Biodiversity and Biogeography of the Kuril Islands and Sakhalin

Preface

The eastern part of the Eurasian Continent was escaped from the covering by a vast ice sheet at the glacial age. Many boreal and arctic-alpine species could survive and freely migrate southward along the Kurils and/or Sakhalin to the Japanese Archipelago. Thus, both the Kuril Islands and Sakhalin worked as the corridors for the migration of these species in the northeastern Asia during the Quarternary period. Detailed clarification on the historical change of flora and fauna in the Kuril Islands and Sakhalin provide a fascinating subject for all the scientists who get an interest in the biodiversity and biogeography of the northeastern Asia.

Since the Kurils and Sakhalin are located in the vicinity of the boundary between Japan and Russia, many political troubles have occurred in the two regions. Some troubles or disagreements are also found in the natural sciences. For example, Japanese and Russian taxonomists often have different opinions on the demarcations between the species and the selection of valid scientific names in many boreal taxa of the Kurils and Sakhalin. It constitutes a significant obstacle to the progress of science of the two countries. International scientific project will help us resolve this taxonomic and nomeclatural problems.

The International Kuril Island Project (IKIP) was carried out under a joint collaboration of Japanese, Russian and American researchers from 1994 to 2000 (totaling 77 individuals for all seven years combined). Flora and fauna of all major islands of the Kuril Islands have been investigated by these IKIPers (see http://artedi.fish.washington.edu/okhotskia/ikip/index.htm). Fifty-six papers in total were presented at the International Symposium on Kuril Island Biodiversity held at Sapporo Campus, Hokkaido University, Japan from May 18 to 22, 2001. Their sources of several papers which are published in this issue are traced at the symposium. Following the joint scientific expedition into the Kurils, some biologists have conducted successive expeditions into Sakhalin since 2001. All these expeditions and symposium have been supported by U.S. National Science Foundation (NSF)*, the Japan Society for the Promotion of Science (JSPS)**, and the Far Eastern Branch of Russian Academy of Sciences (FEB RAS)***. We would like to express our deepest appreciation to many research participants and the financial supports from several sources of Japan, Russia and U.S.A.

Actually we devoted considerable efforts to the field studies in the Kurils and Sakhalin during almost ten years. Biological specimens collected in the expeditions are mainly deposited in Hokkaido University (Japan), the Institute of Biology and Soil Sciences of the Far Eastern Branch of Russian Academy of Sciences (Russia), and the University of Washington (USA). We have acquired considerable information about the biodiversity and biogeography of the Kuril Islands and Sakhalin. Papers revealed in this issue are mainly based on a comprehensive collection and large experience of the Kuril Archipelago and Sakhalin since 1994.

This issue may be the first volume of a series of "Biodiversity and Biogeography of the Kuril Islands and Sakhalin"; it includes eight botanical, entomological and archaeological papers. Additional scientific papers are prepared at various stages and next issue of the same title will also contain the papers on various fields of endeavor.

This issue is published as the second number of the Bulletin of the Hokkaido University Museum. We wish to express our sincere thanks to those who have contributed manuscripts, for their cooperation in producing the final papers and responding to editors' comments.

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Distribution patterns of gymnosperms in Sakhalin and a comparison with those in the Kurils: newly proposed S-K index

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Abstract Distribution patterns of nine species of gymnosperms native to Sakhalin and the Kuril Islands are analyzed quantitatively based on the examination of main Japanese herbaria. *Pinus pumila* and *Larix gmelinii* represent the most abundant species of gymnosperms in the regions. The Sakhalin-Kurils index (S-K index) was newly proposed for the comparison of the abundance of the species between Sakhalin and the Kurils. All S-K indices of gymnosperms show positive numbers reflecting more predominant coniferous forests found in Sakhalin than in the Kurils. For most species of gymnosperms; especially subarctic species, such as *Abies sachalinensis*, *Larix gmelinii*, *Picea jezoensis* and *Juniperus communis*, Sakhalin has functioned as a more important migratory route than the Kurils. But the Kuril Archipelago has similarly functioned as an important migratory route for *Pinus pumila* and *Taxus cuspidata* characterized by comparatively low S-K indices.

Key words: distribution, gymnosperms, Kurils, Sakhalin, S-K index

Introduction

Both Sakhalin and the Kuril Islands functioned as main routes (or corridors) for arctic-alpine plant species to migrate southward to the Japanese Archipelago from the Eurasian Continent during Ice Age. Thus, Sakhalin and the Kurils are fascinating regions to the botanists retaining a keen interest in the phytogeography of Northeast Asia. Before World War II, Japanese botanists frequently conducted hard expeditions into Sakhalin and the Kurils, and then many plant specimens of the regions were brought to Japan. Recent International Cooperative Project; International Kuril Island Project (IKIP) and International Sakhalin Island Project (ISIP), added a large number of specimens further. Based on these specimens deposited in Japanese herbaria, we can understand general distribution patterns of vascular plants native to Sakhalin and the Kuril Islands. As boreal forests are mainly composed of gymnosperms, the present author tried to analyze the distribution patterns of nine species of gymnosperms quantitatively based on the specimens deposited in Japanese herbaria. In this study, the S-K index is newly proposed for the quantitative comparison of the abundance of the species between Sakhalin and the Kurils.

