, which is united to the northeastern extreme of Asia by a narrow and gentle isthmus, has island characteristics. Komarov (1940) demonstrated this point in his study of vascular plants. It has also been noted that inland locations on both Kamchatka and Hokkaido feature a subcontinental

climate, with cold winters and warm, rather dry summers that are markedly different from the oceanic climate found on the coast. These local climatic deviations are impossible on the small islands that make up the Kuril Island Chain.

I compiled a floristic data set for the Kuril Islands (Nyushko and Potemkin 2005; Bakalin and Cherdantseva 2006, and my unpublished data), for Kamchatka (Bakalin 2003, 2005, and unpublished data) and for Hokkaido (Yamada and Iwatsuki 2006) to identify and study patterns. The geographic range for this data set consists of three areas of the Kuril Islands that have been reasonably well studied: northern Kurils (Paramushir and Shumshu), Iturup and Kunashir. The flora of these islands was then subjected to comparative analysis. Analysis was restricted to primarily the liverwort flora of the northern Kurils, Iturup and Kunashir since the majority of the islands in the central part of the Kuril Island Chain have indication for only single species.

Three hundred and forty-one liverwort species are identified for a vast region stretching 40° to 60° north latitude: 218 are encountered on the Kamchatka Peninsula, 97 - in the northern Kurils, 105 - on Iturup, 149 - on Kunashir, with 182 species are found on Hokkaido.

Sixty-two species and 4 varieties found on Kamchatka demonstrate no southward shift. Most of these species have arctic and arctic-montane distribution. Examples include *Anastrophyllum sphenoloboides* R.M. Schust., *Asterella saccata* (Wahlenb.) A. Evans, *Barbilophozia rubescens* (Schust. & Damsh.) Karttunen & Soederstroem, *Cryptocolea imbricata* R.M. Schust., etc. A small number of recently described species, whose distribution is also likely in Japan (*Lophozia lantratoviae* Bakalin), as well as species encountered on other islands of the Japanese Archipelago (*Sphenolobus saxicola* (Schr.) Steph., *Targionia hypophylla* L.), are likely to be discovered on Hokkaido given a thorough search of that island. At least a third of these species are likely to be discovered on islands in the northern portion of the Kuril Island Chain.

Sixty species found on Hokkaido are not found further north. Most of these have a South Temperate or even a predominately subtropical range (*Bazzania yoshinagana* (Steph.) Steph. in S. Hatt., *Calypogeia tosana* (Steph.) Steph., *Cavicularia densa* Steph., *Cheilolejeunea khasiana* (Mitt.) N. Kitag., *Cylindrocolea recurvifolia* (Steph.) H. Inoue). There is also a small group of species with montane distribution that might possibly be found on Kamchatka (*Anastrophyllum assimile* (Mitt.) Steph., *Mannia triandra* (Scop.) Grolle, etc.). At least half of these species are likely to be found in the southern Kurils.

Given the specificity of the areas at the northern and southern extremes of the Kuril Islands, the number of common species joining all the territories studied for this paper (Kamchatka Peninsula, northern Kuril Islands, Iturup, Kunashir and Hokkaido) is extremely

few. The number of species totals 28 and all of these species are either boreal (*Cephalozia leucantha* Spruce, *Conocephalum conicum* (L.) Und., *Lophocolea heterophylla* (Schrad.) Dumort., etc.), or they are arctic species that are broadly distributed in corresponding mountain belts (*Anthelia juratzkana* (Limpr.) Trev., *Diplophyllum albicans* (L.) Dumort., *Nardia scalaris* S.Gray, etc.).

Thirteen species are found only on Kamchatka and Hokkaido and these species are not encountered on the Kuril Islands. Most have boreal and, less often, arctic, montane distribution. The absence of these species on the Kuril Islands is to be expected since volcanic activity on the islands is a determining factor in floristic formation. Such species as *Barbilophozia barbata* (Schmid. ex Schreb.) Loeske, *Calypogeia azurea* Stotler et Crotz, *Chiloscyphus pallescens* (Ehrh. ex Hoffm.) Dumort., *Herbertus aduncus* (Dicks.) Gray, *Macrodiplophyllum microdontum* (Mitt.) H.Perss., *Ricciocarpos natans* (L.) Corda are incapable of active generative reproduction and are not found in regions with volcanic activity. I will note, though, that some of these species might very well be discovered on Shikotan Island where the last identified volcanic activity is dated to the start of the Miocene (Luchinsky 1974).

The specificities of the Kuril Islands relative to adjacent territories: the Kamchatka Peninsula and Hokkaido are as follows. Sixteen species are found on a single island only, on either Kunashir or Iturup, and these species are not encountered on either Kamchatka or Hokkaido. Nearly all have a South Temperate or even a predominately subtropical distribution and all are known to exist on Honshu Island. The majority of the species, examples such as *Alobiellopsis parvifolia* (Steph.) R.M. Schust., *Bazzania japonica* (Sande Lac.) Lindb., *Iwatsukia jishibae* (Steph.) N. Kitag., *Metzgeria fruticulosa* (Dicks.) A.W. Evans, *Pallavicinia lyelli* (Hook.) Carruth., *Plectocolea rigidula* S. Hatt. are likely to be discovered on Hokkaido given an opportunity to carry out additional research on that island. The specificity of the northern Kurils in this field is not represented; there are no Kuril liverwort species found on these islands that are not represented on Kamchatka and Hokkaido.

Eight species are documented on two or more islands of the Kurils. These species, however, are not encountered on Kamchatka or Hokkaido. Six of these species are limited to the southern extreme of the archipelago. Only three of them (*Metzgeria conjugata* Lindb., *Plectocolea rosulans* (Steph.) S. Hatt. и *Solenostoma pyriformum* Steph. var. *minutissima* (Amakawa) Bakalin) are characteristic of more southerly, South Temperate distribution and all three are found further south on Honshu Island. The status of one taxon (*Gymnocolea marginata* (Steph.) S. Hatt.) remains unclear. Two other species (*Cephaloziella elachista* (Jack ex Gottsche et Rabenh.) Schiffn., *Mylia taylorii* (Hook.) S. Gray) are limited in distribution to boreal or even arctic mountain belts (or corresponding

zones in the north). Both are documented on Honshu Island and so there is a basis to suggest that with additional research they will be discovered both on Kamchatka and on Hokkaido. Two species (*Riccardia aeruginosa* Furuki and *Scapania diplophylloides* Amakawa et S. Hatt) extend across the entire Kurils, from the north to the south, but they are not encountered in adjacent regions. Both are documented on Honshu Island and might possibly be discovered in areas adjacent to the Kurils.

The eastern Asian flora of Hokkaido obviously differs in principle from the circumboreal flora of the Kamchatka Peninsula. And it is expected that their ranges should come to end as they stretch across the Kurils. Fifty-four species distributed on Kamchatka are encountered on the Kurils; these species, however, are not known to Hokkaido. Most of these species are restricted in their distribution to the northern part of the archipelago. Many species, however, extend as far south as Kunashir: *Calycularia laxa* Lindb. et Arnell, *Geocalyx graveolens* (Schrad.) Nees, *Marsupella adusta* (Nees) Spruce, *Marsupella funckii* (F.Web. et Mohr) Dumort. Among the taxa distributed on Kamchatka and the Kurils, taxa that have yet to be discovered on Hokkaido, approximately half are known to Honshu Island and their discovery on Hokkaido is more than likely. The distribution of those species for which the Kurils represent the southern extreme of their range in eastern Asia is of special interest.

Thirty-four species and one variety belong to this group. Two of the 34 species are cited in error. The reference in the literature *Blepharostoma arachnoideum* M.A. Howe (Korotkevich 1952) on Kunashir and Shikotan is most likely an inaccurate identification of *Blepharostoma trichophyllum* (L.) Dumort. The locations given in the Kurils are the only reference for this species in Asia and we have not found the species on either of the islands. Another species (*Frullania tamarisci* (L.) Dumort.) Y. Horikawa (1940) listed for Shikotan is probably based on material for *F. tamarisci* ssp. *obscura* (Verd.) S. Hatt., which in the contemporary literature is most often viewed as an independent species - *Frullania appendiculata* Steph., a species that is characteristic of primarily subtropic eastern Asian distribution at the same time that *F. tamarisci*, in the narrow sense, has a montane boreal-South Temperate circumpolar range.

The remaining 32 species and single variety belong to Arctic, Arcticboreal or, less often, Boreal floristic elements. Typical examples are *Athalamia hyalina* (Sommerf.) S. Hatt., *Calycularia laxa* Lindb. et Arnell, *Cephalozia pachycaulis* R.M. Schust., *Jungermannia polaris* Lindb., *Orthocaulis binsteadii* (Kaal.) H. Buch, *Orthocaulis quadrilobus* (Lindb.) Buch, *Tetralophozia setiformis* (Ehrh.) Schljakov. Worthy of mention is that the range of not only species but also of two genus, *Saccobasis* and *Prasanthus*, ends abruptly on the Kuril Islands as they shift south. The range of the majority of the 32 species abruptly ends on the northern Kurils and only individual taxa penetrate

further south, among which are *Cephalozia pachycaulis* R.M. Schust., a recently described species with a yet unclear distribution, *Cephaloziella arctogena* (R.M. Schust.) Konstant., whose species status is not always recognized, and *Geocalyx graveolens* (Schrad.) Nees, which in Japan is replaced by *G. lancistipulus* (Steph.) S. Hatt. To sum up, in this case the northern Kurils and not the southern extreme of the archipelago represent the primary range restricting boundary.

A gradual decline of northern species is not an evident feature of floristic composition from north to south along the Kurils Islands. A steady decline in the number of southern species found in floristic complexes as latitude increases, however, is clearly in evidence. Thirty-five species are encountered on Hokkaido and on a portion of the Kuril Islands that do not reach Kamchatka and that are entirely absent in northeastern Asia. Fifteen species that are encountered on Honshu Island and in the southern portion of the Kuril archipelago are yet to be documented on Hokkaido. Almost all of these species belong to South Temperate or Subtropical floristic elements and their range in the insular western Pacific breaks off abruptly on Kunashir or Iturup and none of the species reach the northern Kurils. Examples are *Bazzania japonica* (Sande Lac.) Lindb., *Diplophyllum andrewsii* A.W. Evans, *Frullania muscicola* Steph., *Lejeunea japonica* Mitt., *Plectocolea rigidula* S. Hatt., *Porella fauriei* (Steph.) S. Hatt., *Radula japonica* Gottsche in Steph. At the genus level, the Kuril archipelago is a natural distribution barrier for such genera as *Alobiellopsis*, *Cololejeunea*, *Iwatsukia*, *Neohattoria*, *Nipponolejeunea*, *Nowellia*, *Pallavicinia*, *Trichocolea* that are moving north into eastern Asia.

What follows from this discussion is that from north to south liverwort flora for the Kuril Islands changes significantly across the expanse of the archipelago. The range of 84 species and one variety end on insular western Pacific. 34 species are found here at the southern extreme of their distribution, and 50 - at their northern. Liverwort flora at the northern and southern extremes of the Kuril Island Chain is qualitatively different and the flora in those regions undoubtedly belong to different floristic provinces. The appendix contains a list of the liverwort species that have been recently found in the southern Kurils for the first time.

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Appendix

List of liverworts identified for the first time in the southern Kurils. The list is based on materials examined from collections for Iturup and Kunashir. Species are provided in alphabetic order. Taxa identified on the Kuril Islands for the first time are marked with an asterisk (*). The understanding of species and the treatment of genus correspond to the Checklist of the Hepaticae and Anthocerotae of the Former USSR (Konstantinova et al. 1992). Bakalin collected all samples and these samples are housed in the herbarium of the Institute of Biology and Soil Sciences in Vladivostok (VLA).

**Albiellopsis parvifolia* (Steph.) R.M. Schust. – Kunashir Island, southern part, Goryachyee Lake area. (43°51'52"N – 145°30'10"E), 140 m alt., fine-grained ground in the crevices of tufa cliff sprayed by lake water, with *Cephalozia bicuspidata*, *Plectocolea hyalina*, #K-45-22-06.

**Anastrophyllum michauxii* (F. Web.) H. Buch – Kunashir Island, southern part, Serebryanoye Lake area (43°03'19"N – 145°50'18"E), 15 m alt., *Picea glehnii* – *Abies sachalinensis* forest with admixture of broad-leaved trees with green moss cover, on decaying wood, with *Lepidozia reptans*, *Scapania bolanderi*, #K-50-2-06.

Aneura pinguis (L.) Dumort. – Iturup Island, Pisimoy Cape area (45°12'28"N – 147°50'18"E), 100 m alt., tufa cliffs near road (abt. 1,5 km to the village of Burevestnik from the bridge across the Rybatskaya River), in wet cliff crevices, on fine-grained soil, with *Jungermannia pumila*, #K-46-3-05. – Kunashir Island, southern part, 3 km to the east from caldera's Golovnin volcano (43°50'13"N – 145°32'43"E), 150 m alt., *Abies* with admixture broad-leaved trees, *Taxus* and *Picea* forest with moss cover, on decaying wood, with *Lophocolea heterophylla*, #K-47-1-06.

Anthelia juratzkana (Limpr.) Trev. – Iturup Island, Baranskogo volcano, area near the peak (45°06'09"N – 148°01'09"E), 1114 m alt., wet crevices in vertical wall of cliff, in full sun, # K-58-11a-05 – Kunashir Island, northern part, atrium of Tyatya volcano (44°20'50"N – 146°15'06"E), 1500 m alt., old clinker, wet fine-grained ground in the crevices, with *Diplophyllum albicans*, *D. tafolium* #K-57-9-06.

**Apometzgeria pubescens* (Schrank) Kuwah. – Kunashir Island, northern part, mouth of Dal'nij Creek (Ruruj Mt.) (44°28'59"N – 146°05'38"E), 50 m alt., *Abies–Picea* forest with admixture of *Kalopanax*, *Acer* and understory of *Taxus*, *Weigela*, *Hydrangea*, etc., boulder in full shade, #K-42-9-06.

**Barbilophozia hatcheri* (Evans) Loeske – Iturup Island, headwaters of the Kuril'skaya River (Gniloye Lake area) (45°09'00"N – 147°57'50"E), 402 m alt., *Betula ermanii* forest with thick underbrush of *Pinus pumila* and *Sasa*, on soil, #K-48-1-05.

**Bazzania bidentula* (Steph.) Steph. – Iturup Island, Baranskogo volcanic area, the first Hot Springs (45°05'26"N – 147°59'32"E), 409 m alt., *Sorbus–Betula* forest with understory of *Pinus pumila*, *Sasa* and *Calamagrostis*, on vertical side of boulder shaded by *Sorbus*, #K-56-17-05.

**Bazzania japonica* (Sande Lac.) Lindb. – Kunashir Island, southern part, Goryachyee Lake area, (43°51'52"N – 145°30'10"E), 180 m alt., decaying wood in *Picea glehnii* forest, with *Cephalozia connivens* (Dicks.) Lindb, #K-45-20-06.

**Bazzania tricrenata* (Wahlenb.) Lindb. – Kunashir Island, southern part, Ozernaya River mouth area, (43°53'04"N – 145°27'43"E), 30 m alt., windy meadow with spots of bare ground, on slope to sea, #K-46-11-06. – Iturup Island. Chyornyye Skaly cliffs (about 8 km to the north of the village of Reydovo along Okhotsk Sea Coast) (45°15'32"N – 148°10'23"E), 15 m alt., in crevices of sheer cliffs shaded by *Alnus* along sea coast, #K-66-3-05.

Blasia pusilla L. – Iturup Island, western macroslope of Bogdan Khmel'nitski volcano, valley of Yuzhnyy Chirip sulphur river, about 1,5 km from the mouth. (45°20'48"N – 147°52'20"E), 256 m alt., on wet tufa cliffs of river's canyon, on thin layer of fine-grained soil, #K-70-7c-05 – Kunashir Island, southern Part, village of Otradnoye (44°03'24"N – 145°51'44"E), 50 m alt., *Abies* with admixture of *Betula ermanii*, *Kalopanax*, *Picea* and cover of ferns forest, on the road-side in forest, with *Nardia assamica*, *Plectocolea vulcanicola*, #K-55-7-06.

**Blepharostoma minus* Horikawa – Kunashir Island, northern part, east slope of Tyatya volcano (44°17'20"N – 146°18'00"E), 40 m alt., mixed *Alnus–Betula–Abies* forest with admixture *Picea*, *Kalopanax*, *Taxus* with forbs, on decaying wood, #K-56-7b-06.

Blepharostoma trichophyllum (L.) Dumort. – Iturup Island, western macroslope of Bogdan Khmel' nitski volcano, valley of Yuzhnyy Chirip sulphur river, about 2 km from the mouth (45°20'50,8" 147°52'46,0"E), 400 m alt., on wet stones of walls of river's canyon, abt. 50 m from the river bed, with *Plagiochila porelloides*, #K-71-5-05 – Kunashir Island, northern Part, Dal'nij Creek (44°27'41"N – 146°06'49"E), 700 m alt., on stones in snow-bed hollow of temporary spring, with *Calycularia crispula*, #K-37-38-06.

****Calycularia crispula*** Mitt. – Kunashir Island, northern part, Atrium of Tyatya volcano, old volcanic cone in the headwaters of Krutoj Creek (44°21'38"N – 146°16'17"E), 1200 m alt., cliffs along slope, in wet crevices of cliffs, #K-58-3a-06.

Calycularia laxa Lindb. & Arnell – Kunashir Island, northern part, Dal'nij Creek (44°27'41"N – 146°06'49"E) 900m alt., on stones along small stream, with *Diplophyllum taxifolium*, *Cephalozia bicuspidata*, *Scapania parvitexta*, #K-37-28-06.

****Calypogeia arguta*** Nees et Mont. – Kunashir Island, northern part, Ruruj Hot Springs area (44°29'20"N – 146°06'16"E), 50 m alt., near hydrosolphatars, on wet peaty ground along thermal stream, #K-41-6-06.

****Calypogeia suecica*** (Arnell et J. Perss.) Mull. Frib. – Kunashir Island, northern part, Dal'nij Creek (Ruruj Mt.), middle part (44°27'40"N – 146°06'49"E), 500 m alt., decaying wood in *Abies-Picea* with admixture of *Acer* forest, with *Cephalozia leucantha*, *Blepharostoma trichophyllum*, *Lophozia ventricosa* (Dicks.) Dumort. var. *guttulata* (Lindb. et Arnell) Bakalin, #K-40-1-06.

Cephalozia bicuspidata (L.) Dumort. – Kunashir Island, northern part, dry stream-bed in the headwaters of Dal'nij Creek (Ruruj Mt.) (44°27'22"N – 146°07'19"E), 1100 m alt., fine-grained soil along rivulet valley, with *Nardia japonica*, #K-38-4b-06 – Iturup Island, Gniloye Lake area, headwaters of a tributary of Gniloye Creek (45°08'07"N – 147°57'45"E), 391 m alt., *Carex-Juncus*-moss eutrophic bog, on ridges and hollows, with *Nardia assamica*, #K-52-11b-05.

****Cephalozia connivens*** (Dicks.) Lindb. – Kunashir Island, southern part, Goryachyee Lake area. (43°51'52"N – 145°30'10"E), 180 m alt., decaying wood in *Picea glehnii* forest. #K-45-18a-06.

Cephalozia leucantha Spruce – Iturup Island, Baranskogo volcano (45°05'25,8"N – 147°59'32,3"E), 409 m alt., the first hot spring, *Sorbus* forest with cover of *Pinus pumila*, *Sasa* and *Calamagrostis*, on boulders along stream (mineral with high content of Fe, but without sulphur), with *Lophozia ventricosa* var. *guttulata*, #K-56-4b-05 – Kunashir Island, northern part, Dal'nij Creek, middle part (Ruruj Mt.) (44°27'40"N – 146°06'49"E), 500 m alt., decaying wood in *Abies-Picea* with admixture of *Acer* forest, with *Scapania bolanderi*, #K-40-1b-06.