Materials and Methods

Nine species of gymnosperms are native to Sakhalin and the Kurils. In this study most scientific names follow the opinion by Yamazaki (1995), but other names are adopted in some cases. Specimens collected from the regions were examined in main Japanese herbaria; KYO, SAPS, SAPT, TI and TNS (acronyms following Holmgren *et al.* 1990). Distribution patterns of gymnosperms in the Kuril Islands was reported in the previous study (Takahashi 2003), therefore in this study those of gymnosperms in Sakhalin are clarified and discussed in comparison with the previous data in the Kurils. Specimens collected from Sakhalin are listed in Appendix (also see Fig. 1). The number of herbarium specimens (excluding duplicate sheets) of gymnosperms are counted for Sakhalin (S) and the Kurils (K) and three parts of each region (Tables 1 and 2). Newly proposed index, the Sakhalin-Kurils index (S-K index) is formulated as S–K / S+K. The numerical value of this index changes between –1.0 and +1.0, a higher positive number indicates more abundance of the species in Sakhalin than in the Kurils.

Results and Discussion

Species distribution pattern

PINACEAE

Abies sachalinensis (F. Schmidt) Mast.

[Distribution map – Takahashi 2003, 30, f. 2a for the Kurils; Smirnov 2002, 119 for Sakhalin, as *A. mayriana* (Miyabe et Kudô) Miyabe et Kudô and *A. sachalinensis* F. Schmidt]

This species occurs in southern to northern Sakhalin; the northern limit of its distribution is located at Okha region. In contrast with its large distribution from south to north in Sakhalin, it is limited to the southern Kurils;

Table 1. A comparison of the number of specimens of gymnosperms between Sakhalin and the Kurils.

Taxa	Regions	Southern	Middle	Northern	Total
Abies sachalinensis	Sakhalin	37	14	3	54
	Kurils	22	–	–	22
Larix gmelinii	Sakhalin	38	38	9	85
	Kurils	28	–	–	28
Picea glehnii	Sakhalin	11	–	–	11
	Kurils	6	–	–	6
Picea jezoensis	Sakhalin	47	18	7	72
	Kurils	22	–	–	22
Pinus pumila	Sakhalin	43	39	10	92
	Kurils	15	30	19	64
Juniperus chinensis	Sakhalin	32	2	–	34
var. *sargentii*	Kurils	20	–	–	20
Juniperus communis	Sakhalin	50	21	10	81
	Kurils	11	7	–	18
Juniperus conferta	Sakhalin	15	1	–	16
	Kurils	–	–	–	0
Taxus cuspidata	Sakhalin	39	6	–	45
	Kurils	24	17	–	41

In Sakhalin, "Southern" is the part between <74> and <56>, "Middle" is between <55> and <28>, and "Northern" between <27> and <4> in the grid (see Fig. 1).
In the Kurils, "Southern" is the region of Shikotan, Kunashir and Iturup, "Middle" is the region from Urup to Onekotan, and "Northern" is the region of Paramushir, Shumshu and Atlasova (see Takahashi 2003).

Shikotan, Kunashir and Iturup (Table 1). The total number of specimens in Sakhalin and the Kurils are about average for gymnosperms of the regions (Table 2). The S-K index (0.42) indicates somewhat high positive number, which means a tendency toward more abundance of *Abies sachalinensis* in Sakhalin than in the Kurils.

Three *Abies* species are native around the Sea of Okhotsk according to Koropachinskiy (1989); *A. holophylla* Maxim. is found in Korea, northeastern China and Ussuri, *A. nephrolepis* (Trautv.) Maxim. is in Korea, northeastern China and Ussuri to Aldan, and *A. sachalinensis* is in Hokkaido, Sakhalin, the southern Kurils and Kamchatka (rare). Based on chloroplast DNA sequences, Suyama *et al.* (2000) clarified that *A. sachalinensis* of Hokkaido is closely related to *A. veitchii* of Honshu. Furthermore, the genetic relationships should be studied between *A. sachalinensis* and two Russian *Abies*; *A. holophylla* and *A. nephrolepis*. Of course the genetic variation among local populations of *A. sachalinensis* may be a highly interesting problem, especially Kamchatka population present a target for future research.

Larix gmelinii Rupr. ex Gordon
[Distribution map – Takahashi 2003, 30, fig. 2b for the Kurils; Smirnov 2002, 119 for Sakhalin, as *L. cajanderi* Mayr]

This species is commonly found in southern to northern Sakhalin, on the other hand its distribution is limited to the southern Kurils; Shikotan and Iturup only (Table 1). The number of specimens is high in Sakhalin but not so high in the Kurils (Table 2). The comparatively high S-K index (0.50) means a tendency toward more abundance of *Larix gmelinii* in Sakhalin than in the Kurils.

Koropachinskiy (1989) regarded the Sakhalin and the Kurils larch as *Larix cajanderi* Mayr. This opinion was followed by Smirnov (2002) for Sakhalin plants. Yamazaki recognized the Kurils larch as *L. gmelinii* Rupr. ex Gordon var. *japonica* (Maxim. ex Regel) Pilg. Thus demarcations between the species of *Larix* are not in agreement between Russian and Japanese botanists. Recently, Semerikov and Lascoux (2003) clarified the genetic variation of Eurasian *Larix* populations, but for the clarification of the genetic variation in Northeast Asia more populations including Sakhalin, the southern Kurils and Kamchatka should be surveyed.

Picea glehnii (F. Schmidt) Mast.
[Distribution map – Takahashi 2003, 30, fig. 2c for the Kurils; Smirnov 2002, 119 for Sakhalin]

This species occurs very rarely in the regions and its distribution is limited only to the southern parts of Sakhalin and the Kurils; Shikotan, Kunashir and Iturup (Tables 1 and 2). This distribution pattern is also supported by Koropachinskiy (1989) and Smirnov (2002). *Picea glehnii* is actually regarded as an endemic species to Japan. Thus the northernmost and easternmost populations of *P. glehnii* are found in southern Sakhalin

Table 2. A comparison of the number of specimens and S-K index of gymnosperms between Sakhalin and the Kurils (KYO, SAPS, SAPT, TI and TNS).

Taxa	Sakhalin	Kurils	S–K	S+K	S-K index*
Abies sachalinensis	54	22	32	76	0.42
Larix gmelinii	85	28	57	113	0.50
Picea glehnii	11	6	5	17	0.29
Picea jezoensis	72	22	50	94	0.53
Pinus pumila	92	64	28	156	0.18
Juniperus chinensis var. *sargentii*	34	20	14	54	0.26
Juniperus communis	81	18	63	99	0.64
Juniperus conferta	16	0	16	16	1.00
Taxus cuspidata	45	41	4	86	0.05
Total	490	221	269	711	

* S–K / S+K

and the southern Kurils, respectively. The S-K index (0.29) is somewhat low for the gymnosperms of the regions.

Picea jezoensis Carrière
[Distribution map- Takahashi 2003, 30, fig. 2d for the Kurils; Smirnov 2002, 119 for Sakhalin, as *P. ajanensis* (Lindl. et Gord.) Fisch. ex Carr.]

This species is found in the southern to northern parts of Sakhalin, but its distribution in the Kurils is limited to the southern parts; Shikotan, Kunashir and Iturup (Table 1). A clearly distinct distribution pattern between Sakhalin and the Kurils is the same as in *Abies sachalinensis* and *Larix gmelinii*, which were stated above. The high S-K index (0.53) means a tendency toward more abundance of *Picea jezoensis* in Sakhalin than in the Kurils.

Picea jezoensis is distributed in N. Korea, Ussuri, Sakhalin, the southern Kurils, Japan and C. Kamchatka (Yamazaki 1995). But Koropachinskiy (1989) did not recognize *P. jezoensis*, in place of it, he adopted *Picea ajanensis* (Lindl. et Gord.) Fisch. ex Carr. in the Far Eastern Russia. This opinion is also followed by Smirnov (2002) for Sakhalin plants. The genetic relationships among the East Asian populations of the *Picea jezoensis* – *P. ajanensis* complex should be investigated in future.

Pinus pumila (Pall.) Regel
[Distribution map – Takahashi 2003, 30, fig. 3a for the Kurils; Smirnov 2002, 120 for Sakhalin]

This species occurs the most commonly in the southern to northern parts in both Sakhalin and the Kurils (Tables 1 and 2). High number of the specimens (64) is exceptional for gymnosperms of the Kurils and the number is also at the top in Sakhalin. The S-K index (018); the lowest second to *Taxus*, means that *Pinus pumila* occurs abundantly in the Kurils as well as in Sakhalin.

Pinus pumila is endemic to Northeast Asia, and it grows common in the Sea of Okhotsk region (Koropachinskiy 1989).

CUPRESSACEAE
Juniperus chinensis L. var. ***sargentii*** Henry
[Distribution map – Takahashi 2003, 30, fig. 3b for the Kurils; Smirnov 2002, 65 for Sakhalin, as *J. sargentii* (A. Henry) Takeda ex Koidz.]

This species is found in southwestern Sakhalin and the southern Kurils; Shikotan, Kunashir and Iturup (Table 1). It is not found in northern Sakhalin and the northern Kurils and Kamchatka, therefore this species is regarded as a temperate species. The number of specimens is comparatively low in both Sakhalin and the Kurils, and the S-K index (0.26) indicates comparatively low value.