****Cephalozia otaruensis*** Steph. – Iturup Island, Chyornyee Skaly cliffs (about 8 km to the north from the village of Reydovo along Okhotsk Sea Coast) (45°15'32"N 148°10'23"E), 15 m alt., in crevices of

sheer cliffs shaded by *Alnus* along sea coast, with *Diplophyllum taxifolium*, #K-66-17-05.

Cephalozia pachycaulis R.M. Schust. – Kunashir Island, southern part, Goryachyee Lake area (43°51'52"N – 145°30'10"E), 150 m alt., wet soil near thermal hot springs on the coast of Kipyashchyee Lake, #K-45-9b-06.

Cephalozia pleniceps (Aust.) Lindb. – Kunashir Island, southern part, Goryachyee Lake area (43°51'52"N – 145°30'10"E), 180 m alt., decaying wood in *Picea glehnii* forest, #K-45-14b-06.

Cephalozia arctogena (R.M. Schust.) Konstant. – Kunashir Island, southern part, 3 km to the east from caldera's Golovnin volcano (43°50'13"N – 145°32'43"E), 200 m alt., road in *Sasa* with clumps of *Pinus pumila* thickets, on wet clayish road-side, #K-48-3c-06.

Cephalozia divaricata (Sm.) Schiffn. – Iturup Island, headwaters of the Kuril'skaya River (Gniloye Lake area) (45°09'00"N – 147°57'50"E), 402 m alt., *Juncus-Carex*-dwarf-shrub-moss bog, in hollows (between *Carex*) and on pure peat, with *Gymnocolea inflata*, #K-49-14-05.

****Cephalozia elachista*** (J.B. Jack ex Gottsche et Rabenh.) Schiffn. – Kunashir Island, southern part, Serebryanoye Lake area (43°03'19"N – 145°50'18"E), 15 m alt., dwarf-shrub-moss-sedge bogs, wet hollows between *Sphagnum* hummocks, #K-51-6a-06. – Iturup Island, *Larix* forest with *Sphagnum* cover near the northwest shore of Reydovoye Lake (45°15'28"N – 148°01'41"E), 20 m alt., on *Sphagnum* ridges. 30.VIII.2006 K-62-4-05.

Chiloscyphus cf. rivularis (Schrad.) Haszl. – Iturup Island, the shore of the western part of Reydovoye Lake (45°15'28"N – 148°01'41"E), 20 m alt., on peaty bank, with *Conocephalum conicum* (L.) Und., #K-64-2-05.

Chiloscyphus fragilis (A. Roth) Schiffn. – Iturup Island, Pisimoy Cape area (45°12'33"N – 147°50'05"E), 75 m alt., *Quercus-Acer* forest with admixture of *Sorbus*, *Betula ermanii*, *Salix*, *Alnus* and thick understory of *Sasa*, on boulders along stream-bed (at times sprayed by water), #K-45-29-05 – Kunashir Island, southern part, Kislaya River, the area of thermal springs (44°00'20"N – 145°46'23"E), 100 m alt., along small stream with pure water, #K-52-21-06.

Cladopodiella fluitans (Nees) H. Buch – Iturup Island, Gniloye Lake area (45°08'32,8"N – 147°57'25,7"E), 422 m alt., *Carex-Juncus*-moss bog near lake-shore in eastern surrounding of lake, on ridges and hollows, with *Scapania paludicola* Loeske & K.Muell., #K-51-5-05 – Kunashir Island, southern part, Serebryanoye Lake area (43°03'19"N – 145°50'18"E), 15 m alt., dwarf-shrub-moss-sedge bog, wet hollows between *Sphagnum* hummocks, with *Riccardia cf. latifrons*, *Kurzia makinoana* (Steph.) Grolle, #K-51-9-06.

Cladopodiella francisci (Hook.) H. Buch ex Joerg. – Iturup Island, Baranskogo volcano, area near the peak (45°05'55"N – 148°00'38"E), 965 m alt., fumaroles field in mountain circus on South slope of volcano,

vertical cliff's walls of circus, with *Nardia scalaris*, *Lophozia sudetica*, #K-59-3-05 – Kunashir Island, northern part, area near the top of Ruruj Mt. (44°27'32"N – 146°08'12"E), 1300 m alt., on wet fine-grained soil in cliff crevices, with *Cephalozia bicuspidata*, *Marsupella sphacelata*, #K-39-7-06.

**Cololejeunea macounii* (Spruce in Underw.) A. Evans – Kunashir Island, southern part, 3 km to the east from caldera Golovnin volcano's, (43°50'13"N – 145°32'43"E), 150 m alt., *Abies* forest with admixture broad-leaved trees, *Taxus* and *Picea* with moss cover, on the bark of *Abies* at the height 1-2 m from the ground, with *Nipponolejeunea subalpina* (Horik.) S. Hatt., #K-47-18a-06.

**Crossocalyx hellerianus* (Nees in Lindenb.) Meyl. – Kunashir Island, northern part, Dal'nij Creek (44°27'41"N – 146°06'49"E), 300 m alt., *Picea*–*Betula* flood plain forest, on decaying wood, with *Lophocolea heterophylla*, *Nowellia curvifolia*, *Lophozia ventricosa* var. *guttulata*, #K-37-22a-06.

**Crossogyna autumnalis* (DC.) Schljakov – Kunashir Island, northern part, Dal'nij Creek, middle part (Ruruj Mt.) (44°27'40"N – 146°06'49"E), 500 m alt., decaying wood in *Abies*–*Picea* with admixture of *Acer* forest, with *Aneura pinguis*, *Blepharostoma trichophyllum*, *Lophozia ventricosa* var. *guttulata*, *Cephalozia leucantha*, *Lophocolea heterophylla*, #K-40-6-06.

**Cryptocoleopsis imbricata* Amakawa – Kunashir Island, northern part, Dal'nij Creek (44°27'41"N – 146°06'49"E), 700 m alt., on stones in temporary spring, with *Cephalozia bicuspidata*, #K-37-40-06

**Diplophyllum andrewsii* Evans – Kunashir Island, southern part, beginning of road to Goryachyee Lake (43°51'52"N 145°30'10"E), 80 m alt., fine-grained soil along road-side, with *Solenostoma handelii*, #K-44-1-06. – Iturup Island, southern macroslope of Volchyok knoll (Gniloye Lake area). Community of *Pinus pumila* with *Sasa* underbrush (45°09'23"N – 147°57'58"E), 425 m alt., on fine-grained soil along road-side With *Nardia japonica*, #K-50-8a-05.

**Eremonotus myriocarpus* (Carr.) Lindb. & Kaal. – Kunashir Island, northern part, atrium of Tyatya volcano (44°21'38"N – 146°16'17"E), 1200 m alt., old volcanic cone in the headwaters of Krutoj Creek, cliffs along slope, in wet crevices of cliffs, #K-58-5c-06

**Fossombronina alaskana* Steere et Inoue – Kunashir Island, southern part, village of Otradnoye (44°03'24"N – 145°51'44"E), 10 m alt., sea coastal sandy dunes, wet place overgrowth by *Juncus*, on wet sand, #K-54-1-06.

**Frullania inflata* Gottsche – Iturup Island, 1 km to the southwest of Reydivoye Lake. Right tributary of Mineral'nyy Creek (45°14'48"N – 148°00'51"E), 25 m alt., flood-plain, wet *Alnus*-*Salix* with solitary *Larix* trees forest with tall grasses, on bark of *Alnus* at the height of 1,5 m, #K-61-7-05.

**Frullania kaponenii* S. Hatt. – Kunashir Island, southern part, village of Otradnoye (44°03'24"N –

145°51'44"E), 50 m alt., *Abies* forest with admixture of *Betula ermanii*, *Kalopanax*, *Picea* and cover of ferns, on the bark of *Picea*, #K-55-4-06.

**Frullania muscicola* Steph. – Kunashir Island, southern part, village of Otradnoye (44°03'24"N – 145°51'44"E), 50 m alt., *Abies* forest with admixture of *Betula ermanii*, *Kalopanax*, *Picea* and cover of ferns, on the bark of *Picea*, #K-55-4b-06.

**Geocalyx graveolens* (Schrad.) Nees – Kunashir Island, Ruruj Hot Springs area (44°29'07"N – 146°05'57"E), 38 m alt., *Abies*–*Picea* forest with admixture of *Acer* and *Tilia*, on decaying wood and boulders in shade, with *Cephalozia lunulifolia*, *Calypogeia integristipula*, *Liochlaena subulata*, *Lepidozia reptans*, #K-36-10-06.

**Geocalyx lancistipulus* (Steph.) S. Hatt. – Kunashir Island, northern part, Saratovka River mouth area (44°15'21"N – 146°05'57"E), 27 m alt., *Picea glehnii* boggy forest with admixture of *Sorbus*, *Betula*, *Taxus cuspidata*, *Abies sachalinensis* and moss cover, in wet hollows, #K-63-14-06.

**Gymnocolea inflata* (Huds.) Dumort. – Iturup Island, headwaters of the Kuril'skaya River (Gniloye Lake area) (45°09'00"N – 147°57'50"), 402 m alt., *Juncus*-*Carex*-dwarf-shrub-moss bog, in hollows (between *Carex*) and on pure peat, with *Cephalozia divaricata*, #K-49-14-05 – Kunashir Island, northern part, headwaters of Dal'nij Creek (Ruruj Mt.) (44°27'22"N – 146°07'19"E), 1100 m alt., dry stream-bed, fine-grained soil along rivulet valley, #K-38-2c-06.

**Gymnocolea marginata* (Steph.) S. Hatt. – Kunashir Island, northern part, area near the top of Ruruj Mt. (44°27'32"N – 146°08'12"E), 1300 m alt., on wet fine-grained soil in cliff crevices, #K-39-11a-06. – Iturup Island, Baranskogo volcano, area near the peak (45°06'09"N – 148°01'09"E), 1114 m alt., wet crevices in vertical wall of cliff, in full sun, #K-58-28-05.

**Gymnomitrium apiculatum* (Schiffn.) Mull. Frib. – Kunashir Island, northern part, atrium of Tyatya volcano (44°20'50"N – 146°15'06"E), 1500 m alt., old clinker, on wet fine-grained ground in the crevices, #K-57-12a-06.

**Gymnomitrium concinnatum* (Lightf.) Corda – Iturup Island, Baranskogo volcano, area near the peak, (45°06'09"N – 148°01'09"), 1114 m alt., wet crevices in vertical wall of cliff, in full sun, with *Kurzia makinoana*, #K-58-2-05 – Kunashir Island, northern part, atrium of Tyatya volcano (44°20'50"N – 146°15'06"E), 1500 m alt., old clinker, on wet fine-grained ground in the crevices, #K-57-16c-06.

**Gymnomitrium corallioides* Nees – Kunashir Island, northern part, headwaters of the Dal'nij Creek (Ruruj Mt.) (44°27'22"N – 146°07'19"E), 1100 m alt., dry stream-bed, fine-grained soil along rivulet valley, with *Anthelia juratzkana* (Limpr.) Trev., #K-38-3a-06.

**Harpanthus flotovianus* (Nees) Nees – Iturup Island, western macroslope of Bogdan Khmel'nitski volcano, valley of Yuzhnyy Chirip sulphur river, about 2 km from the mouth (45°20'51"N – 147°52'46"E),

400 m alt., on wet stones of walls of river's canyon, abt. 50 m from the river bed, with *Scapania curta*, *Tritomaria quinquedentata*, #K-71-3-05 – Kunashir Island, southern part, Serebryanoye Lake area (43°03'19"N – 145°50'18"E), 15 m alt., *Picea glehnii* – *Abies sachalinensis* with admixture of broad-leaved trees forest with green moss cover, wet hollows, #K-50-13-06.

Hygrobrella laxifolia (Hook.) Spruce – Iturup Island, western macroslope of Bogdan Khmel'nitski volcano, valley of Yuzhnyy Chirip sulphur river, about 2 km from the mouth (45°20'51"N – 147°52'46"E), 400 m alt., on wet stones of walls of river's canyon, abt. 50 m from the river bed, with *Diplophyllum taxifolium*, *Cephalozia bicuspidata*, *Jungermannia pumila*, *Blepharostoma trichophyllum*, *Scapania diplophyllodes*, #K-71-8-05 – Kunashir Island, northern part, atrium of Tyatya volcano (44°21'38"N – 146°16'17"E), 1200 m alt., old volcanic cone in the headwaters of Krutoj Creek, cliffs along slope, in wet crevices of cliffs, #K-58-3-06.

Isopachetes bicrenatus (Schmid. ex Hoffm.) H. Buch – Iturup Island, Vetrovoy Peresheek neck (45°16'14.8"N – 148°18'17.3"E), 28 m alt., on overgrowing sandy dunes along Okhotsk Sea coast, with *Marsupella sprucei*, #K-68-3a-05 – Kunashir Island, southern part, 3 km to the east from caldera's Golovnin volcano (43°50'13"N – 145°32'43"E), 200 m alt., road in *Sasa* with clumps of *Pinus pumila* thickets, on wet clayish road-side, #K-48-1b-06.

**Iwatsukia jishibae* (Steph.) N. Kitag. – Kunashir Island, southern part, Kislaya River, the area of thermal springs (44°00'20"N – 145°46'23"E), 100 m alt., on wet decaying wood in *Abies–Picea* forest along river, with *Riccardia palmata*, *Mylia verrucosa*, *Nowellia curvifolia*, *Scapania bolanderi*, #K-52-20a-06.

**Jungermannia cf. borealis* Damsh. et Vana – Iturup Island, *Betula ermanii* forest with thick underbrush of *Pinus pumila* and *Sasa* in headwaters of the Kuril'skaya River (Gniloye Lake area) (45°09'00"N – 147°57'50"E), 402 m alt., on boulders in the stream-bed, #K-48-32-05.

Jungermannia eucordifolia Schljakov – Iturup Island, area near the stream near entrance to the village of Rybaki from Kurilsk town side (45°12'38"N – 147°51'12"E), 10 m alt., on wet cliffs near waterfall of sea-coast cliffs, #K-47-11-05 – Kunashir Island, northern part, Prosolov Cape, 20 m alt., in wet crevices of coastal cliffs, #K-43-1b-06.

Jungermannia exsertifolia Steph. – Kunashir Island, northern part, Dal'nij Creek (44°27'41"N – 146°06'49"E) 200 m alt., wet cliffs near high waterfall (abt. 50 m of height), #K-37-17a-06.

Jungermannia pumila With. – Iturup Island, area near the stream at the entrance to the village of Rybaki near the city of Kurilsk (45°12'38"N – 147°51'12"E), 10 m alt., on wet cliffs near waterfall of sea-coast cliffs, #K-47-17-05 – Kunashir Island, northern part, atrium of Tyatya volcano (44°21'38"N – 146°16'17"E), 1200 m alt., old volcanic cone in the headwaters of

the Krutoj Creek, cliffs along slope, in wet crevices of cliffs, #K-58-3c-06.

**Lejeunea cavifolia* (Ehrh.) Lindb. – Kunashir Island, southern part, Ozernaya River mouth area (43°53'04"N – 145°27'43"E), 30 m alt., in the crevices along sea-coast, shaded by broad-leaved trees, #K-46-10-06.

**Lepidozia cf. vitrea* Steph. – Kunashir Island, southern part, Serebryanoye Lake area (43°03'19"N – 145°50'18"E), 15 m alt., *Picea glehnii* – *Abies sachalinensis* with admixture of broad-leaved trees forest with green moss cover, on decaying wood, #K-50-2b-06.

**Liochlaena subulata* (Evans) Schljak. – Kunashir Island, northern part, east slope of Tyatya volcano (44°17'20"N – 146°18'00"E), 40 m alt., mixed *Alnus–Betula–Abies* with admixture *Picea*, *Kalopanax*, *Taxus* forest with forbs, on decaying wood, #K-56-2a-06.

**Lophocolea cuspidata* (Nees) Limpr. – Kunashir Island, southern part, Serebryanoye Lake area (43°03'19"N – 145°50'18"E), 15 m alt., *Picea glehnii* – *Abies sachalinensis* with admixture of broad-leaved trees forest with green moss cover, wet hollows, with *Riccardia chamaedryfolia*, #K-50-16-06.

Lophocolea heterophylla (Schrad.) Dumort. – Iturup Island, the forest massif along stream flowing to Reydivoye Lake abt. 2 km to the southwest of the village of Reydovo (45°15'28"N – 148°01'41"E), 20 m alt., *Larix–Betula–Quercus–Sorbus* forest with cover of *Ilex rugosa*, *Taxus*, *Skimia* and *Calamagrostis*, on decaying wood, with *Plagiochila porelloides*, #K-65-15-05 – Kunashir Island, northern part, 1 km to the northwest from Saratovka River mouth (44°15'58"N – 146°06'23"E), 21 m alt., *Abies* with admixture *Betula* and *Picea glehnii* forest, on decaying wood, with *Blepharostoma trichophyllum*, #K-61-1b-06.

**Lophocolea itoiana* H. Inoue – Iturup Island, Pisimoy Cape area (45°12'33"N – 147°50'05"E), 75 m alt., *Acer–Quercus* forest with admixture of *Sorbus*, *Betula ermanii*, *Salix*, *Alnus* and thick understory of *Sasa*, in full shade, on boulder covered by fine-grained soil, K-45-16-05.

Lophocolea minor Nees – Iturup Island, western macroslope of Bogdan Khmel'nitski volcano, valley of Yuzhnyy Chirip sulphur river, about 2 km from the mouth (45°20'51"N – 147°52'46"E), 400 m alt., on wet stones of walls of river's canyon, abt. 50 m from the river bed, with *Diplophyllum taxifolium*, #K-71-2-05 – Kunashir Island, southern part, 3 km to the east from caldera's Golovnin volcano (43°50'13"N – 145°32'43"E), 150 m alt., *Abies* with admixture broad-leaved trees, *Taxus* and *Picea* forest with moss cover, on decaying wood, #K-47-8b-06.

Lophozia lacerata N. Kitag. – Iturup Island, Baranskogo volcano, the first Hot Springs (45°05'26"N – 147°59'32"E), 409 m alt., *Sorbus–Betula* forest with understory of *Pinus pumila*, *Sasa* and *Calamagrostis*, on decaying wood of *Pinus pumila*, with *Cephalozia leucantha*, *Lophocolea heterophylla*, #K-56-23-05.

Lophozia savicziae Schljakov – Iturup Island, Baranskogo volcano, area near the peak (45°06'08.8"N – 148°01'09.2"E), 1114 m alt., wet crevices in vertical wall of cliff, in full sun, with *Lophozia sudetica* var. *anomala* (Schljakov) Schljakov, *Macrodiplrophyllum plicatum*, #K-58-22a-05.

Lophozia silvicola H. Buch – Iturup Island, the forest massif along stream flowing to Reydovoye Lake abt. 2 km to the southwest of the village of Reydovo (45°15'28"N – 148°01'41"E), 20 m alt., *Larix-Betula-Quercus-Sorbus* forest with cover of *Ilex rugosa*, *Taxus*, *Skimmia* and *Calamagrostis*, on decaying wood, with *Macrodiplrophyllum plicatum*, #K-65-21-05 – Kunashir Island, southern part, Kislaya River, the area of thermal springs (44°00'20"N – 145°46'23"E), 100 m alt., on wet fine-grained soil with sulphur in the steam of hot water, with *Lepidozia reptans*, *Mylia verrucosa*, #K-52-3-06.

Lophozia silvicoloides N. Kitag. – Iturup Island, southern macroslope of Volchyok Knoll (Gniloye Lake area) (45°09'23.1"N – 147°57'58.0"E), 425 m alt., community of *Pinus pumila* with *Sasa* underbrush, on horizontal part of *Pinus pumila* branches, with *Orthocaulis attenuatus*, *Bazzania trilobata*, *Ptilidium californicum*, #K-50-3-05 – Kunashir Island, northern part, east slope of Tyatya volcano (44°17'20"N – 146°18'00"E), 40 m alt., mixed *Alnus-Betula-Abies* with admixture *Picea*, *Kalopanax*, *Taxus* forest with forbs, on decaying wood, with *Riccardia* sp., *Scapania bolanderi*, #K-56-4-06.

Lophozia sudetica (Nees ex Huebener) Grolle – Iturup Island, Baranskogo volcano, area near the peak (45°06'09"N – 148°01'09"E), 1114 m alt., wet crevices in vertical wall of cliff, in full sun, with *Gymnomitrium concinnatum*, #K-58-15-05 – Kunashir Island, northern part, atrium of Tyatya volcano (44°20'50"N – 146°15'06"E), 1500 m alt., old clinker, on wet fine-grained ground in the crevices, #K-57-1-06.

Lophozia wenzelii (Nees) Steph. – Kunashir Island, northern part, Dal'nij Creek (44°27'41"N – 146°06'49"E), 700 m alt., on stones in snow-bed hollow of temporary spring, with *Diplophyllum albicans*, *D. taxifolium*, #K-37-32-06.

Marchantia aquatica (Nees) Burgeff – Kunashir Island, southern part, Goryachyee Lake area (43°51'52"N – 145°30'10"E), 150 m alt., wet soil near thermal hot springs on the coast of Kipyashchyee Lake, #K-45-6-06.

**Marchantia paleacea* Bertol. – Kunashir Island, Ruruj Hot Springs area (44°29'07"N – 146°05'57"E), 38 m alt., destroying travertine cone, in percolated thermal water, #K-36-1-06.

**Marsupella adusta* (Nees) Spruce – Kunashir Island, northern part, Dal'nij Creek, (44°27'41"N – 146°06'49"E), 700 m alt., on stones in snow-bed hollow of impermanent spring #K-37-39-06.

Marsupella alpina (Gottsche ex Limpr.) H. Bernet – Kunashir Island, northern part, atrium of Tyatya volcano (44°20'50"N – 146°15'06"E), 1500 m alt., old clinker, on wet fine-grained ground in the crevices, with

Diplophyllum taxifolium, #K-57-10-06.

Marsupella boeckii (Aust.) Lindb. ex Kaal. – Kunashir Island, northern part, atrium of Tyatya volcano (44°21'38"N – 146°16'17"E), 1200 m alt., old volcanic cone in the headwaters of the Krutoj Creek, cliffs along slope, in wet crevices of cliffs, #K-58-3b-06.

**Marsupella commutata* (Limpr.) H. Bernet – Iturup Island, Baranskogo volcano, area near the peak (45°06'09"N – 148°01'09"E), 1114 m alt., wet crevices in vertical wall of cliff, in full sun, with *Gymnomitrium concinnatum*, #K-58-29-05. – Kunashir Island, northern part, area near the top of Ruruj Mt. (44°27'32"N – 146°08'12"E), 1300 m alt., on wet fine-grained soil in cliff crevices, with *Gymnomitrium concinnatum*, *Diplophyllum albicans*, *D. taxifolium*, *Lophozia sudetica*, #K-39-2a-06.

Marsupella emarginata (Ehrh.) Dumort. – Kunashir Island, southern part, the area of confluence of Kislaya and Lesnaya Rivers (44°00'20"N – 145°46'23"E), 60 m alt., on fine-grained soil along river, with *Scapania ampliata*, *Kurzia makinoana*, *Nardia subclavata*, *Solenostoma sphaerocarpum*, #K-53-5-06.

**Marsupella funkii* (F. Web. & D. Mohr) Dumort. – Kunashir Island, northern part, area near the top of Ruruj Mt. (44°27'32"N – 146°08'12"E), 1300 m alt., on wet fine-grained slip soil, with *Nardia japonica*, #K-39-20-06.

Marsupella sphacelata (Gieseke ex Lindenb.) Dumort. – Iturup Island, Baranskogo volcano, area near the peak (45°06'09"N – 148°01'09"E), 1114 m alt., wet crevices in vertical wall of cliff, in full sun, #K-58-16-05 – Kunashir Island, southern part, the area of confluence of Kislaya and Lesnaya Rivers (44°00'20"N – 145°46'23"E), 60 m alt., on fine-grained soil along river, #K-53-6-06.

Marsupella sprucei (Limpr.) H. Bernet – Iturup Island, Vetrovoy Peresheek neck (45°16'15"N – 148°18'17"E), 28 m alt., on overgrowing sandy dunes along Okhotsk Sea coast, #K-68-1-05.

**Marsupella tubulosa* Steph. – Kunashir Island, northern part, Dal'nij Creek. (44°27'41"N – 146°06'49"E), 700 m alt., on stones in snow-bed hollow of temporary spring, with *Anthelia juratzkana*, #K-37-38a-06.

**Metzgeria conjugata* Lindb. – Kunashir Island, northern part, Dal'nij Creek. (44°27'41"N – 146°06'49"E), 700 m alt., on stones in snow-bed hollow of temporary spring, with *Blepharostoma trichophyllum*, #K-37-40c-06. – Iturup Island. The shore of the western part of Reydovoye Lake (45°15'28"N – 148°01'41"E), 20 m alt., on boulders, #K-64-12a-05.

**Metzgeria fruticulosa* (Dicks.) A. Evans – Kunashir Island, southern part, 3 km to the east from caldera's Golovnin volcano (43°50'13"N – 145°32'43"E), 150 m alt., *Abies* with admixture broad-leaved trees, *Taxus* and *Picea* forest with moss cover, on the bark of *Abies* on the height 1-2 m from the ground, #K-47-22-06.

Mylia anomala (Hook.) S. Gray – Iturup Island, Gniloye Lake area (45°08'32,8"N – 147°57'25,7"E), 422 m alt., *Carex-Juncus*-moss bog near lake-shore in east surrounding of lake, on ridges, #K-51-16-05 – Kunashir Island, southern part, Serebryanoye Lake area (43°03'19"N – 145°50'18"E), 15 m alt., dwarf-shrub-moss-sedge bog, wet hollows between *Sphagnum* hummocks, with *Kurzia makinoana*, *Calypogeia neogaea*, #K-51-3-06.

**Mylia taylorii* (Hook.) S. Gray – Kunashir Island, northern part, area near the top of Ruruj Mt. (44°27'32"N – 146°08'12"E), 1300 m alt., on wet fine-grained soil in cliff crevices, #K-39-1-06. – Iturup Island, Baranskogo volcano, area near the peak (45°06'09"N – 148°01'09"E), 1114 m alt., wet crevices in vertical wall of cliff, in full sun, with *Lophozia sudetica*, *Macrodiplrophyllum plicatum*, #K-58-23a-05.

**Nardia assamica* (Mitt.) Amakawa – Kunashir Island, northern part, Ruruj Hot Springs area, near hydrosolphatars. (44°29'20"N – 146°06'16"E), 50 m alt., on hot (30-40°C) strata of travertine, #K-41-2-06. – Iturup Island, Baranskogo volcano, the Second (Big) Hot Springs (45°04'40"N – 147°59'13"E), 193 m alt., moss mats hanging from big boulders and cliffs above hot stream steaming with H₂O and SO₂ (it is always humid, acidic and warm), #K-60-7b-05.

Nardia breidlerii (Limpr.) Lindb. – Iturup Island, Vetrovoy Peresheek neck (45°16'15"N – 148°18'17"E), 28 m alt., on fine-grained soil of swampy, former Japanese airfield, with *Solenostoma pyriformum* var. *minutissima*, #K-68-8-05.

Nardia geoscyphus (De Not.) Lindb. – Iturup Island, western macroslope of Bogdan Khmel'nitski volcano, valley of Yuzhnyy Chirip sulphur river, about 1,5 km from the mouth (45°20'48"N – 147°52'20"E), 256 m alt., on wet tufa cliffs of river's canyon, on thin layer of fine-grained soil, with *Conocephalum japonicum*, *Harpanthus flotovianus*, *Plectocolea rosulans*, *Cephalozia bicuspidata*, #K-70-7d-05.

Nardia japonica Steph. – Iturup Island, southern macroslope of Volchyok knoll (Gniloye Lake area) (45°09'23"N – 147°57'58"E), 425 m alt., community of *Pinus pumila* with *Sasa* underbrush, on fine-grained soil along road-side, with *Diplophyllum andrewsii*, #K-50-8-05 – Kunashir Island, northern part, dry stream-bed at the headwaters of the Dal'nij Creek (Ruruj Mt.) (44°27'22"N – 146°07'19"E), 1100 m alt., fine-grained soil along rivulet valley, with *Cephalozia bicuspidata*, #K-38-4b-06.

Nardia scalaris S. Gray – Iturup Island, Baranskogo volcano, area near the peak (45°06'09"N – 148°01'09"E), 1114 m alt., wet crevices in vertical wall of cliff, in full sun, with *Cephalozia bicuspidata*, *Diplophyllum taxifolium*, #K-58-5-05 – Kunashir Island, northern part, dry stream-bed at the headwaters of Dal'nij Creek (Ruruj Mt.) (44°27'22"N – 146°07'19"E), 1100 m alt., fine-grained soil along rivulet valley, #K-38-5b-06.

**Nardia subclavata* (Steph.) Amakawa – Kunashir Island, southern part, Kislaya River, the area of thermal

springs (44°00'20"N – 145°46'23"E), 100 m alt., on wet fine-grained soil with sulphur in the stream of hot water, #K-52-4-06. – Iturup Island, western macroslope of Bogdan Khmel'nitski volcano, valley of Yuzhnyy Chirip sulphur river, about 1,5 km from the mouth (45°20'48"N – 147°52'20"E), 256 m alt., on wet tufa cliffs of river's canyon, on thin layer of fine-grained soil, with *Cephalozia bicuspidata*, #K-70-1-05.

Nardia unispiralis Amakawa – Iturup Island, Vetrovoy Peresheek neck (45°16'15"N 148°18'17"E), 28 m alt., on fine-grained soil of swampy, former Japanese airfield, with *Solenostoma jenseniana* (Grolle) Bakalin, #K-68-6-05 – Kunashir Island, northern part, atrium of Tyatya volcano (44°20'50"N – 146°15'06"E), 1500 m alt., old clinker, on wet fine-grained ground in the crevices, #K-57-2-06.

**Nowellia curvifolia* (Dicks.) Mitt. – Kunashir Island, southern part, Kislaya River, the area of thermal springs (44°00'20"N – 145°46'23"E), 100 m alt., on wet decaying wood in *Abies-Picea* forest along river, with *Scapania bolanderi*, #K-52-19a-06.

**Obtusifolium obtusum* (Lindb.) S.W. Arnell – Kunashir Island, southern part, Kislaya River, the area of thermal springs (44°00'20"N – 145°46'23"E), 100 m alt., on wet fine-grained soil with sulphur in the steam of hot water, with *Cephalozia bicuspidata*, #K-52-11-06.

**Odontoschisma denudatum* (Mart.) Dumort. – Kunashir Island, southern part, Goryachyee Lake area (43°51'52"N – 145°30'10"E), 180 m alt., decaying wood in *Picea glehnii* forest, #K-45-14a-06.

**Orthocaulis attenuatus* (Mart.) Evans – Iturup Island, *Betula ermanii* forest with thick underbrush of *Pinus pumila* and *Sasa* at the headwaters of the Kuril'skaya River (Gniloye Lake area) (45°09'00"N – 147°57'50"E), 402 m alt. on bark of *Betula* near trunk base, with *Ptilidium californicum*, #K-48-7-05.

**Pallavicinia lyellii* (Hook.) Carruthers – Kunashir Island, northern part, Saratovka River mouth area (44°15'21"N – 146°05'57"E), 27 m alt., *Picea glehnii* with admixture of *Sorbus*, *Betula*, *Taxus cuspidata*, *Abies sachalinensis* boggy with moss cover forest, in wet hollows, #K-63-8-06.

**Pedinophyllum truncatum* (Steph.) H. Inoue – Kunashir Island, northern part, mouth of Dal'nij Creek (Ruruj Mt.). (44°28'59"N – 146°05'38"E), 50 m alt., *Abies-Picea* forest with admixture of *Kalopanax*, *Acer* and understory of *Taxus*, *Weigela*, *Hydrangea*, etc., boulder in full shade, #K-42-11b-06.

Pellia endiviifolia (Dicks.) Dumort. – Iturup Island, Chyornyye Skaly cliffs (about 8 km to the north of the village of Reydovo along Okhotsk Sea Coast) (45°15'32"N – 148°10'23"E), 15 m alt., on wet sandy slumping slope of a maritime dune, with *Conocephalum japonicum*, *Blasia pusilla*, #K-66-19-05 – Kunashir Island, northern part, Dal'nij Creek (44°27'41"N – 146°06'49"E), 200 m alt., wet cliffs near high waterfall (abt. 50 m of height), #K-37-13a-06.

Plectocolea hyalina (Lyell) Mitt. – Iturup Island, Belyye Skaly cliffs (about 12 km to the north of the

village of Reydovo along Okhotsk Sea Coast) (45°15'48"N – 148°13'03"E), 18 m alt., on slumping slope of white pumice deposits, #K-67-3a-05. – Kunashir Island, southern part, Goryachyee Lake area (43°51'52"N – 145°30'10"E), 140 m alt., fine-grained ground in the crevices of tufa cliffs sprayed by lake water by water of the lake, #K-45-24a-06.

**Plectocolea infusca* Mitt. var. *ovalifolia* Amakawa – Kunashir Island, northern part, mouth of Dal'nij Creek (Ruruj Mt.). (44°28'59"N – 146°05'38"E), 50 m alt., *Abies-Picea* forest with admixture of *Kalopanax*, *Acer* and understory of *Taxus*, *Weigela*, *Hydrangea*, etc., boulder in full shade, #K-42-15-06.]

**Plectocolea infusca* Mitt. var. *ovicalyx* (Steph.) Bakalin – Iturup Island, western macroslope of Bogdan Khmel'nitski volcano, valley of Yuzhnyy Chirip sulphur river, about 2 km from the mouth (45°20'51"N – 147°52'46"E), 400 m alt., on wet stones of walls of river's canyon, abt. 50 m from the river bed, with *Marsupella sphacelata*, #K-71-7a-05. – Kunashir Island, southern part, Ozernaya River mouth area (43°53'04"N – 145°27'43"E), 100 m alt., *Abies-Picea*-broad-leaved forest on slope to river, on the bark of *Acer*, #K-46-1a-06.

**Plectocolea rigidula* S. Hatt. – Kunashir Island, northern part, Dal'nij Creek (44°27'41"N – 146°06'49"E), 200 m alt., wet cliffs near high waterfall (abt. 50 m high), with *Hygrobiella laxifolia*, *Scapania integerrima*, #K-37-11-06.

**Plectocolea rosulans* (Steph.) S. Hatt. – Kunashir Island, northern part, Dal'nij Creek (44°27'41"N – 146°06'49"E), 100 m alt., on stones along small stream, #K-37-31-06. – Iturup Island, western macroslope of Bogdan Khmel'nitski volcano, valley of Yuzhnyy Chirip sulphur River, about 1,5 km from the mouth (45°20'48"N – 147°52'20"E), 256 m alt., on wet tufa cliffs of river's canyon, on thin layer of fine-grained soil, #K-70-2-05.

**Plectocolea virgata* Mitt. – Iturup Island, Chyomye Skaly cliffs (about 8 km north of the village of Reydovo along Okhotsk Sea Coast) (45°15'32"N – 148°10'23"E), 15 m alt., on pumice stone, with *Nardia assamica*, #K-66-20a-05.

**Pleurocladula albescens* (Hook.) Grolle – Iturup Island, Baranskogo volcano, area near the peak (45°06'09"N – 148°01'09"E), 1114 m alt., wet crevices in vertical wall of cliff, in full sun, with *Kurzia makinoana*, *Diplophyllum taxifolium* var. *macrosticta* H. Buch, #K-58-18-05 – Kunashir Island, northern part, atrium of Tyatya volcano (44°20'50"N – 146°15'06"E), 1500 m alt., old clinker, on wet fine-grained ground in the crevices, with *Lophozia sudetica*, *Diplophyllum albicans*, #K-57-8a-06.

**Porella fauriei* (Steph.) S. Hatt. – Kunashir Island, northern part, mouth of Dal'nij Creek (Ruruj Mt.) (44°28'59"N – 146°05'38"E), 50 m alt., *Abies-Picea* forest with admixture of *Kalopanax*, *Acer* and understory of *Taxus*, *Weigela*, *Hydrangea*, etc., boulder in full shade, #K-42-8-06. – Iturup Island, Pisimoy Cape area (45°12'33"N – 147°50'05"E), 75 m alt.,

Quercus-Acer forest with admixture of *Sorbus*, *Betula ermanii*, *Salix*, *Alnus* and thick understory of *Sasa*. On the base of *Acer* tree, #K-45-2-05.

**Porella grandiloba* Lindb. – Kunashir Island, northern part, mouth of Dal'nij Creek (Ruruj Mt.) (44°28'59"N – 146°05'38"E), 50 m alt., *Abies-Picea* forest with admixture of *Kalopanax*, *Acer* and understory of *Taxus*, *Weigela*, *Hydrangea*, etc., boulder in full shade, #K-42-13-06.

**Preissia quadrata* (Scop.) Nees – Kunashir Island, northern part, atrium of Tyatya volcano (44°21'38"N – 146°16'17"E), 1200 m alt., old volcanic cone in the headwaters of the Krutoj Creek, cliffs along slope, in wet crevices of cliffs, #K-58-1-06.

**Protolophozia debiliformis* (Schust.) Konstant. – Iturup Island, Baranskogo volcano, area near the peak (45°06'09"N – 148°01'09"E), 1114 m alt., wet crevices in vertical wall of cliff, in full sun, with *Sphenolobus minutus*, *Mylia taylorii*, #K-58-22-05.

**Ptilidium californicum* (Aust.) Pears. – Iturup Island, headwaters of the Kuril'skaya River (Gniloye Lake area) (45°09'00"N – 147°57'50"E), 402 m alt., *Betula ermanii* forest with thick underbrush of *Pinus pumila* and *Sasa*, on bark of *Betula* near its base, #K-48-3-05.

**Ptilidium ciliare* (L.) Hampe – Iturup Island, Baranskogo volcano, area near the peak (45°05'55"N – 148°00'38"E), 965 m alt., fumaroles field in mountain cirque on South slope of volcano, vertical cliff's walls of cirque, #K-59-2-05.

**Radula complanata* (L.) Dumort. – Iturup Island, 1 km to the southwest of Reydovoye Lake, the right tributary of Mineral'nyy Creek (45°14'48"N – 148°00'51"E), 25 m alt., flood-plain, wet *Alnus-Salix* with solitary *Larix* trees forest with tall grasses, on bark of *Alnus* at the height of 1 m, #K-61-19-05.

**Radula constricta* Steph. – Iturup Island, the shore of the western part of Reydovoye Lake (45°15'28"N – 148°01'41"E), 20 m alt., on boulders, #K-64-10-05.

**Radula japonica* Gottsche in Steph. – Iturup Island, Pisimoy Cape area (45°12'32,9"N – 147°50'04,5"E), 75 m alt., *Quercus-Acer* forest with admixture of *Sorbus*, *Betula ermanii*, *Salix*, *Alnus* and thick understory of *Sasa*, on big boulder in full shade in the headwaters, with *Conocephalum conicum*, #K-45-37-05. – Kunashir Island, southern part, Ozernaya River mouth area (43°53'04"N – 145°27'43"E), 100 m alt., *Abies-Picea*-broad-leaved forest on slope to river, on the bark of *Acer*, #K-46-1-06.