Russian botanists (Koropachinskiy 1989; Smirnov 2002) adopted *J. sargentii* (Henry) Takeda ex Koidz., but Yamazaki (1995) adopted *Sabina chinensis* (L.) Antonine var. *sargentii* (Henry) W. C. Cheng et L. K. Fu. for this species. There are differences in taxonomic interpretations of *Juniperus* s.l. between Russian and Japanese botanists.

Juniperus communis L. s.l.
[Distribution map – Takahashi 2003, 30, fig. 3c for the Kurils; Smirnov 2002, 65 for Sakhalin, as *J. sibirica* Burgsd.]

This species is recognized in a broad sense here. It occurs somewhat commonly in southern to northern Sakhalin, but is found only in the southern to middle parts of the Kurils; to Ketoi (Table 1). This species is distributed in northern Sakhalin and also in Kamchatka, therefore it is regarded as a subarctic species. The number of specimens is comparatively high in the regions, and the high S-K index (0.64) means more abundance in Sakhalin than in the Kurils.

Adams *et al.* (2003) clarified that the Kamchatka

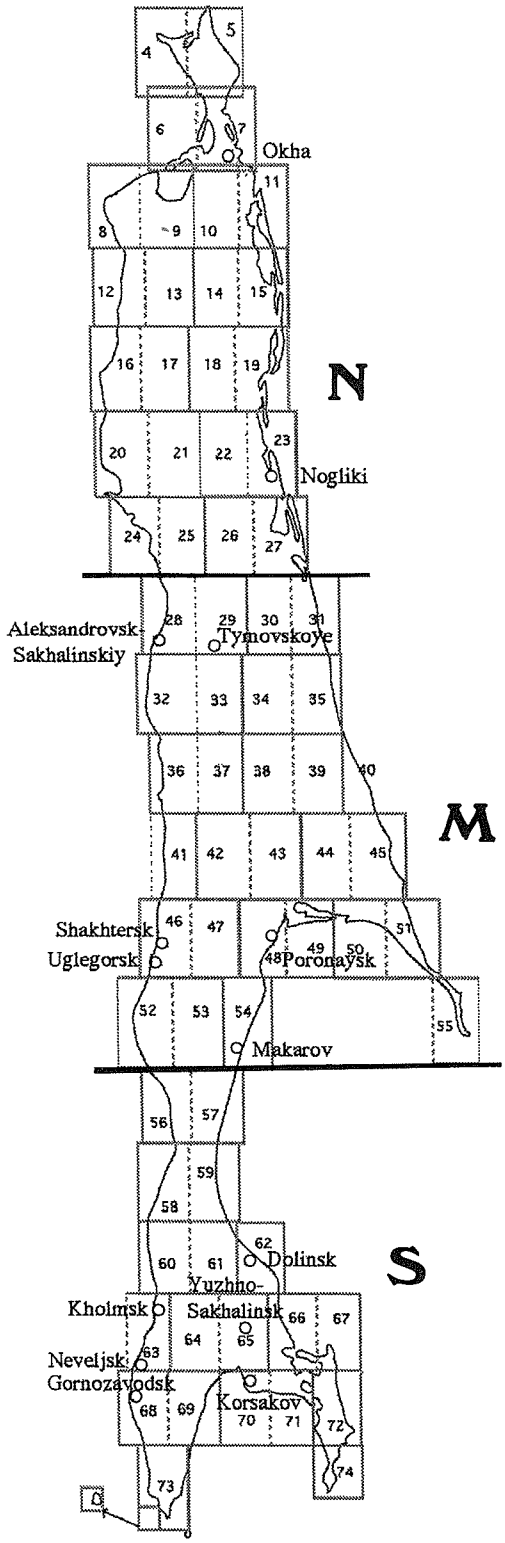

Fig. 1. A map of Sakhalin showing the division into the southern (S), middle (M) and northern (N) parts. The grid numbers are equivalent to those in a list of Appendix and the map "Atlas of Sakhalin Region part I Sakhalin (1994)".

population of *J. communis* was quite dissimilar to any populations from throughout the arctic regions based on RAPDs method. Adams & Pandey (2003) concluded that the Kamchatka population is recent in origin and likely funded by birds bringing seeds from Japan. But the distribution in the Kuril Islands shows somewhat discontinuity between Hokkaido and Kamchatka; especially the lack in the northern Kurils (Table 1 and see Takahashi, 2003). The genetic variation in the Sakhalin and the southern Kurils populations should be investigated.

In Sakhalin, the plants with intermediate leaf forms between *Juniperus communis* and the following species, *J. conferta* are sometimes found, especially around Sakaehama, southern Sakhalin (those plants are marked with "hybrid?" in Appendix). The genetic study should be also carried out for the *J. communis – J. conferta* complex in Sakhalin.