**Riccardia aeruginosa* Furuki – Kunashir Island, northern part, Saratovka River mouth area (44°15'21"N – 146°05'57"E), 27 m alt., *Picea glehnii* with admixture of *Sorbus*, *Betula*, *Taxus cuspidata*, *Abies sachalinensis* boggy moss forest, in wet hollows, with *Schistochilopsis cornuta*, *Calypogeia* cf. *neogaea*, #K-63-6-06.

**Riccardia chamaedryfolia* (With.) Grolle – Kunashir Island, southern part, Serebryanoye Lake area. (43°03'19"N – 145°50'18"E), 15 m alt., *Picea*

glehnii – *Abies sachalinensis* forest with admixture of broad-leaved trees with green moss cover, wet hollows, with *Calypogeia integristipula* Steph., *Cephalozia leucantha*, *Harpanthus flotovianus*, #K-50-15-06.

**Riccardia latifrons* (Lindb.) Lindb. – Kunashir Island, southern part, the area of confluence of Kislaya and Lesnaya Rivers (44°00'20"N – 145°46'23"E), 60 m alt., cliffs along rivers, on peaty mats of dieing mosses, with *Kurzia makinoana*, *Cephalozia bicuspidata*, #K-53-4-06.

**Riccardia multifida* (L.) Gray ssp. *decrescens* (Steph.) Furuki – Iturup Island, Pisimoy Cape area (45°12'33"N – 147°50'05"E), 75 m alt., *Quercus*–*Acer* forest with admixture of *Sorbus*, *Betula ermanii*, *Salix*, *Alnus* and thick understory of *Sasa*, on big boulder in full shade in the headwaters of stream, #K-45-41a-05.

**Riccardia subalpina* Furuki – Kunashir Island, northern part, east slope of Tyatya volcano (44°17'20"N – 146°18'00"E), 40 m alt., Mixed *Alnus*–*Betula*–*Abies* with admixture *Picea*, *Kalopanax*, *Taxus* forest with forbs cover, on decaying wood, #K-56-7-06.

**Riccardia vitrea* Furuki – Iturup Island, Pisimoy Cape area (45°12'33"N – 147°50'05"E), 75 m alt., *Quercus*–*Acer* forest with admixture of *Sorbus*, *Betula ermanii*, *Salix*, *Alnus* and thick understory of *Sasa*, on crumble fine-grained soil along stream, in part shade, #K-45-46-05.

**Scapania ampliata* Steph. – Kunashir Island, northern part, area near the top of Ruruj Mt. (44°27'32"N – 146°08'12"E), 1300 m alt., on wet fine-grained soil in cliff crevices, with *Myliia taylorii*, *Marsupella sphacelata*, #K-39-17a-06. – Iturup Island, Baranskogo volcano, area near the peak (45°06'09"N – 148°01'09"E), 1114 m alt., wet crevices in vertical wall of cliff, in full sun. With *Lophozia sudetica*, #K-58-24b-05.

**Scapania bolanderi* Austin – Kunashir Island, northern part, mouth of Dal'nij Creek (Ruruj Mt.) (44°28'59"N – 146°05'38"E), 50 m alt., *Abies*–*Picea* forest with admixture of *Kalopanax*, *Acer* and understory of *Taxus*, *Weigela*, *Hydrangia*, etc., on decaying wood, #K-42-4a-06.

**Scapania crassiretis* Bryhn – Iturup Island, Baranskogo volcano, area near the peak (45°06'09"N – 148°01'09"E), 1114 m alt., wet crevices in vertical wall of cliff, in full sun, with *Marsupella sphacelata*, *Lophozia sudetica*, #K-58-13-05.

**Scapania curta* (Mart.) Dumort. – Iturup Island, Baranskogo volcano, area near the peak (45°06'08,8"N – 148°01'09,2"E), 1114 m alt., wet crevices in vertical wall of cliff, in full sun, with *Lophozia sudetica*, *Diplophyllum taxifolium*, #K-58-24-05.

Scapania diplophyloides Amakawa et S. Hatt. – Iturup Island, Baranskogo volcano area, the first Hot Spring (45°05'26"N – 147°59'32"E), 409 m alt., *Sorbus*–*Betula* forest with understory of *Pinus pumila*, *Sasa* and *Calamagrostis*, on vertical side of boulder shaded by *Sorbus*, with *Lophozia ventricosa* var. *guttulata*, *Diplophyllum taxifolium*, #K-56-18-05 – Kunashir Island, northern part, dry stream-bed in the headwaters of Dal'nij Creek (Ruruj Mt.) (44°27'22"N

– 146°07'19"E), 1100 m alt., fine-grained soil along rivulet valley, with *Diplophyllum taxifolium*, #K-38-3b-06.

**Scapania integerrima* Steph. – Iturup Island, western macroslope of Bogdan Khmel'nitski volcano, valley of Yuzhnyy Chirip sulphur river, about 2 km from the mouth (45°20'51"N – 147°52'46"E), 400 m alt., on wet stones of walls of river's canyon, abt. 50 m from the river bed, with *Diplophyllum taxifolium*, #K-71-7-05. – Kunashir Island, southern part, Kislaya River, in the area of thermal springs (44°00'20"N – 145°46'23"E), 100 m alt., on wet fine-grained soil with sulphur in the stream of hot water, #K-52-1-06.

Scapania irrigua (Nees) Nees – Iturup Island, headwaters of the Kuril'skaya River (Gniloye Lake area) (45°09'00"N – 147°57'50"E), 402 m alt., *Juncus*–*Carex*-dwarf-shrub-moss bog, in hollows (between *Carex*) and on pure peat, #K-49-4-05.

Scapania lingulata H. Buch – Iturup Island, Belyye Skaly cliffs (about 12 km to the north of the village of Reydovo along Okhotsk Sea Coast) (45°15'48"N – 148°13'03"E), 18 m alt., on crumble slope of white pumice deposits, with *Nardia assamica*, #K-67-8a-05 – Kunashir Island, northern part, dry stream-bed in the headwaters of Dal'nij Creek (Ruruj Mt.) (44°27'22"N – 146°07'19"E), 1100 m alt., fine-grained soil along rivulet valley, with *Marsupella sphacelata*, #K-38-5-06.

Scapania paludicola Loeske & Mull.Frib. – Iturup Island, Gniloye Lake area (45°08'33"N – 147°57'26"E), 422 m alt., *Carex*–*Juncus*-moss bog near lake-shore in east surrounding of lake, in ridges and hollows, #K-51-1-05 – Kunashir Island, southern part, Serebryanoye Lake area (43°03'19"N – 145°50'18"E), 15 m alt., dwarf-shrub-moss-sedge bog, wet hollows between *Sphagnum* hummocks, with *Cephalozia bicuspidata*, #K-51-1-06.

Scapania paludosa (Mull.Frib.) Mull.Frib. – Iturup Island, headwaters of the Kuril'skaya River (Gniloye Lake area) (45°09'00"N – 147°57'50"E), 402 m alt., *Betula ermanii* forest with thick underbrush of *Pinus pumila* and *Sasa*, on boulders in the stream-bed, with *Jungermannia* cf. *borealis*, #K-48-32-05 – Kunashir Island, northern part, Dal'nij Creek (44°27'41"N – 146°06'49"E), 200 m alt., wet cliffs near high waterfall (abt. 50 m of height), with *Solenostoma fusiforme*, #K-37-13-06.

**Scapania parvifolia* Warnst. – Kunashir Island, southern part, Ozernaya River mouth area (43°53'04"N – 145°27'43"E), 30 m alt., windy meadow with spots of bare ground, on slope to sea, #K-46-13-06.

**Scapania parvitexta* Steph. – Kunashir Island, northern part, Dal'nij Creek (44°27'41"N – 146°06'49"E), 300 m alt., on stones along small stream, #K-37-27-06.

Scapania subalpina (Nees ex Lindenb.) Dumort. – Kunashir Island, northern part, Dal'nij Creek (44°27'41"N – 146°06'49"E), 200 m alt., wet cliffs near high waterfall (abt. 50 m of height), #K-37-14a-06.

**Scapania umbrosa* (Schrad.) Dumort. – Kunashir

Island, southern part, the area of confluence of Kislaya and Lesnaya Rivers (44°00'20"N – 145°46'23"E), 60 m alt., on fine-grained soil of road-side in forest, with *Nardia subclavata*, #K-53-16-06.

Scapania undulata (L.) Dumort. – Iturup Island, Gniloye Lake area, headwaters of a tributary of Gniloye Creek (45°08'07"N – 147°57'45"E), 391 m alt., *Carex-Juncus*-moss eutrophic bog, on ridges and hollows, #K-52-21-05 – Kunashir Island, northern part, Dal'nij Creek (44°27'41"N – 146°06'49"E), 700 m alt., on stones in snow-bed hollow of temporary spring, #K-37-35b-06.

Schistochilopsis opacifolia (Culm. ex Meyl.) Konstant. – Iturup Island, Belye Skaly cliffs (about 12 km to the north of the village of Reydovo along Okhotsk Sea Coast) (45°15'48"N – 148°13'03"E), 18 m alt., on slumping slope of white pumice deposits, with *Nardia assamica*, *Solenostoma pyriformum* var. *minutissima*, *Scapania* sp., *Blasia pusilla*, #K-67-4-05.

**Solenostoma caespiticium* (Lindenb.) Steph. – Kunashir Island, southern part, Goryachyee Lake area (43°51'52"N – 145°30'10"E), 170 m alt., road-side in *Sasa-Pinus pumila* thickets, #K-45-4a-06 – Iturup Island, Gniloye Lake area, (45°08'33"N – 147°57'26"E), 422 m alt. Coll. 14.IX.2005 On slumping slope along Gniloye Lake (mixture of peat and sandy soil) K-51-24a-05.

**Solenostoma* cf. *handelii* Schiffn. – Kunashir Island, southern part, beginning of road to Goryachyee Lake (43°51'N – 145°30'E), 80 m alt., fine-grained soil along road-side, with *Diplophyllum andrewsii*, #K-44-1-06.

**Solenostoma fauriana* (Beauverd in Steph.) Bakalin comb. nov. – *Jungermannia fauriana* Beauverd in Steph. Spec. Hepat. 6: 571. 1924. – Kunashir Island, southern part, Ozernaya River mouth area (43°53'04"N – 145°27'43"E), 30 m alt., windy meadow with spots of bare ground, on slope to sea, with *Nardia assamica*, #K-46-12-06.

**Solenostoma fusiforme* (Steph.) Amakawa – Iturup Island, Gniloye Lake area, headwaters of a tributary of Gniloye Creek (45°08'07"N – 147°57'45"E), 391 m alt., *Carex-Juncus*-moss eutrophic bog, on ridges and hollows, #K-52-2-05. – Kunashir Island, southern part, Kislaya River, in the area of thermal springs (44°00'20"N – 145°46'23"E), 100 m alt., thermal spring mire along river, in hollows, #K-52-18-06.

**Solenostoma jenseniana* (Grolle) Bakalin. – Iturup Island, Vetrovoy Peresheek neck (45°16'15"N

– 148°18'17"E), 28 m alt., on fine-grained soil of swampy, former Japanese airfield], with *Nardia unispiralis*, #K-68-6-05.

Solenostoma koreanum Steph. – Iturup Island, Gniloye Lake area (45°08'33"N – 147°57'26"E), 422 m alt., on slumping slope along Gniloye Lake (mixture of peat and sandy soil), #K-51-24b-05 – Kunashir Island, southern part, 3 km to the east from caldera's Golovnin volcano (43°50'13"N – 145°32'43"E), 200 m alt., road in *Sasa* with clumps of *Pinus pumila* thickets, on wet clayish road-side, #K-48-3a-06.

**Solenostoma pyriformum* Steph. var. *minutissima* (Amakawa) Bakalin – Iturup Island, Baranskogo volcano area, the first Hot Spring (45°05'26"N – 147°59'32"E), 409 m alt., *Sorbus-Betula* forest with understory of *Pinus pumila*, *Sasa* and *Calamagrostis*, on boulders along stream (water with high content of Fe), with *Nardia* cf. *subclavata*, #K-56-4-05. – Kunashir Island, southern part, Ozernaya River mouth area (43°53'04"N – 145°27'43"E), 30 m alt., windy meadow with spots of bare ground, on slope to sea, with *Anthelia juratzkana*, #K-46-13a-06.

**Solenostoma sphaerocarpum* (Hook.) Steph. – Kunashir Island, southern part, the area of confluence of the Kislaya and Lesnaya Rivers (44°00'20"N – 145°46'23"E), 60 m alt., on fine-grained soil along river, with *Marsupella emarginata*, *Scapania ampliata*, *Kurzia makinoana*, *Nardia subclavata*, #K-53-5-06.

Sphenolobus minutus (Schreb.) Berggr. – Iturup Island, Baranskogo volcano, area near the peak (45°06'09"N – 148°01'09"E), 1114 m alt., wet crevices in vertical wall of cliff, in full sun, #K-58-6-05.

**Tritomaria exsecta* (Schmid. ex Schrad.) Loeske – Kunashir Island, northern part, east slope of Tyatyta volcano (44°17'20"N – 146°18'00"E), 40 m alt., mixed *Alnus-Betula-Abies* forest with admixture *Picea*, *Kalopanax*, *Taxus* with forbs cover, on decaying wood, with *Lophocolea heterophylla*, *Macrodiplphyllum plicatum*, *Bazzania ovifolia*, #K-56-3-06.

Tritomaria quinquedentata (Huds.) H. Buch – Iturup Island, western macroslope of Bogdan Khmel'nitski volcano, valley of Yuzhnyy Chirip sulphur river, about 2 km from the mouth (45°20'51"N – 147°52'46"E), 400 m alt., on wet stones of walls of river's canyon, abt. 50 m from the river bed, with *Marsupella sphacelata*, #K-71-8a-05 – Kunashir Island, northern part, Dal'nij Creek (44°27'41"N – 146°06'49"E), 700 m alt., on stones in snow-bed hollow of temporary spring, #K-37-32a-06.

The Millipedes (Diplopoda) of the Sakhalin Island

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Abstract A review of the millipede fauna of the Sakhalin Island is provided, with 13 recognizable species involved. A brief historical account, a comparative analysis, and some zoogeographical comments are provided. In addition, new faunistic records and data on the distribution of the island's species are given. Illustrations are provided for all species encountered. All currently known species from the Sakhalin Island are keyed.

Key words: Diplopoda, fauna, distribution, keys, Sakhalin, islands, Far East of Russia

Introduction

The first data on the millipede fauna of the Sakhalin Island derive from the publication of Chamberlin & Wang (1953) in which the only synanthropic subcosmopolitan species was mentioned as occurring in this island. After a long period of inactivity the first ecological observations of general millipede abundance in the southern part of Sakhalin have appeared (Molodova 1973, 1974, 1976). At the same time Golovatch (1976) described the new genus and species from there. These data remained the only reliable records of the millipedes of the Sakhalin Island until the 1990's of the twentieth century when additional species were reported from this island (Mikhaljova 1990, 1993). The papers exclusively devoted to the diplopods of the Sakhalin and Kurile islands was published after a break (Mikhaljova 1995; Mikhaljova and Basarukin 1995). In addition, new taxonomical data, faunistic reviews and the information on the distribution of some species have appeared (Enghoff 1994; Ganin 1997; Mikhaljova 1998a, 1998b, 2000; Mikhaljova and Golovatch 2001; Mikhaljova and Korsós 2003; Mikhaljova and Marusik 2004, 2006; Shear 1990; Shelley 1993, 1998).

The main data on the diplopods of the Sakhalin Island are summarized in the review of the millipede fauna of the Asian part of Russia (Mikhaljova 2004).

Material and Methods

Materials treated here are deposited in the collection of the Institute of Biology and Soil Science, Far Eastern Branch of the Russian Academy of Sciences (IBSS), Vladivostok, Russia.

Species names include the literature references for Sakhalin only. The classification adopted here is basically that of Hoffman (1980).

Faunistic Part

Order Polyzoziida

Family Polyzoziidae

Angarozonium aduncum (Mikhaljova, 1995) [Figs 1–2.]

Polyzonium aduncum Mikhaljova, 1995 in: Mikhaljova & Basarukin, 1995: 90–91, 90: map 1, 91: figs 1–3.

Angarozonium aduncum – Shelley, 1998: 30; Mikhaljova, 1998b: 12, 11: figs 21–22, 12: map 2; 2004: 44–45, 44: figs 20–21, 45: map 2; Mikhaljova & Marusik, 2006: 116, 122, 124–125, 116: figs 1–2.

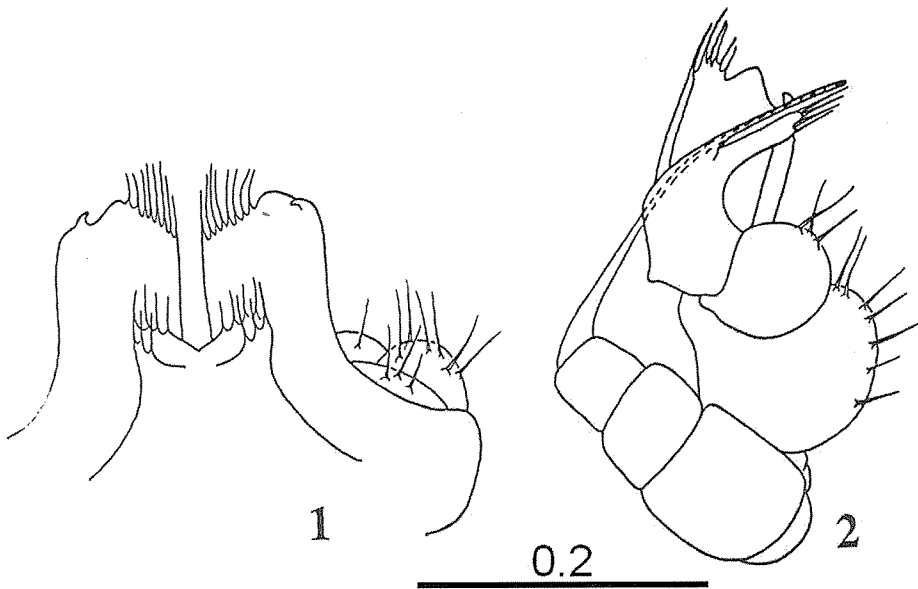
Material examined. 1 male (IBSS), Russia, Sakhalin Island, SW part, Krilyon Peninsula, W slope, ca. 5 km S of Shebunino, 36°22.536' N 141°52.562' E, 14–15.VIII.2001, leg. Yu.M. Marusik. – 1 female (IBSS), Russia, Sakhalin Island, SW part, Krilyon Peninsula, east side, Uryum River, ca. 3 km from mouth, 46°28.078' N 142°19.764' E, 17–18.VIII.2001, leg. Yu.M. Marusik.

Distribution. Russia: Far East (southern part of Sakhalin Island, Kurile Islands: Kunashir, Shikotan).

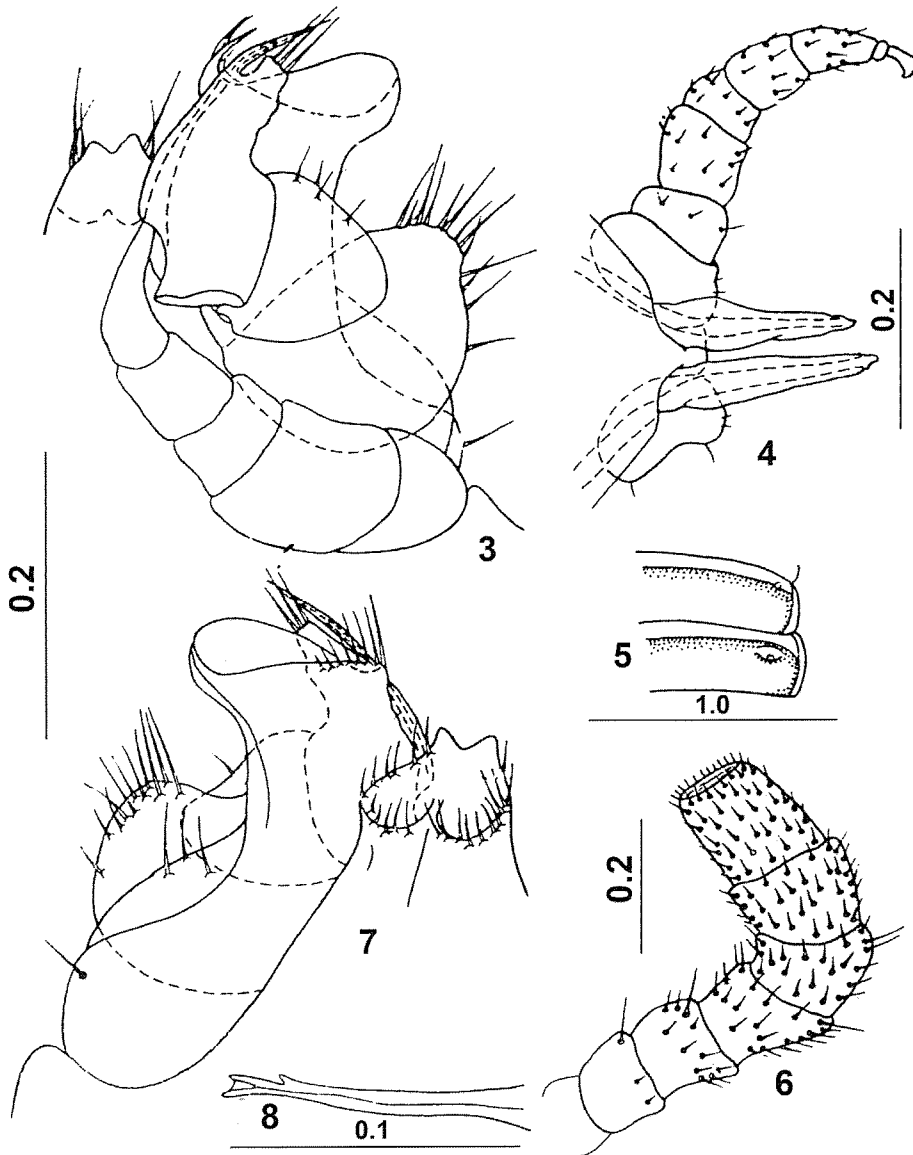
Angarozonium amurense (Gerstfeldt, 1859) [Figs 3–8.]

Polyzonium cyathiferum – Mikhaljova, 1990: 137; 1993: 8–9, 8: map 1; Mikhaljova & Basarukin, 1995: 90: map 1; Ganin, 1997: 133.

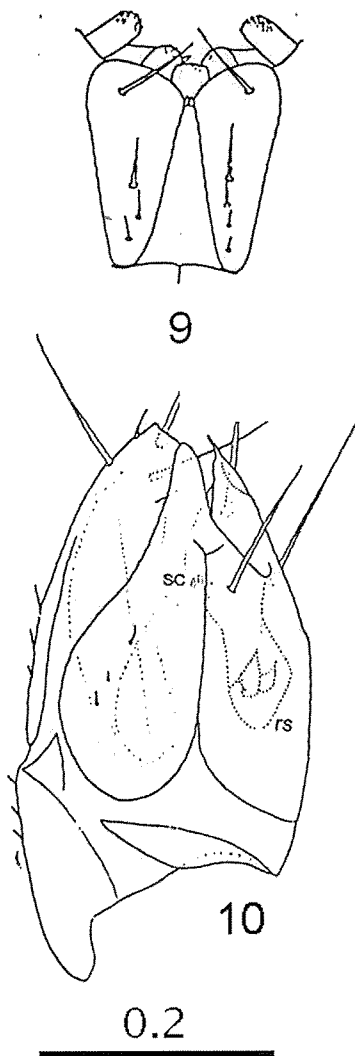
Angarozonium amurense – Mikhaljova, 1998b: 12–13, 12: map 2, 13: figs 23–28; 2002: 207; 2004: 45–48, 46: figs 22–27, 47: map 3; Mikhaljova & Marusik, 2006: 125.



Figures 1-2.
Angarozonium aduncum
 (Mikhaljova, 1995). 1
 - gonopods (front view);
 2 - gonopods (caudal
 view). Scale in mm (after
 Mikhaljova and Basarukin
 1995).



Figures 3-8.
Angarozonium amurense
 (Gerstfeldt, 1859). 3
 - gonopods (caudal
 view); 4 - male leg pair
 2 and penes; 5 - sides of
 male body segments 5
 and 6; 6 - antenna; 7 -
 gonopods (front view);
 8 - last telopoditomere
 of posterior gonopod.
 Scales in mm (after
 Mikhaljova 1981, with
 some changes).



Figures 9–10.

Orinisobates microthylax Enghoff, 1985. 9 – lamellae linguales and promentum of female gnathochilarium; 10 – left vulva; rs – receptaculum seminis with a pair of internal flaps; sc – sclerotisations at base of receptaculum seminis. Scale in mm (after Enghoff 1985).

Material examined. 2 males, 5 females (IBSS), Russia, Sakhalin Island, Poronaisk District, near Poronaisk, *Salix* forest, 24.VIII.1993, leg. A.M. Basarukin. – 1 male (IBSS), Russia, Sakhalin Island, CN part, Tim River (upper flow), E of Palevo village, 50°37' N 142°55' E, 7–8.VIII.2001, leg. Yu.M. Marusik.

Distribution. Russia: Siberia (central part of Krasnoyarsk Province, Irkutsk Area, Chita Area, Buryatia, Republic of Sakha [Yakutia]), Far East (southern part of Khabarovsk Province, Jewish Autonomous Region, northern and central parts of Sakhalin Island, Kamchatka Peninsula). Northeast China. North Mongolia.

Order Julida
Family Nemasomatidae

***Orinisobates microthylax* Enghoff, 1985 [Figs 9–10.]**

Orinisobates microthylax – Mikhaljova, 1993: 16, 12: map 2; 1998a: 7; 1998b: 73, 73: map 19, 72: figs 316–317; 2004: 94–96, 94: map 12, 95: figs 211–212; Mikhaljova & Basarukin, 1995: 91–92, 90: map 1; Mikhaljova & Golovatch, 2001: 107; Mikhaljova & Korsós, 2003: 219–220; Mikhaljova & Marusik, 2004: 5; 2006: 116–117, 123–125, 117: figs 3–4; Enghoff, 1994: 29.

Remarks. This species is characterized by parthenogenesis.

Distribution. Russia: Siberia (Buryatia), Far East (central and southern parts of Kamchatka Peninsula, southern part of Kuriles, Sakhalin Island, southern part of Khabarovsk Province, Primorsky Province, Amurskaya Area, Jewish Autonomous Region).

***Orinisobates soror* Enghoff, 1985 [Figs 11–16.]**

Orinisobates soror – Mikhaljova, 1990: 137; 1993: 16, 12: map 2; 1998a: 7; 1998b: 72–73, 72: figs 312–315, 73: map 19; 2004: 92–94, 93: figs 205–210, 94: map 12; 2006: 202; Mikhaljova & Basarukin, 1995: 91, 90: map 1; Mikhaljova & Marusik, 2006: 117, 123–125, 117: figs 5–10; Ganin, 1997: 133.

Material examined. 19 males, 23 females, 4 juveniles (IBSS), Russia, Sakhalin Island, Korsakov District, near Utiosnoe, 15.IX.1993, leg. A.M. Basarukin.

Distribution. Russia: Far East (southern part of Sakhalin Island, Moneron Island, southern and middle parts of Kuriles).

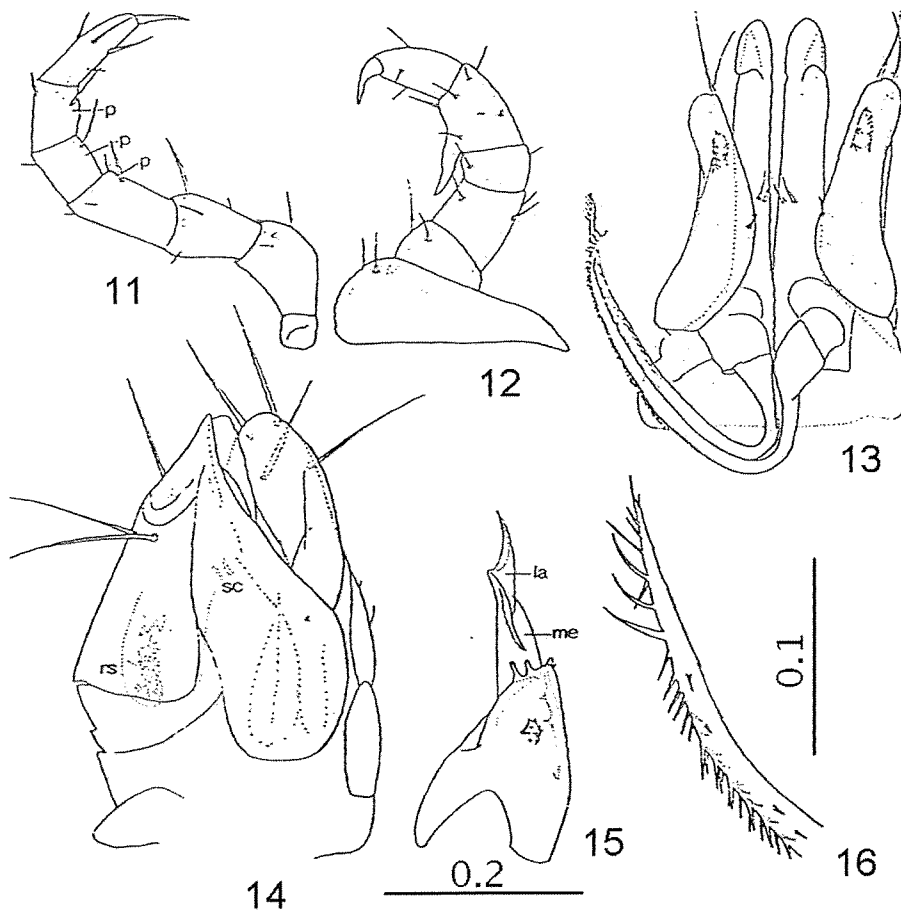
Order Chordeumatida
Family Diplomaragnidae

***Sakhalineuma basarukini* (Mikhaljova, 1995) [Figs 17–23.]**

Diplomaragna basarukini Mikhaljova, 1995: 82, 81: figs 5–12; 1998b: 21–22, 20: figs 57–62, 19: map 5; Mikhaljova & Basarukin, 1995: 94, 93: map 3.

Sakhalineuma basarukini – Mikhaljova, 2000: 172; 2004: 124–126, 125: figs 284–290, 126: map 17; Mikhaljova & Marusik, 2006: 125.

Material examined. 3 males, 9 juveniles (IBSS), Russia, Sakhalin Island, central part, Leonidovka River (right tributary of Poronai River), 30 m downstream from Ulyanovka River mouth, 49°15.092' N 142°43.889' E, 4–5.VIII.2001, leg. Yu.M. Marusik. – 1 male, 1 female, 1 juvenile (IBSS), Russia, Sakhalin Island, CN part, Tim River (upper flow), east of Palevo, 50°37' N 142°55' E, 220 m, 7–8.VIII.2001, leg.



Figures 11–16.
Orinisobates soror Enghoff, 1985. 11 – male midbody leg; 12 – male leg of pair 1 (front view); 13 – anterior gonopods (caudal view); 14 – right vulva; 15 – right posterior gonopod (lateral view); 16 – distal part of flagellum; la – lateral lamella; me – mesal lamella; p – soft pads; rs – receptaculum seminis with sperm; sc – sclerotisations at base of receptaculum seminis. Scales in mm (after Enghoff 1985).

Yu.M. Marusik. – 2 males, 1 juvenile (IBSS), Russia, Sakhalin Island, NE part, East Sakhalin Range, below Chamginski Pass, 50°39.830' N 143°10.001' E, 400 m, *Abies-Larix-Picea* forest with *Ledum*, thick layer of *Sphagnum*, litter of sparse *Pinus pumila* bushes among forest, 8.VIII.2001, leg. Yu.M. Marusik.

Distribution. Russia: Far East (northern and central parts of Sakhalin Island).

***Sakhalineuma curvatum* (Mikhaljova, 1995)** [Figs 24–28.]

Diplomaragna curvata Mikhaljova, 1995: 83–86, 84: figs 19–23; 1998b: 23, 23: figs 72–74, 19: map 5; Mikhaljova & Basarukin, 1995: 94, 93: map 3.

Sakhalineuma curvatum – Mikhaljova, 2000: 172; 2004: 129–130, 130: figs 299–303, 126: map 17; 2006: 202–203; Mikhaljova & Marusik, 2006: 118, 123–125, 118: figs 12–16.

Material examined. 2 males, 2 females (IBSS), Russia, Sakhalin Island, SW part, Krilyon Peninsula, W shore, ca. 5 km S of Shebunino, Kitosia River mouth, 36°22.536' N 141°52.562' E, 14–15.VIII.2001, leg. Yu.M. Marusik. – 3 males, 3 females, 5 juveniles (IBSS), Russia, Sakhalin Island, SW part, Krilyon Peninsula, eastern side, Uryum River, ca. 3 km from mouth, 46°28.078' N 142°19.746' E, 17–18.VIII.2001, leg. Yu.M. Marusik.

Remarks. The diplopod materials from the

Moneron Island contain juveniles and a single female belonging to the genus *Sakhalineuma* (Mikhaljova 2006). In the absence of males it appears impossible to provide a closer identification. However, it seems quite plausible that these individuals actually belong to *S. curvatum* or *S. tuberculatum* known from the Krilyon Peninsula, Sakhalin Island.

Distribution. Russia: Far East (southern part of Sakhalin, ?Moneron Island, Kurile Islands: Kunashir, Iturup).

***Sakhalineuma globuliferum* (Mikhaljova, 1995)** [Figs 29–31.]

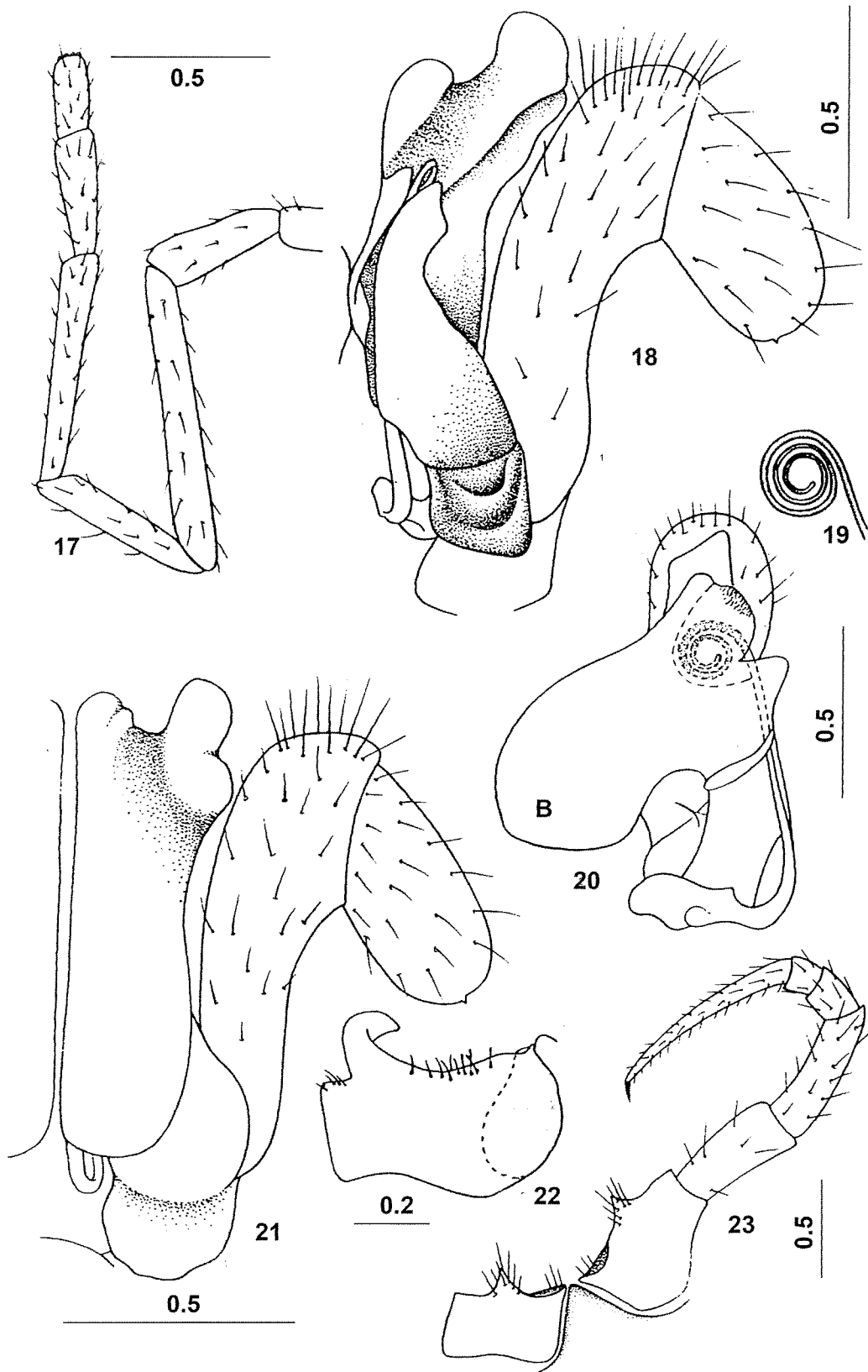
Diplomaragna globulifera Mikhaljova, 1995: 87, 86: figs 27–29; 1998b: 22–23, 22: figs 69–71, 19: map 5; Mikhaljova & Basarukin, 1995: 94, 93: map 3.

Sakhalineuma globuliferum – Mikhaljova, 2000: 172; 2004: 128–129, 129: figs 296–298, 126: map 17; Mikhaljova & Marusik, 2006: 125.

Distribution. Russia: Far East (northern and central parts of Sakhalin Island).

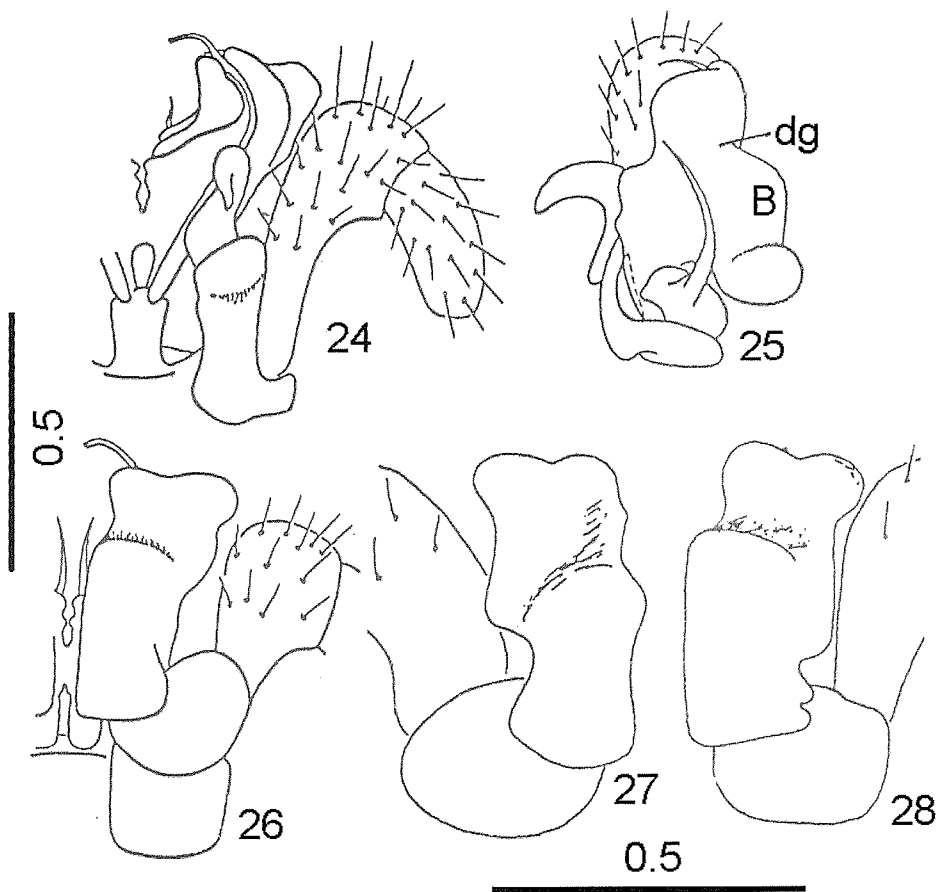
***Sakhalineuma molodovae* Golovatch, 1976** [Figs 32–34.]