Juniperus conferta Parlatore
[Distribution map – No reports for the Kurils: Smirnov 2002, 64 for Sakhalin]

This species is found rarely in southern to middle Sakhalin and is not found in the Kurils (Table 1). Among three *Juniperus* species, this species occurs most rarely in the regions. This species is clearly regarded as a temperate species and its distribution has stretched northward to Sakhalin. According to the absence of this species in the Kurils, the S-K index is 1.0 (Table 2). But recently the present author noticed a specimen of *J. conferta* (S. Saito 1956 in TI) which collected from Shikotan. Because this specimen showed some similarities to *J. communis* and there were no detailed localities within Shikotan on the label, he suspended the adoption of this specimen in this study.

TAXACEAE
Taxus cuspidata Siebold et Zucc.
[Distribution map – Takahashi 2003, 30, fig. 3d for the Kurils; Smirnov 2002, 179 for Sakhalin]

This species occurs in the southern to middle parts of Sakhalin, and similarly occurs in the southern and middle Kurils; to Rasshua (Tables 1 and 2). The total number of specimens in the regions are about average, and the lowest S-K index (0.05) in this study means that the occurrence of *Taxus cuspidata* shows a similarity in abundance between Sakhalin and the Kurils. This species is not distributed in northern Sakhalin and also not in the northern Kurils and Kamchatka, therefore it is regarded as a temperate species.

Distribution patterns between Sakhalin and the Kurils

Distribution patterns of *Abies sachalinensis*, *Larix gmelinii* and *Picea jezoensis* (and not so clear but also included in this category; *Juniperus communis*) show clear difference between Sakhalin and the Kurils. All these four species occur from south to north in Sakhalin, but in contrast, occur only in the southern (or to the middle) Kurils. Also all these species can be regarded as subarctic species characterized by the distribution in more northern regions; e.g. in Kamchatka. The comparatively high S-K indices of these subarctic species means that Sakhalin might have functioned as a more important migratory route than the Kurils.

Pinus pumila is also regarded as a subarctic species together with the above-mentioned four species. But the distribution pattern of Sakhalin and the Kurils is different from those of the above species. Comparatively low S-K index (0.18) means that the Kuril Archipelago worked a main migratory route as well as Sakhalin. Thus the distribution pattern of *Pinus pumila* is exceptional in the subarctic species of gymnosperms in the regions.

Remaining four species; *Picea glehnii*, *Juniperus chinensis* var. *sargentii*, *Juniperus conferta* and *Taxus cuspidata* are regarded as temperate species characterized by the lack of the distribution in more northern regions; e.g., Kamchatka. The S-K indices of these species show variable values and indicate no specified tendency. Among them, *Juniperus conferta* is characterized by high S-K index value (1.00), on the other hand *Taxus cuspidata* shows low value (0.05) for gymnosperms in the regions.

There are clear difference in the forest vegetation between Sakhalin and the Kurils. The middle and northern Kurils are dominated by the scrubs composed of *Alnus maximowiczii* and *Pinus pumila*, but middle and northern Sakhalin is by the coniferous forests/scrubs mainly composed of *Larix gmelinii*, *Picea jezoensis* and *Pinus pumila*. Distribution patterns and the S-K indices of nine species of gymnosperms which were clarified in this study, may correspond to the different arrangement of the forest vegetations between Sakhalin and the Kurils.

The S–K index is very simple and useful to clarify the differences of the abundance of the species between Sakhalin and the Kuril Archipelago which have worked as two main migratory routes between northern Japan and the Eurasian Continent. The implication of the high S–K index is that the species in question have migrated along Sakhalin. Future studies on the genetic variation and relationships in the populations of the Far Eastern Russia including Sakhalin and the Kurils will clarify the above-mentioned presumption.

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Appendix

A list of the herbarium specimens of gymnosperms collected from Sakhalin. The figure between angle brackets indicates the grid on a map (Fig. 1). Four equal parts of each grid are recognized further when we can locate the collection site.

PINACEAE

Abies sachalinensis (F. Schmidt) Mast.