Sakhalineuma molodovae Golovatch, 1976: 1491–1492, 1490: fig 1; Mikhaljova, 2000: 172: figs 53–55; 2004: 131–132, 131: figs 304–306, 126: map 17; Mikhaljova & Marusik, 2006: 125; Shelley et al.,

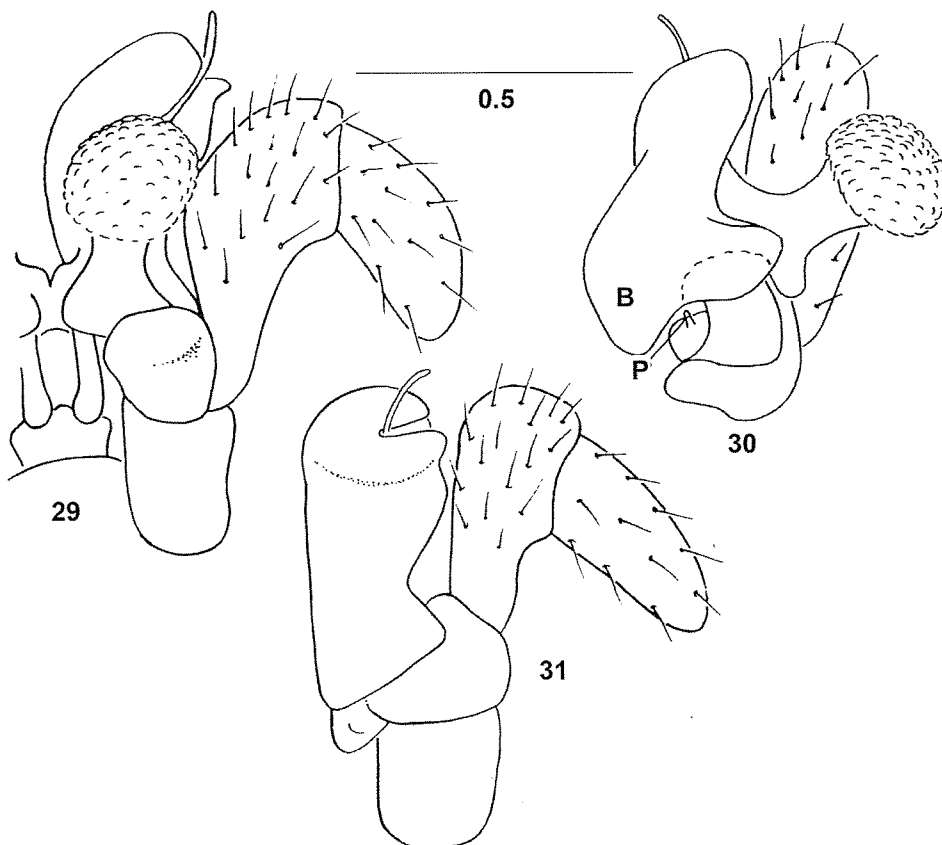


Figures 17– 23.

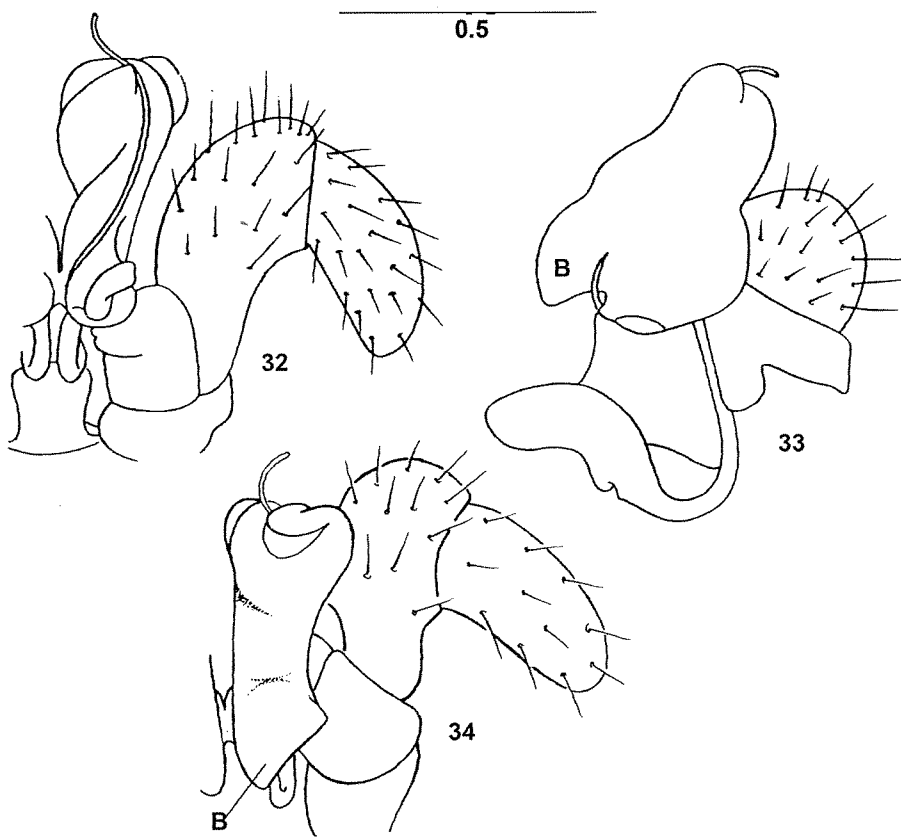
Sakhalineuma basarukini (Mikhaljova, 1995). 17 – antenna; 18 – gonopods (caudal view); 19 – distal part of anterior gonopod telopodite (mesal view, enlarged not to scale); 20 – gonopods (mesal view); 21 – gonopods (front view); 22 – male coxa 11; 23 – male leg pair 10; B – prominence of colpocoxite. Scales in mm (17–21, 23 – after Mikhaljova 1998b; 22 – after Mikhaljova 1995).



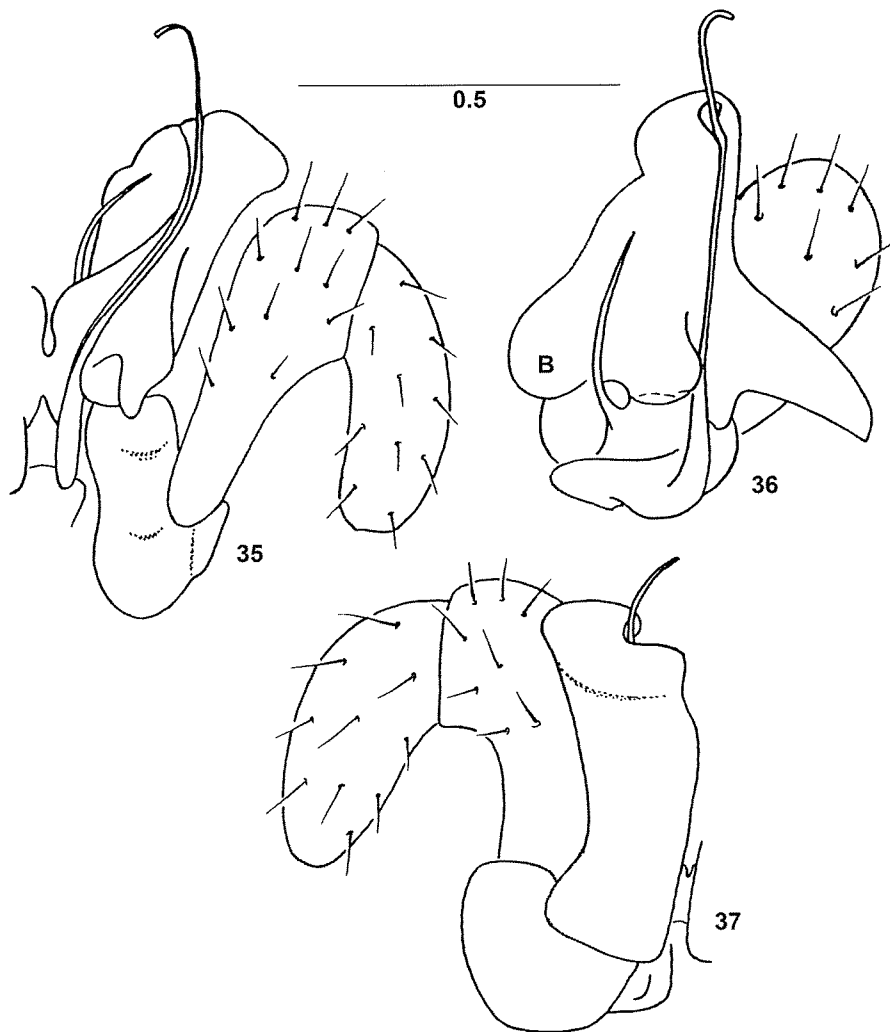
Figures 24–28.
Sakhalineuma curvatum
 (Mikhaljova, 1995). 24 – gonopods (caudal view); 25 – gonopods (mesal view); 26–28 – gonopods (front view); B – prominence of colpocoxite; dg – distal groove of colpocoxite. Scales in mm (24–26 – after Mikhaljova 1998b; 27–28 – after Mikhaljova 1995).



Figures 29–31.
Sakhalineuma globuliferum
 (Mikhaljova, 1995). 29 – gonopods (caudal view); 30 – gonopods (mesal view); 31 – gonopods (front view); B – prominence of colpocoxite; p – mesal process of angiocoxite. Scale in mm (after Mikhaljova 1998b).



Figures 32–34.
Sakhalineuma molodovae
 Golovatch, 1976. 32 –
 gonopods (caudal view);
 33 – gonopods (mesal
 view); 34 – gonopods (front
 view); B – prominence of
 colpocoxite. Scale in mm
 (after Mikhaljova 1998b).



Figures 35–37.
Sakhalineuma sakhalinicum
 (Mikhaljova, 1995). 35 –
 gonopods (caudal view);
 36 – gonopods (mesal
 view); 37 – gonopods (front
 view); B – prominence of
 colpocoxite. Scale in mm
 (after Mikhaljova 1998b).

2000: 78.

Diplomaragna molodovae – Shear, 1990: 27, 25: figs 62–64; Mikhailjova, 1993: 25; 1995: 79–82, 80: figs 1–4; 1998b: 23–25, 24: figs 75–77, 19: map 5; Mikhailjova and Basarukin, 1995: 94, 93: map 3; Ganin, 1997: 133.

Distribution. Russia: Far East (southern part of Sakhalin Island).

***Sakhalineuma sakhalanicum* (Mikhailjova, 1995)** [Figs 35–37.]

Diplomaragna sakhalinica Mikhailjova, 1995: 86–87, 85: figs 24–26; 1998b: 25, 24: figs 78–80, 19: map 5; Mikhailjova and Basarukin, 1995: 94, 93: map 3.

Sakhalineuma sakhalanicum – Mikhailjova, 2000: 173; 2004: 132–133, 132: figs 307–309, 126: map 17; Mikhailjova & Marusik, 2006: 125.

Distribution. Russia: Far East (southern part of Sakhalin Island).

***Sakhalineuma tuberculatum* (Mikhailjova, 1995)** [Figs 38–42.]

Diplomaragna tuberculata Mikhailjova, 1995: 82–83, 83: figs 13–18; 1998b: 22, 21: figs 63–68, 19: map 5; Mikhailjova & Basarukin, 1995: 94, 93: map 3.

Sakhalineuma tuberculatum – Mikhailjova, 2000: 173; 2004: 126–128, 126: map 17, 127: figs 291–295; 2006: 202–203; Mikhailjova & Marusik, 2006: 118–119, 123–125, 119: figs 17–21.

Remarks. The diplopod materials from the Moneron Island contain juveniles and a single female belonging to the genus *Sakhalineuma* (Mikhailjova 2006). In the absence of males it appears impossible to provide a closer identification. However, it seems quite plausible that these individuals actually belong to *S. curvatum* or *S. tuberculatum* known from the Krilyon Peninsula, Sakhalin Island.

Distribution. Russia: Far East (southern part of Sakhalin, ?Moneron Island, Kurile Islands: Kunashir, Paramushir).

Family Caseyidae

***Underwoodia kurtschevae* Golovatch, 1980** [Figs 43–55.]

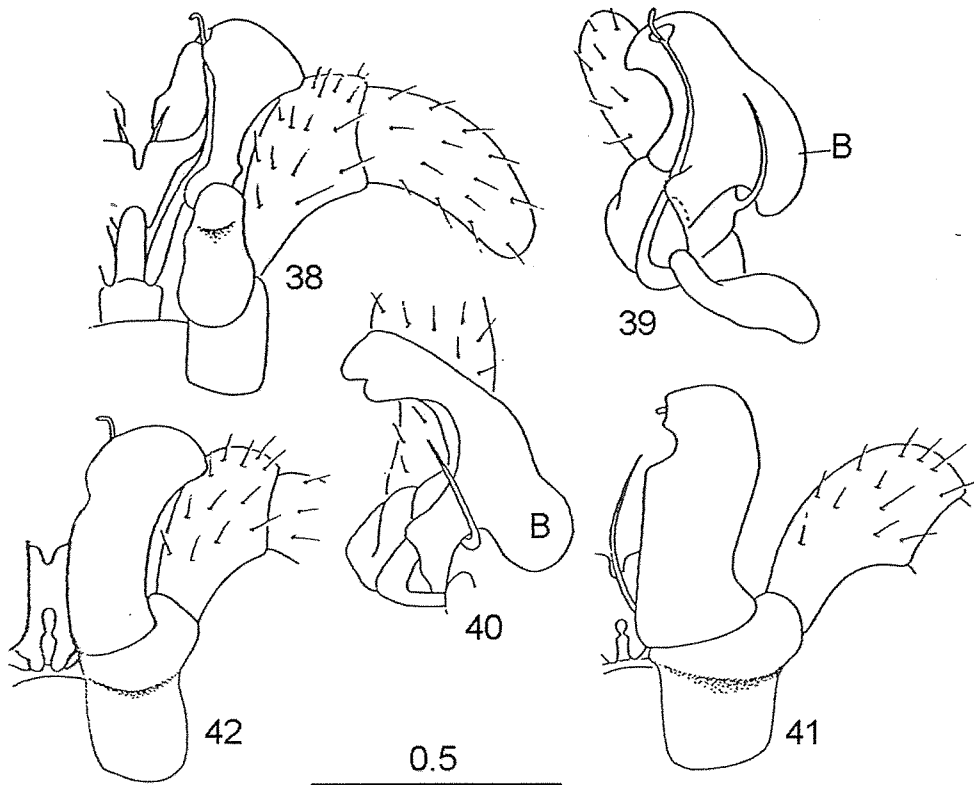
Underwoodia kurtschevae – Mikhailjova, 1990: 137; 1993: 17–18; 1998b: 40–42, 39: figs 138–141, 40: map 9; 2004: 202–205, 203: figs 505–517, 204: map 26; 2006: 202; Mikhailjova & Basarukin, 1995: 92–94, 92: figs 4–7, 93: map 2; Mikhailjova & Marusik, 2004: 6; 2006: 119–120, 122–125, 120: figs 22–34; Shelley, 1993: 175, 172: fig. 10, 175: map (= fig. 12); Ganin, 1997: 133.

Material examined. 2 juveniles (IBSS), Russia, Sakhalin Island, Aniva District, ca. 5–7 km E of Novoaleksandrovsk, 5.VI.1992, leg. A.M. Basarukin.

– 5 females (IBSS), Russia, Sakhalin Island, Aniva District, ca. 5 km E of Novoaleksandrovsk, coniferous litter, 27.VI.1992, leg. A.M. Basarukin. – 2 females, 1 juvenile (IBSS), Russia, Sakhalin Island, Aniva District, ca. 5–9 km E of Novoaleksandrovsk, 17.VII.1992, leg. A.M. Basarukin. – 1 juvenile (IBSS), Russia, Sakhalin Island, Aniva District, near Novoaleksandrovsk, Krasnoselskaya River, humid alder forest, 17–30.V.1993, leg. A.M. Basarukin. – 1 female (IBSS), Russia, Sakhalin Island, Aniva District, ca. 5–7 km E of Novoaleksandrovsk, bilberry-bush, 17.VI.1994, leg. A.M. Basarukin. – 10 females, 3 juveniles (IBSS), Russia, Sakhalin Island, Aniva District, Mt. Chekhova, N-W slope, coniferous forest, 8.IX.1994, leg. A.M. Basarukin. – 2 juveniles (IBSS), Russia, Sakhalin Island, Aniva District, Mt. Chekhova, N-W slope, *Betula* forest with coniferous tree, 8.IX.1994, leg. A.M. Basarukin. – 1 female, 2 juveniles (IBSS), Russia, Sakhalin Island, Aniva District, Mt. Chekhova, N-W slope, *Pinus pumila*, 8.IX.1994, leg. A.M. Basarukin. – 4 females (IBSS) Russia, Sakhalin Island, Korsakov District, near Lesnoe, 28.VI.1994, leg. A.M. Basarukin. – 2 females, 1 juvenile (IBSS), Russia, Sakhalin Island, Korsakov District, near Utiosnoe, coniferous forest, 21.VIII.1994, leg. A.M. Basarukin. – 2 females, 1 juvenile (IBSS), Russia, Sakhalin Island, near Yuzhno-Sakhalinsk, mixed forest, 1–3.VI.1993, leg. A.M. Basarukin. – 3 females (IBSS), Russia, Sakhalin Island, Timovskoe District, ca. 10 km W of Yasnoe, 3–5.VII.1993, leg. A.M. Basarukin. – 2 females, 3 juveniles (IBSS), Russia, Sakhalin Island, Tomari District, near Baklan'e Lake, coniferous forest, 3.VIII.1994, leg. A.M. Basarukin. – 8 juveniles (IBSS), Russia, Sakhalin Island, SE part, near Sokol Field Station, Belaya River (middle flow), 47°14.560' N 142°46.550' E, 16.VII–21.VIII.2001, leg. Yu.M. Marusik. – 1 female (IBSS), Russia, Sakhalin Island, SE part, ca. 27 km E of Sokol Field Station, Belaya River, 47°15.347' N 142°48.397' E, 17.VII.2001, leg. Yu.M. Marusik. – 15 females, 10 juveniles (IBSS), Russia, Sakhalin Island, SE part, near Staroabskoye, Naiba River, mouth part, 47°24' N 142°45' E, 23.VII–12.VIII.2001, leg. Yu.M. Marusik. – 4 juveniles (IBSS), Russia, Sakhalin Island, Leonidovka River (right tributary of Poronai River), 30 m downstream from Ulyanovka River mouth, 49°15.092' N 142°43.889' E, 4–5.VIII.2001, leg. Yu.M. Marusik. – 2 females (IBSS), Russia, Sakhalin Island, upper Evay River, Mt. Evay, *Picea* forest, 8.IX.2001, leg. V.A. Kostenko.

Remarks. This species is characterized by parthenogenesis.

Distribution. Russia: Far East (Primorsky and Khabarovsk provinces, Amurskaya Area, Jewish Autonomous Region, Kamchatka Peninsula, Sakhalin Island, Moneron Island, Kurile Islands: Zelyonyi, Shikotan, Kunashir, Iturup, Urup, Chirpoi, Ketoi). North Korea.



Figures 38–42.

Sakhalineuma tuberculatum (Mikhaljova, 1995). 38 – gonopods (caudal view); 39–40 – gonopods (mesal view); 41–42 – gonopods (front view); B – prominence of colpocoxite. Scale in mm (after Mikhaljova 1998b).

Order Polydesmida

Family Paradoxosomatidae

Oxidus gracilis (C. L. Koch, 1847) [Figs 56–58.]

Oxidus gracilis – Chamberlin & Wang, 1953: 7; Mikhaljova & Marusik, 2006: 125.

Remarks. This species is free-living in the subtropics and tropics, in the temperate conditions it largely occurs in the anthropogenic places. It has hitherto been reported from the Sakhalin Island only once, from an unspecified locality (Chamberlin and Wang 1953). Without any doubt, this species has been found in an anthropogenic habitat. At least numerous samples from natural habitats in Sakhalin fail to contain any *Oxidus gracilis* material.

Distribution. Subcosmopolitan.

Family Polydesmidae

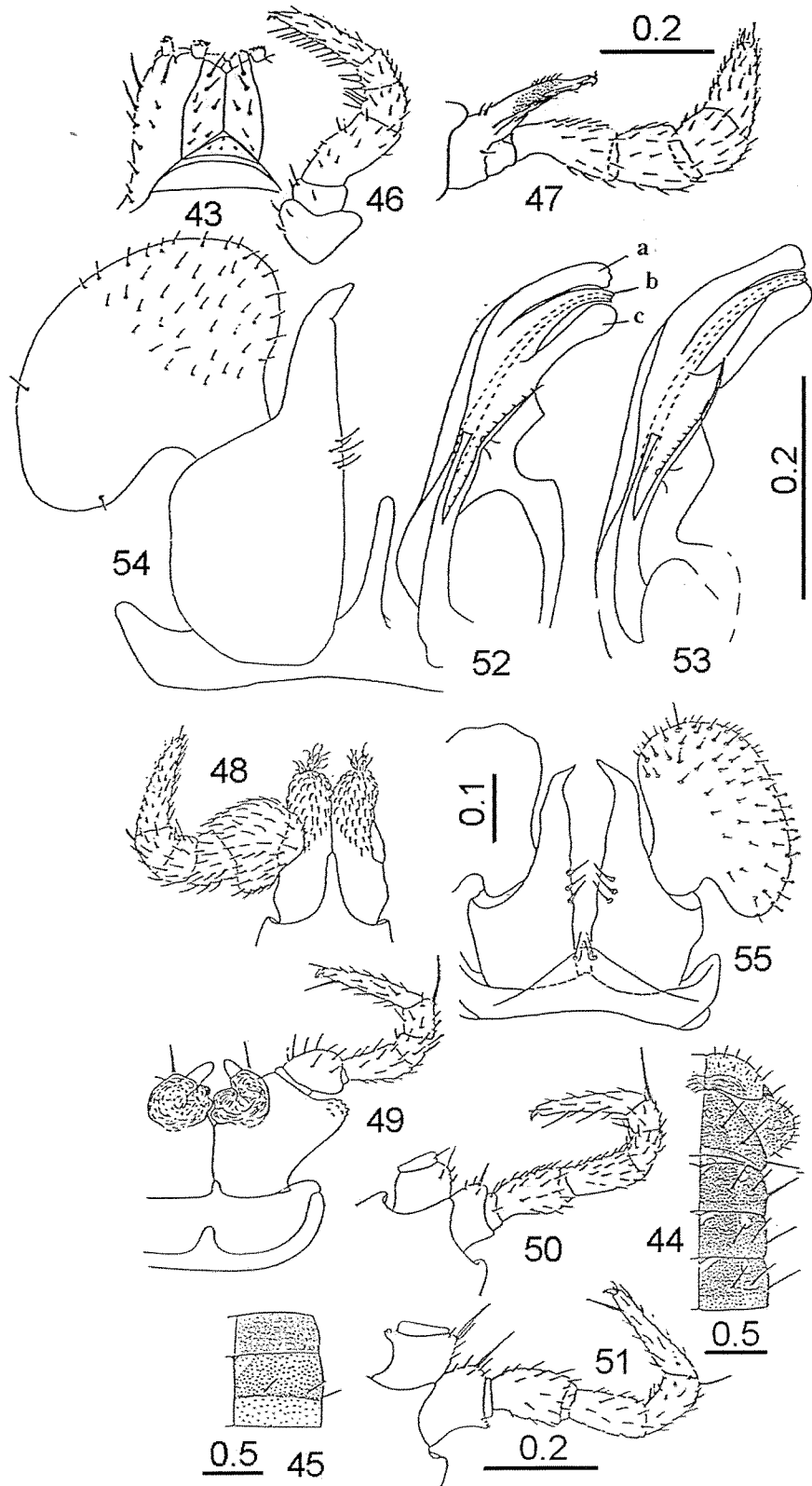
Uniramidesmus septimus Mikhaljova, 1990 [Figs 59–61.]

Uniramidesmus septimus Mikhaljova, 1990: 136–137, 137: fig. 2; 1993: 33, 32: fig. 56; 1998b: 50–51, 50: fig. 184–185, 48: map 11; 2004: 233–235, 234: fig. 585–587, 225: map 29; 2006: 203; Mikhaljova & Basarukin, 1995: 94–95, 95: map 4; Mikhaljova & Ma-

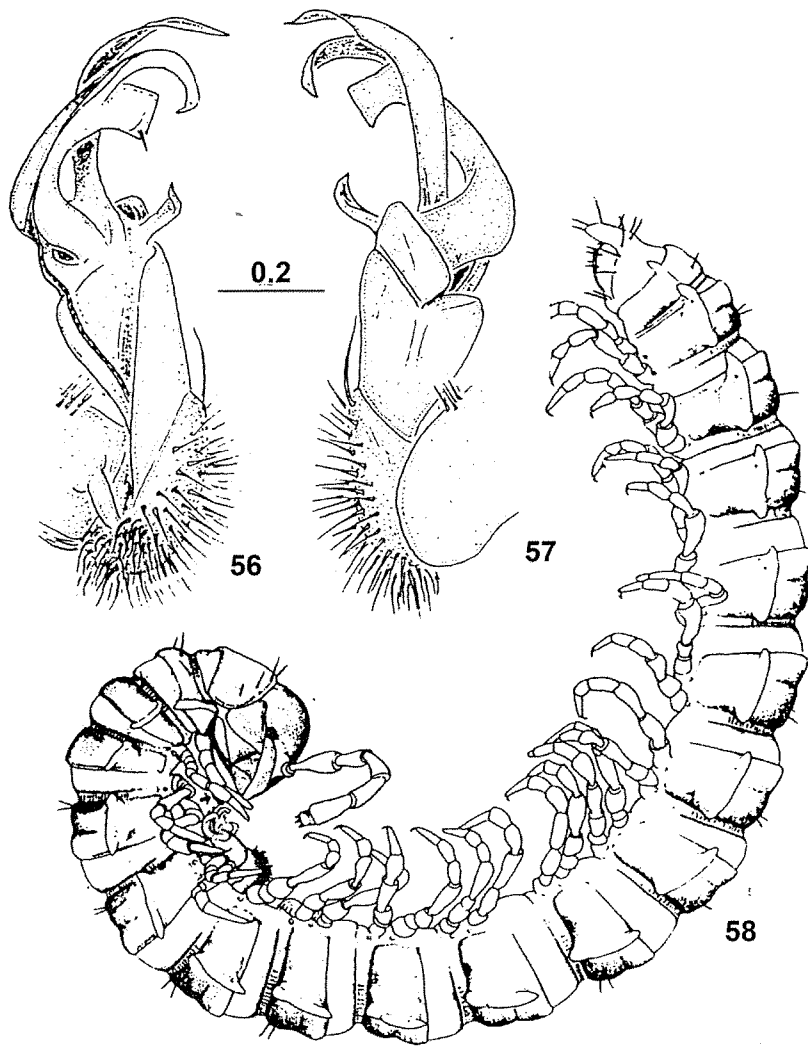
rusik, 2006: 122–125, 123: figs 46–48; Ganin, 1997: 133.

Material examined. 3 females, many juveniles (IBSS), Russia, Sakhalin Island, Aniva District, ca. 7–8 km E of Novoaleksandrovsk, 28.V.1988, leg. A. M. Basarukin. – 4 juveniles (IBSS) Russia, Sakhalin Island, Aniva District, ca. 5–7 km E of Novoaleksandrovsk, 5.VI.1992, leg. A. M. Basarukin. – 1 male, 2 females, 2 juveniles (IBSS), same locality, 11.IX.1992, leg. A. M. Basarukin. – 2 males, 1 female (IBSS), Russia, Sakhalin Island, Aniva District, ca. 5–7 km E of Novoaleksandrovsk, bilberry-bush, 17.VI.1994, leg. A.M. Basarukin. – 2 males (IBSS), Russia, Sakhalin Island, Aniva District, Mt. Chekhova, N-W slope, coniferous forest, 8.IX.1994, leg. A. M. Basarukin. – 1 male (IBSS), Russia, Sakhalin Island, Aniva District, ca. 7 km NE of Bereznyaki, *Betula* forest, 11.IX.1994, leg. A.M. Basarukin. – 1 juvenile (IBSS), Russia, Sakhalin Island, Dolinsk District, near Anna River, 13–14.VI.1993, leg. A. M. Basarukin. – 1 male, 1 juvenile (IBSS), Russia, Sakhalin Island, SE part, ca. 27 km E of Sokol Field Station, Belaya River, 47°15.347' N 142°48.397' E, 17.VII.2001, leg. Yu.M. Marusik.

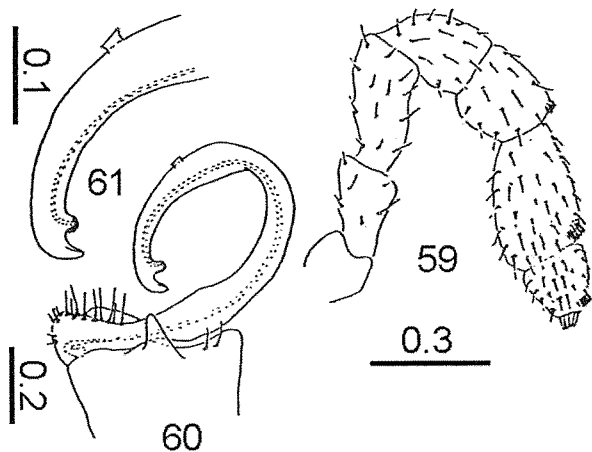
Distribution. Russia: Far East (southern part of Khabarovsk Province, Sakhalin Island, Moneron Island, Kurile Islands: Kunashir).



Figures 43–55.
Underwoodia kurtschevae Golovatch, 1980. 43 – gnathochilarium; 44 – fore part of male body (dorsal view); 45 – male midbody segment (dorsal view); 46 – male leg of pair 1; 47 – male leg of pair 2 and gonapophysis; 48 – male leg pair 3; 49 – male leg pair 10; 50 – male leg pair 4; 51 – male leg pair 11; 52–53 – anterior gonopods (caudal view); 54 – posterior gonopod (caudal view); 55 – posterior gonopods (front view); a – mesal branch of colpocoxite; b – lateral branch of colpocoxite; c – posterior branch of colpocoxite. Scales in mm (43–51, 55 – after Golovatch 1980; 52–54 – after Mikhaljova and Basarukin 1995).



Figures 56–58.
Oxidus gracilis (C. L. Koch, 1847).
56 – gonopod (mesal view); 57 – gonopod (lateral view); 58 – male habitus (lateral view). Scale in mm (56–57 – after Golovatch and Enghoff 1993; 58 – after Blower 1985).



Figures 59–61.
Uniramidesmus septimus Mikhaljova, 1990. 59 – antenna; 60 – gonopod (lateral view); 61 – distal part of gonopod telopodite. Scales in mm (after Mikhaljova 1990).

Key to Orders, Families, Genera and Species:

- 1 (4) Head very small, elongated anteriorly into a rostrum. Body strongly flattened dorsoventrally, without paraterga.
..... Order Polyzoniida,
..... Family Polyzoniidae,
..... Genus *Angarozonium*
- 2 (3) External edge of coxal process of anterior gonopod with a small unciform outgrowth (Fig 1).
..... *A. aduncum*
- 3 (2) External edge of coxal process of anterior gonopod without any outgrowths (Figs 3, 7). ..
..... *A. amurense*
- 4 (1) Head larger, more or less ovoid, devoid of a rostrum. Body more or less cylindrical, with or without paraterga. 5
- 5(18) Telson with a pair of spinnerets. Each metatergite with 3+3 macrochaetae.
..... Order Chordeumatida
- 6(17) Body segments with medium-sized paraterga. Posterior gonopod bearing colpocoxite with a front prominence (B) (Figs 20, 39).
..... Family Diplomaragnidae,
..... Genus *Sakhalineuma*
- 7 (8) A flagelliform telopodite of anterior gonopod

- spiralling (Figs 19–20). *S. basarukini*
- 8 (7) A flagelliform telopodite of anterior gonopod not coiled into a spiral. 9
- 9(10) Male coxa 11 with a digitiform process. Lateral sheath process of posterior gonopod colpocoxite tuberculiform (Fig 39). *S. tuberculatum*
- 10 (9) Male coxa 11 without processes. Lateral sheath process of posterior gonopod colpocoxite different. 11
- 11(12) Lateral sheath process of posterior gonopod colpocoxite globuliform (Figs 29–30). *S. globuliferum*
- 12(11) Lateral sheath process of posterior gonopod colpocoxite different. 13
- 13(14) Front prominence of colpocoxite well-developed, distinctly delimiting a distal hollow (Figs 25–28). Lateral sheath process of colpocoxite cylindrical, curved (Fig 25). ... *S. curvatum*
- 14(13) Front prominence of colpocoxite either poorly expressed or obliterated distally, not demarcated by a hollow. Lateral sheath process of colpocoxite different. 15
- 15(16) Lateral sheath process of colpocoxite broad, with a blunt apex (Fig 33). *S. molodovae*
- 16(15) Lateral sheath process of colpocoxite conical, with a pointed apex (Fig 36). *S. sakhalinicum*
- 17 (6) Body segments without paraterga or bulges (Fig 45). Gonopods, including posterior ones, different, as in Figs 52–55. Family Caseyidae,
Genus *Underwoodia*,
U. kurtschevae
- 18 (5) Telson without spinnerets. Metatergites without macrochaetae or with simple setae ... 19
- 19(22) Metatergites with paraterga. Eyes absent. Adult body with 20 segments, including telson. Order Polydesmida
- 20(21) Paraterga serrate at lateral margin, without peritremata. Body relatively slender; metaterga relatively flat, with three transverse rows of bosses. Gonopod coxites as in Fig 60. Family Polydesmidae,
Genus *Uniramidesmus*,
U. septimus
- 21(20) Paraterga non-serrate at lateral margin, with peritremata (Fig 58). Body stout, metaterga strongly convex, arched, without traces of bosses. Gonopods as in Figs 56–57. Family Paradoxosomatidae,
Genus *Oxidus*,
O. gracilis
- 22(19) Metatergites without paraterga, body subcylindrical. Eyes present. Adult body with more than 20 segments. Surface of metazonites clearly striate only below ozopore level. Order Julida,
Family Nemasomatidae,
Genus *Orinisobates*
- 23(24) Setae on metazonites distinctly visibly. Gonopods as in Figs 13, 15. *O. soror*
- 24(23) Setae on metazonites not or hardly visible even at high magnification. Male unknown. Female receptaculum seminis reduced (Fig 10). *O. microthylax*

Results and Discussion

At present, 13 species from 6 genera, 6 families and 4 orders of Diplopoda are known to occur in the Sakhalin Island (see Table 1). The highest species diversity is recorded in the southern part of the island. The northern and central parts of the Sakhalin Island support six species. The millipede species complex of Southern Sakhalin sufficiently differs from one of Northern-Central Sakhalin. Only three species appear to be common for these parts of the island. These species have the large distribution ranges covering the different regions of the Asian part of Russia. However, at the family and generic levels the millipede faunas of Southern Sakhalin and Northern-Central Sakhalin are almost identical (excluding the family Paradoxosomatidae and genus *Oxidus* represented by the synanthropic *O. gracilis* introduced to Sakhalin).

Generally, the fauna of Diplopoda of the Sakhalin Island is relatively original. Four species (30.8% of the island's total number of species) are endemic to the Sakhalin Island. Eight species (61.5% of all species of Sakhalin) have the insular ranges. Thus, *Angarozonium aduncum* is known only from the Sakhalin and Kurile islands. Two (or three) species (*Orinisobates soror*, species of *Sakhalineuma*) have been reported only from the Sakhalin, Moneron and Kurile islands. At the generic level *Sakhalineuma* is endemic to Sakhalin-Moneron-Kuriles.

The distribution areas of the other five species (38.5% of the island's total species diversity) cover both the continental territories and the Sakhalin Island. Thus, *Angarozonium amurense* is widely distributed in the Asian part of Russia; it also penetrates Northeast China and Mongolia. *Underwoodia kurtschevae* occurs in the different parts of the Russian Far East. Also it has been recorded in North Korea. *Orinisobates microthylax* is known from East Siberia and the Russian Far East. The range of *Uniramidesmus septimus* covers the Kuriles, Sakhalin Island and Khabarovsk Province in the Far East of Russia. The synanthropic species *Oxidus gracilis* has been introduced to the island of Sakhalin through human agency (Mikhaljova 2004).

The genera *Orinisobates*, *Underwoodia* and subfamily Polyzoniinae represented by the genus *Angarozonium* in the Sakhalin Island demonstrate of trans-Beringian connections (Mikhaljova 2004). *Uniramidesmus* is endemic to the Asian part of Russia; it is represented by nine species in the southern Far East of Russia and one species in East Siberia. The genus *Sakhalineuma* is the peripheral member of the family Diplomaragnidae; a presumed origin centre of this family is Central Asia (Shear 1990).

The diplopods of the Sakhalin Island and the adjacent territories are given in table 2. The millipede complexes of the Moneron and Sakhalin islands form the organic whole.

A comparison of the millipede taxonomical

Table 1. The millipedes (Diplopoda) of Sakhalin.