Luguri – Okha. <07-lower l.>, Y. Kudo & B. Ishida 7197, Aug. 31, 1923 (SAPS); Baykal Bay <09-upper l.>, Y. Kudo & B. Ishida 7419, Sep. 5, 1923 (SAPS); Tymi, Pupuni, in forests <26-lower l.>, Y. Kudo & M. Tatewaki 6336, Aug. 8, 1922 (SAPS); Ako, tundra <28-lower l.>, Y. Kudo & M. Tatewaki 6056, Jul. 26, 1922 (SAPS); Alexandrowsk <28-lower l.>, Okada, Aug. 19, 1923 (TI); 40km E of Palevo, N of Changinskiy Pass <34-upper r.>, H. Takahashi 30374, Aug. 8, 2002 (SAPS); Shikka, Hamdasa <37-lower r.>, T. Miyake, Aug. 27, 1906 (SAPS); Shikka, Hayabusayama <38-lower l.>, T. Miyake, Aug. 28, 1906 (SAPS); Shikka, Higashiyama <38-lower l.>, T. Miyake, Aug. 28, 1906 (SAPS); Shikka, vicinity of R. Wuruna <43-lower l.>, T. Miyake, Aug. 22, 1906 (SAPS); Shikka-shicho, E. Coast, Chirikoro <45-upper r.>, Y. Hoshino & S. Sugiyama, Aug. 14, 1933 (SAPS); Shikka, Unetonnai <48-lower l.>, K. Miyabe & T. Miyagi, Jul. 28, 1906 (SAPS); E. Coast, Shikka, Nayoro <48-lower l.>, T. Miyake, Sep. 6, 1906 (SAPS); Shikka, Pamaito Detu <48-upper r.>, T. Miyake, Aug. 19, 1906 (SAPS); Kitashiretoko Pen., Chirie <51-lower r.>, Y. Hoshino, S. Sugiyama & S. Okada, Jul. 15, 1933 (SAPS); E. Coast, Shikka, Ponkotan <54->, T. Miyake, Sep. 13, 1906 (SAPS); Kitashiretoko Pen., Kitashiretoko Cape <55-lower r.>, Y. Hoshino & S. Okada, Jul. 20, 1933 (SAPS); Middle stream of Chinnai River <56-upper r.>, S. Wada, Sep. 25, 1913 (SAPS); Shikka, Makunkotan <57-lower l.>, K. Miyabe & T. Miyagi, Jul. 22, 1906 (SAPS); Shikka, Buriu <57-lower r.>, T. Miyake, Aug. 24, 1906 (SAPS); Shikka, Mt. Kashipo <57-upper r.>, N. Hiratsuka, Aug. 8, 1928 (SAPS); Tomarioru <58-lower l.>, S. Saito, Aug. 8, 1929 (TI); Nayori (Nayoro) <58-upper l.>, S. Komatsu, Aug. 7, 1913 (TI); E. Coast, Toyohara, Shiraraka <59-upper l.>, T. Miyake, Sep. 20, 1907 (SAPS); Manui – Nayori(Nayoro) <59-upper l.>, S. Komatsu, Aug. 5, 1913 (TI); Miho River. <61-lower r.>, No collector name, Sep. 2, 1910 (TI); Aikawa, Tokyo Univ. Forest <61-upper r.>, M. Honda & Y. Kimura, Aug. 11, 1940 (TI); Toyohara, Galkinovlaskoe <62-lower l.>, T. Miyake, Sep. 20, 1906 (SAPS); 20km E of Sokol town, mouth of Bakhura River <62-lower r.>, H. Takahashi 29133, Jul. 19, 2001 (SAPS); Sakaehama <62-upper l.>, G. Koidzumi, Aug. 13, 1930 (KYO); Odomari, Semantomari <63-upper r.>, T. Miyake, Jul. 3, 1906 (SAPS); 20km NW of Yuzhno-Sakhalinsk, around Sanatornyy <64-upper r.>, H. Takahashi 31009, Jul. 23, 2003 (SAPS); Urajimirofka <65-upper l.>, G. Nakahara 5989, Jul., 1906 (TI); Ohsawa. <65-upper l.>, S. Komatsu, Aug. 20, 1913 (TI); Konuma <65-upper l.>, M. Sugawara, Jun. 16, 1928 (SAPS- 2 sheets); Foot of Mt. Susuya. <65-upper r.>, H. Hara, Aug. 13, 1928 (TI- 2 sheets); Peak Chekhov, along the pass <65-upper r.>, T. Fukuda 1105, Jul. 22, 2001 (SAPS); Okhotskoye, Sedykh Lake <66-lower l.>, S. Tsuji et al. 729001, Jul. 29, 1996 (TI); Okhotskoye, Sedykh Lake <66-lower l.>, S. Tsuji et al. 802001, Aug. 2, 1996 (TI); Okhotskoye, Sedykh Lake <66-lower l.>, S. Tsuji et al. 600, Aug. 14, 1996 (TI); 30 km SE of Yuzhno-Sakhalinsk, S of Okhotskoye <66-lower l.>, H. Takahashi 27903, Jul. 19, 2000 (SAPS); E. Coast, Odomari, Tonnaicha <66-lower r.>, T. Miyake, Jun. 28, 1908 (SAPS); Mt. Oyakochi <67-lower l.>, T. Miyake, Jun. 25, 1908 (SAPS); Aniwa Bay, Ootomari, Tomarionnai <69-lower l.>, K. Miyabe & T. Miyagi, Jul. 19, 1906 (SAPS); Korssakoff <70-upper r.>, K. Miyabe & T. Miyagi, Jul. 12, 1906 (SAPS); Korssakoff <70-upper r.>, K. Miyabe & T. Miyagi, Aug. 4, 1906 (SAPS); Aniwa Bay, Ootomari <70-upper r.>, T. Miyake, May 12, 1907 (SAPS); Ohtomari <70-upper r.>, Y. Narita, Aug. 20 & 26, 1923 (TI); 10km E of Korsakov, E side of Mereya River <70-upper r.>, H. Takahashi 29439, Jul. 28, 2001 (SAPS); Aniwa Bay, Chipisani <71-upper l.>, T. Miyake, Jul. 19, 1908 (SAPS); Nagahama-gun, Tobuchi <71-upper r.>, H. Sase, Aug. 11, 1936 (TNS); Nagahama-gun, Tobuchi-mura <71-upper r.>, H. Sase, Sep. 13, 1936 (SAPS); (Mauka), Wendgishi <73-upper l.>, K. Miyabe & T. Miyagi, Aug. 18, 1906 (SAPS- 2 sheets); (Mauka), Chiishiya <73-upper r.>, K. Miyabe & T. Miyagi, Aug. 18, 1906 (SAPS).

Larix gmelinii Rupr. ex Gordon

W of the Peninsula Schmidt, mouth of River Tum' <04-lower l.>, T. Fukuda 1882, Aug. 9, 2001 (SAPS); Schmidt-Penin., around Piliwo <04-lower r.>, Y. Kudo & B. Ishida 7083, Aug. 25, 1923 (SAPS); Schmidt Penin., Tumi <04-lower r.>, Y. Kudo & B. Ishida 7444, Sep. 6, 1923 (SAPS); Pronge Baikal, Pomeri – Moskaliwo, Takada-shokai peat land <06-lower r.>, Y. Kudo & B. Ishida 7309, Aug. 31, 1923 (SAPS); Schmidt-Penin., Pilituk, dry peat <07-upper l.>, Y. Kudo & B. Ishida 7130, Aug. 28, 1923 (SAPS); 15km S of Okha, E side of the road to Okha <10-upper r.>, H. Takahashi 31162, Jul. 28, 2003 (SAPS); 5km S of Val, between Nogliki and Okha <19-lower l.>, H. Takahashi 31120, Jul. 27, 2003 (SAPS); Nyiwo, Age Cape, sandy coast <23-lower l.>, Y. Kudo & M. Tatewaki 6468, Aug. 12, 1922 (SAPS); Tymi, Pupuni, in forests <26-lower l.>, Y. Kudo & M. Tatewaki 6337, Aug. 8, 1922 (SAPS); Alexandrowsk <28-lower l.>, Okada, Aug. 19, 1923 (TI); Shikka, Hamdasa <37-lower r.>, T. Miyake, Aug. 27, 1906 (SAPS); Poronaimura <37-lower r.>, T. Miyake, Aug. 29, 1906 (SAPS); Shikka, Higashiyama <38-lower l.>, T. Miyake, Aug. 28, 1906 (SAPS); 80km N of Poronaysk, Mirnyy – Pervomayskoye <38-lower l.>, H. Takahashi 30481, Aug. 10, 2002 (SAPS); Shisuka-shicho, Asase <40-lower l.>, Y. Hoshino & S. Sugiyama, Aug. 12, 1933 (SAPS); Shisuka-shicho, Chirie-gun, Ennai <40-lower l.>, M. Tatewaki & Y. Takahashi 22473, Jun. 14, 1936 (SAPS); Shisuka-shicho, Chirie-gun, Mirukunai <40-lower r.>, M. Tatewaki & Y. Takahashi 22487, Jun. 15, 1936 (SAPS); Shisuka, Kyoto Univ. Forest <42-upper r.>, S. Okamoto 114, Jul. 28, 1928 (KYO- 2 sheets); Shikka, vicinity of R. Wuruna <43-lower l.>, T. Miyake, Aug. 22, 1906 (SAPS); Shikka, Borodo <43-lower l.>, T. Miyake, Sep. 1, 1906 (SAPS); Shisuka-shicho, E. Coast, Naruko River <45-upper r.>, Y. Hoshino & S. Sugiyama, Aug. 13, 1933 (SAPS); Shisuka-shicho, Chirie-gun, Atsunai <45-upper r.>, M. Tatewaki & Y. Takahashi 23031, Jun. 30, 1936 (SAPS); E. Coast, Shikka, Ehorokofunai <48-lower l.>, T. Miyake, Aug. 11, 1906 (SAPS); E. Coast, Shikka, Nayoro <48-lower l.>, T. Miyake,