Order, family, species	Northern- Central Sakhalin	Southern Sakhalin	Other territories
<u>Polyzoniida</u>			
Polyzoniidae			
<i>Angarozonium aduncum</i> (Mikhaljova, 1995)		●	KU
<i>Angarozonium amurense</i> (Gerstfeldt, 1859)	●		KP, IA, ChA, B, RS, KhP, JAR, K, NCh, NM
<u>Julida</u>			
Nemasomatidae			
<i>Orinisobates microthylax</i> Enghoff, 1985	●	●	B, K, KU, KhP, PP, AA, JAR,
<i>Orinisobates soror</i> Enghoff, 1985		●	KU, MO
<u>Chordeumatida</u>			
Diplomaragnidae			
<i>Sakhalineuma basarukini</i> (Mikhaljova, 1995)	●		
<i>Sakhalineuma curvatum</i> (Mikhaljova, 1995)		●	KU, ?MO
<i>Sakhalineuma globuliferum</i> (Mikhaljova, 1995)	●		
<i>Sakhalineuma molodovae</i> Golovatch, 1976		●	
<i>Sakhalineuma sakhalinicum</i> (Mikhaljova, 1995)		●	
<i>Sakhalineuma tuberculatum</i> (Mikhaljova, 1995)		●	KU, ?MO
Caseyidae			
<i>Underwoodia kurtschevae</i> Golovatch, 1980	●	●	PP, KhP, AA, JAR, K, KU, NK, MO
<u>Polydesmida</u>			
Polydesmidae			
<i>Uniramidesmus septimus</i> Mikhaljova, 1990	●	●	KhP, KU, MO
Paradoxosomatidae			
<i>Oxidus gracilis</i> (C.L. Koch, 1847)		●	Subcosmopolitan
Total	6	10	

AA – Amurskaya Area, B – Buryatia, ChA – Chita Area, IA – Irkutsk Area, JAR – Jewish Autonomous Region, K – Kamchatka Peninsula, KhP – Khabarovsk Province, KP – Krasnoyarsk Province, KU – Kurile Islands, MO – Moneron Island, PP – Primorsky Province, RS – Republic of Sakha (Yakutia) (all within Russia). NCh – Northeast China. NK – North Korea. NM – North Mongolia.

composition of the Sakhalin Island with that of the Kuriles has revealed their resemblance and difference. Thus, the millipede generic diversity of the Kurile Islands (8 genera) appears to be highest. In addition, the generic composition of this archipelago incorporates all genera (with the exception of *Oxidus* represented by the synanthropic *O. gracilis* introduced to Sakhalin) known from Sakhalin. However, the species composition of Diplopoda of the Sakhalin Island is higher than that of the Kuriles. This pattern can be changed in the future because of the currently relatively poorly known millipede fauna of the Kurile Islands. Seven species appear to be common for the Sakhalin and Kurile islands. The representatives of the East Asian genera *Epanerchodus* and *Haplogonosoma* have not been recorded in Sakhalin, while in Kuriles

they are known to occur.

Kamchatka Peninsula supports only three species. These species are known from the Sakhalin Island too. They have the large distribution ranges.

One genus (*Oxidus*) and one synanthropic species (*O. gracilis*) are common for Sakhalin and Hokkaido. At the family level only 27.3% of all families of these islands appear to be shared by Sakhalin and Hokkaido.

Acknowledgements

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Table 2. The millipedes (Diplopoda) of Sakhalin and the adjacent territories (Hokkaido, Moneron, Kuriles, Kamchatka Peninsula).

Order, family, species	Hokkaido	Sakhalin	Moneron	Kamchatka	Kuriles
<u>Polyzoniida</u>					
Polyzoniidae					
<i>Angarozonium aduncum</i> (Mikhaljova, 1995)		●			●
<i>Angarozonium amurense</i> (Gerstfeldt, 1859)		●		●	
<u>Julida</u>					
Nemasomatidae					
<i>Orinisobates microthylax</i> Enghoff, 1985		●		●	●
<i>Orinisobates soror</i> Enghoff, 1985		●	●		●
Mongoliulidae					
<i>Kopidoiulus longus</i> Shinohara, 1963	●				
Julidae					
<i>Cylindroiulus latestriatus</i> (Curtis, 1845)					●
<i>Japanopachyiulus niponicus</i> Miyosi, 1957	●				
<i>Amblyiulus lobatus</i> (Verhoeff, 1937)	●				
Pseudonemasomatidae					
<i>Pseudonemasoma femerotuberculata</i> Enghoff, 1991	●				
<u>Chordeumatida</u>					
Diplomaragnidae					
<i>Sakhalineuma basarukini</i> (Mikhaljova, 1995)		●			
<i>Sakhalineuma curvatum</i> (Mikhaljova, 1995)		●	●		●
<i>Sakhalineuma globuliferum</i> (Mikhaljova, 1995)		●			
<i>Sakhalineuma molodovae</i> Golovatch, 1976		●			
<i>Sakhalineuma sakhalinicum</i> (Mikhaljova, 1995)		●			
<i>Sakhalineuma tuberculatum</i> (Mikhaljova, 1995)		●	●		●
<i>Diplomaragna gracilipes</i> (Verhoeff, 1914)	●				
<i>Diplomaragna tsurusakii</i> Shear, 1990	●				
<i>Maritimosoma hokkaidense</i> (Verhoeff, 1939)	●				
Conotylidae					
<i>Japanosoma scabrum</i> Verhoeff, 1914	●				
<i>Yasudatyla yasudai</i> Shear & Tsurusaki, 1995	●				
<i>Yasudatyla shariensis</i> Shear & Tsurusaki, 1995	●				
<i>Yasudatyla hidakaensis</i> Shear & Tsurusaki, 1995	●				
Caseyidae					
<i>Underwoodia kurtschevae</i> Golovatch, 1980		●	●	●	●
<u>Polydesmida</u>					
Xystodesmidae					
<i>Levizonus montanus</i> (Takakuwa, 1941)	●				
<i>Levizonus takakuwai</i> (Verhoeff, 1941)	●				
Paradoxosomatidae					
<i>Oxidus gracilis</i> (C.L. Koch, 1847)	●	●			
<i>Haplogonosoma implicatum</i> Brölemann, 1916					●
Polydesmidae					
<i>Epanerchodus cuspidatus</i> Mikhaljova, 1996					●
<i>Epanerchodus fontium</i> Verhoeff, 1940	●				
<i>Epanerchodus furculiger</i> Verhoeff, 1937	●				
<i>Epanerchodus gracilis</i> Takakuwa, 1954	●				
<i>Epanerchodus kunashiricus</i> Mikhaljova, 1988					●
<i>Epanerchodus orientalis</i> (Attems, 1901)	●				
<i>Uniramidesmus septimus</i> Mikhaljova, 1990		●	●		●
Total	18	13	3 (?5)	3	11

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Redescription of *Cyphon patiens* Klausnitzer based on the Japanese Specimens

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Abstract *Cyphon patiens* Klausnitzer is newly recorded from Japan, with redescription and figures.

Key words: Scirtidae, Coleoptera, *Cyphon patiens*, redescription, Hokkaido

Introduction

Recently the second author found out that two variations of the male genitalia in *Cyphon ainu* Nakane distributed in Hokkaido, Japan. After the careful examination of our collections and type specimens, it became clear that one of them is true *Cyphon ainu* Nakane and another is *Cyphon patiens* Klausnitzer known from Kunashir Islands.

In the present paper, we redescribe *Cyphon patiens* Klausnitzer based on the Japanese specimens.

Methodology and abbreviations were shown in the previous study (Yoshitomi, 2005).

Taxonomy

Cyphon patiens Klausnitzer, 1982

Cyphon patiens Klausnitzer, 1982, 280 [Type: in ZIL, examined].

Cyphon ainu: Yoshitomi, 2005, 103 [a part, misidentification].

[Japanese name: Nise-ainu-chibi-maruhananomi]

Materials examined. Type materials – Holotype, 1 male, Kunashir, Tretiakovo, 29–VI–1973, Kerzhner leg. (written by Russian characters). Misidentification to *Cyphon ainu* in Yoshitomi (2005) – 11 males & 2 females, Sarufutsu-gawa, Sarufutsu-mura, 1–VIII–1996, K. Mizota leg.; 1 male, Shiretoko-rindô, 24–VII–1986, K. Ishida leg.; 1 male, near Shiretoko-tôge, 500–750m alt., Rausu-chô, 26–VII–1994, K. Akita leg.; 1 male, Wakoto, Kucharo, 5–VII–1958, M. Miyatake leg.

Additional materials examined – 1 male & 1 female, Shiranuka, near Kushiro, 11–VII–1992, B. Kuznetsov leg.; 3 males & 1 female, Shiretoko-rindô, Utoro, Shari-chô, 8–VII–1992, B. Kuznetsov leg.; 1 male, Kitayama

camp station, Abashiri, 23–VI–1998, K. Ijima leg.; 1 male, Kabuto-numa, Toyotomi-chô, 28–VI–1999, M. Hayashi leg.; 1 male, Hyôtan-numa, Temninkyô, Higashikawa-chô, 22–VII–1993, M. Hayashi leg.; 2 males, Shitaosobetsu, Shibeche, 28–VI–1995, K. Ijima leg.

Redescription. Male. The external features fully described by Klausnitzer (1982); PW/PL 2.00–2.21 (2.11); EL/EW 1.53–1.85 (1.71); EL/PL 4.83–5.52 (5.17); EW/PW 1.33–1.58 (1.44); TL/EW 1.84–2.20 (2.05). Caudal margin of sternite VII lightly convex. Tergite VIII well sclerotized; median plate forming lobe-like projection, finely punctate; lateral projections short, curved interiorly, obtuse at apices, closely covered with large punctures in apical 1/3. Tergite IX well sclerotized, consisting of a pair of rod-like hemitergite, as long as tergite VIII; apices obtuse, bearing short setae. Tegmen short, well sclerotized; parameres short, curved dorsally, pointed at apices. Penis short, well sclerotized; parameroid forming lobe-like projection, lacking any projections in lateral margin, obtuse at apex.

Female. Sexual dimorphism indistinct. PW/PL 2.13–2.25 (2.19); EL/EW 1.69–1.80 (1.75); EL/PL 5.08–5.54 (5.32); EW/PW 1.32–1.50 (1.39); TL/EW 2.00–2.13 (2.08). Caudal margin of sternite VII arcuate. Tergite VIII moderately sclerotized, trapezoidal, shallowly concave in caudal margin, which bearing short spines, sparsely covered with minute setae in caudal part; apodemes long and slender. Sternite VIII moderately sclerotized, bearing short setae in apical part, rather straight in apical margin. Ovipositor long, two pairs of apical setae in stylus; relative length of stylus, coxite and baculus as (n = 1) 1.0 : 4.1 : 18.3. Prehensor weakly sclerotized, V-shaped.

Measurement. Male (n = 8): TL 3.39–4.08 (3.71)

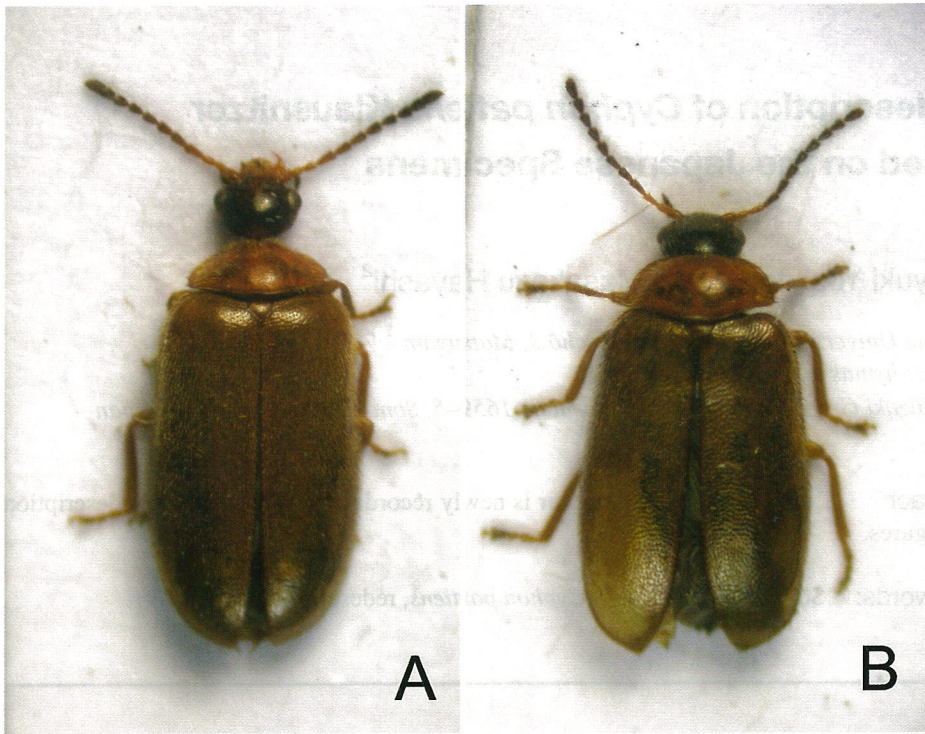


Figure 1.
Habitus of *Cyphon ainu*
Nakane (A) and *Cyphon*
patiens Klausnitzer (B).

mm; PW 1.15–1.40 (1.27) mm; PL 0.52–0.68 (0.60) mm; EL 2.87–3.40 (3.10) mm; EW 1.75–1.90 (1.81) mm. Female (n = 3): TL 3.60–3.80 (3.70) mm; PW 1.20–1.35 (1.28) mm; PL 0.55–0.61 (0.59) mm; EL 3.05–3.20 (3.12) mm; EW 1.75–1.80 (1.78) mm.

Distribution. Kunashir, Hokkaido (east and northern parts).

Remarks. This species belongs to subgroup A of *Cyphon collaris* species-group (sensu Yoshitomi, 2005). This is closely related to *Cyphon ainu* Nakane distributed sympatrically (see Figure 3), and differs from the latter by the following characteristics: 1) lateral projections of tergite VIII shorter than median plate, closely covered with large punctures in apical 1/3; 2) parameroid of penis forming lobe-like projection; 3) apical margin of sternite VIII of female rather straight; 4) tergite VIII of female shallowly concave in caudal margin.

In the original description of this species (p. 280–282 in Klausnitzer, 1982), the following mistakes were presented: sternite IX (also fig. 23) – lateral projections of tergite VIII; tegmen (also fig. 24) – penis and upside-down; penis (also fig. 25) – tegmen.

Cyphon ainu Nakane, 1963

Cyphon ainu Nakane, 1963, 31 [Type: in SEHU, examined]. Other synonyms see Yoshitomi (2005).

[Japanese name: Ainu-chibi-maruhananomi]

Additional materials examined. 1 male, Iwabokki, Kushiro, 6–VII–1992, B. Kuznetsov leg.; 1 male, Kottaro, Kushiro, 6–VII–1992, B. Kuznetsov leg.; 1 male, Shiraisawa-rindô, Otaru, 1–VII–1992, B. Kuznetsov leg.; 1 male, Kushiro-shitsugen, 4–VII–1992, B. Kuznetsov leg.; 3 males, Kabuto-numa, Toyotomi-chô, 28–VI–1999, M. Hayashi leg.; 33 exs.,

Shibetsu-chô, 26–VI–2001, H. Yoshitomi leg.; 4 males, Bushigawa, Okushiri Is., 6~9–VI–2003, S. Hori leg.

Other materials were recorded by Yoshitomi (2005) except for the specimens of misidentification to *Cyphon patiens* Klausnitzer, 1982 (see above).

Discussion

We can not find the differential characters between *C. ainu* and *C. patiens* in the external features, so we have to check the male and female genitalia.

The following keys are addition to “Key to species of *Cyphon collaris* species-group of Japan” (Yoshitomi, 2005, p. 100–103).

1. Coloration of body almost yellowish-orange throughout; distributed in Hokkaido. 1'
- . Coloration of body almost blackish-brown throughout, but some species have yellowish-orange in pronotum only; distributed in Honshu, Shikoku and Kyushu. 2
- 1'. Lateral projections of tergite VIII of male shorter than median plate, closely covered with large punctures in apical 1/3; parameroid of penis forming lobe-like projection; apical margin of sternite VIII of female rather straight; tergite VIII of female shallowly concave in caudal margin.
..... *C. patiens* Klausnitzer
- . Lateral projections of tergite VIII of male longer than median plate, closely covered with short setae; parameroid of penis expanded laterally in apical part; apical margin of sternite VIII of female arcuate; tergite VIII of female arcuate in caudal margin. *C. ainu* Nakane

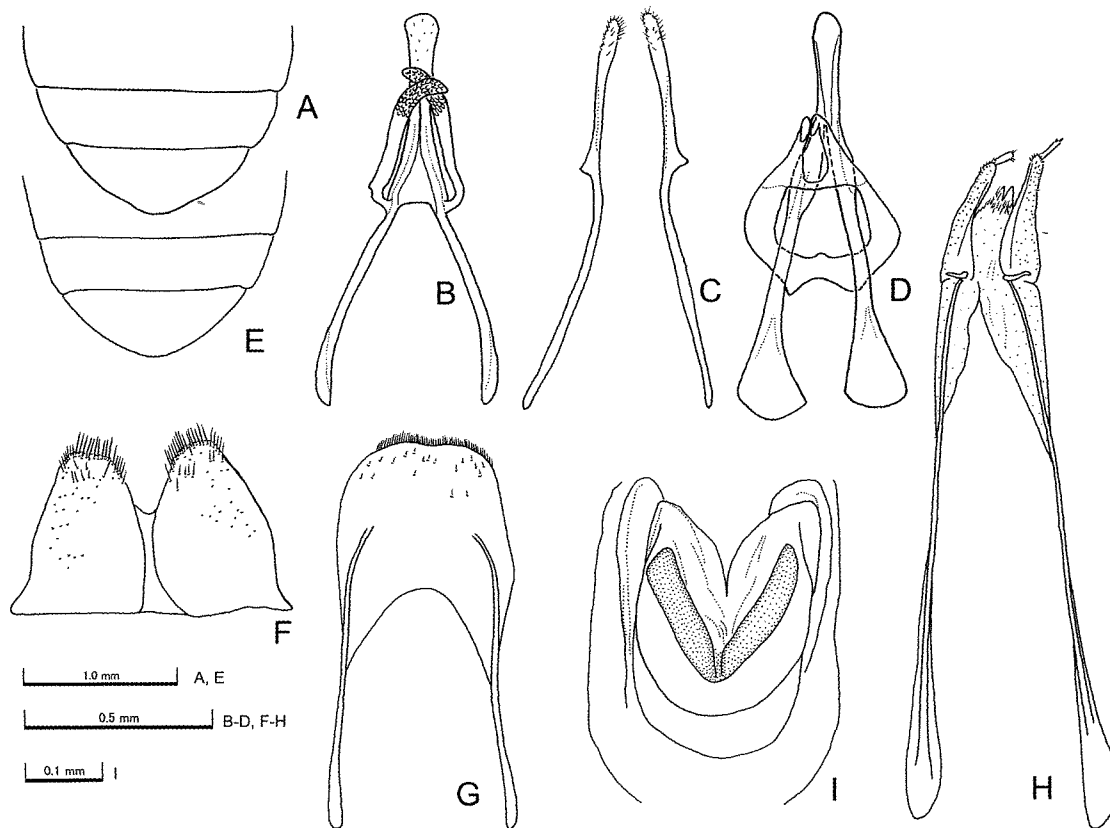


Figure 2.

Cyphon patiens Klausnitzer, male (A–D) and female (E–I). A and E: sternites V–VII. B: tergite VIII. C: tergite IX. D: tegmen and penis. F: sternite VIII. G: tergite VIII. H: ovipositor. I: prehensor.

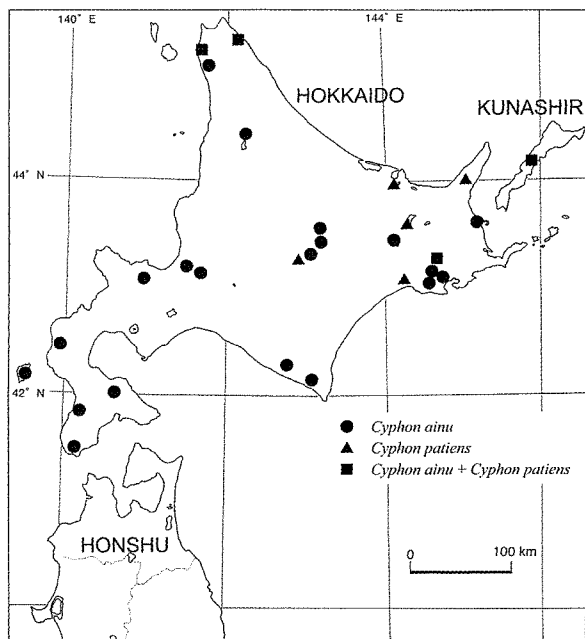


Figure 3.

Distribution map of *Cyphon patiens* Klausnitzer and *Cyphon ainu* Nakane.

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