Sep. 6, 1906 (SAPS); Poronaysk – Leonidovo, moor <48-upper l.>, H. Takahashi 30544, Aug. 13, 2002 (SAPS); Shisuka <48-upper r.>, S. Sugawara (SS1621), 1936 (SAPS, SAPT); Shikka <48-upper r.> K. Miyabe & T. Miyagi, Jul. 23, 1906 (SAPS); Telpenia Bay, Shikka <48-upper r.>, T. Miyake, Aug. 12, 1906 (SAPS); Shisuka <48-upper r.>, I. Namikawa, Aug. 7, 1914 (SAPS); Siska <48-upper r.>, T. Sawada, Aug. 14, 1923 (TI); Shikka <48-upper r.>, Y. Imai & H. Otani, Jul. 19, 1930 (SAPS); Siska <48-upper r.>, Koidzumi & Kitamura, Aug. 19, 1930 (KYO); Down stream of Horonai River, tundra <48-upper r.>, H. Hara, Aug. 2, 1931 (TI); Shisuka-shicho, Shisuka-cho, Otasuno-mori <48-upper r.>, Y. Hoshino & S. Sugiyama, Jul. 8, 1933 (SAPS); Taraika <49-upper r.>, T. Miyake. Aug. 14, 1906 (SAPS); Shisuka-shicho, Taraika – Nimenjo <49-upper r.>, B. Yoshimura & M. Hara, Jul. 10, 1937 (SAPS); Around Taraika <49-upper r.>, M. Honda & Y. Kimura, Aug. 17, 1940 (TI); Shikka, Jimtaki <50-upper r.>, K. Miyabe & T. Miyagi, Jul. 24, 1906 (SAPS); Shisuka-shicho, Nishinokoro <50-upper r.>, Y. Hoshino & S. Sugiyama, Aug. 16, 1933 (SAPS); Kitashiretoko Pen., Noto <51-lower l.>, Y. Hoshino & S. Okada, Jul. 12, 1933 (SAPS); Shikka, Lak. Solenuiya <51-lower r.>, K. Miyabe & T. Miyagi, Jul. 26, 1906 (SAPS); Kitashiretoko Pen., Chirie <51-lower r.>, Y. Hoshino & S. Okada, Jul. 15, 1933 (SAPS); Kitashiretoko Pen., Funakoshi <51-lower r.>, Y. Hoshino & S. Okada, Jul. 25, 1933 (SAPS); E. Coast, Shikka, Ponkotan <54->, T. Miyake, Sep. 13, 1906 (SAPS); Kitashiretoko Pen., Kitashiretoko Cape <55-lower r.>, Y. Hoshino & S. Okada, Jul. 20, 1933 (SAPS); Kitashiretoko Pen., Enton – Nushike <55-upper l.>, Y. Hoshino & S. Okada, Jul. 21, 1933 (SAPS); Kitashiretoko Pen., Yoman – Rosoku-iwa <55-upper r.>, Y. Hoshino & S. Okada, Jul. 21, 1933 (SAPS); Motodomari-shicho, Mt. Tosso <57-lower l.>, M. Honda & Y. Kimura, Aug. 12, 1940 (TI); Tomarioru <58-lower l.>, S. Saito, Aug. 8, 1929 (TI); W. Coast, Tomarioro, Kusunnai <58-upper r.>, T. Miyake, Sep. 16, 1907 (SAPS); E. Coast, Toyohara, Manue <59-upper l.>, T. Miyake, Sep. 22, 1906 (SAPS); Manui <59-upper l.>, S. Komat, Aug. 4, 1913 (TI); Fukakusa <61-lower r.>, S. Sugawara, May 30, 1921 (TI); Toyohara-D, Fukakusa <61-lower r.>, S. Sugawara, May 10, 1925 (SAPS); Toyohara, Galkinovlaskoe <62-lower l.>, T. Miyake, Jul. 11, 1906 (SAPS); 6km W of Sokol, environs surrounding Mal Takoy river <62-lower l.>, H. Takahashi 29188, 29192, Jul. 20, 2001 (SAPS- 2 sheets); Toyohara, Dubki <62-upper l.>, K. Miyabe & T. Miyagi, Jul. 22, 1906 (SAPS); Sakaehama <62-upper l.>, S. Komat, Aug. 2, 1913 (TI); Sakaihama <62-upper l.>, S. Saito, Jul. 28-29, 1929 (TI); Sakaehama <62-upper l.>, H. Hara, Jul. 31, 1931 (TI); 8 km N of Dolinsk, environs surrounding Nayba river <62-upper l.>, H. Takahashi 29299, Jul. 23, 2001 (SAPS); Mituriofuka. <65-lower l.>, K. Fujii, Sep. 12, 1910 (TI- 8 sheets); Korsakovsky Distr., Susuya Moor, old-Enoura station <65-lower l.>, S. Tsuji et al. 593, Aug. 9, 1996 (TI); Korsakovsky Distr., Susuya Moor, Ozeretskoye <65-lower l.>, S. Noshiro et al., Jul. 5, 1997 (TI); Toyohara <65-upper l.>, E. H. Wilson, Aug. 5, 1914 (SAPS); Toyohara. <65-upper l.>, H. Hara, Jul. 30, 1931 (TI); Konuma <65-upper l.>, Y. Kikkawa, Oct. 9, 1931 (SAPS); Mt. Susuya <65-upper r.>, H. Hara, Aug. 13, 1928 (TI); Yuzhno-Sakhalinsk, Rogatka River, alt. 120m <65-upper r.>, S. Noshiro et al., Jul. 1, 1997 (TI); Minakeshi <66-lower l.>, T. Miyake, Jun. 5, 1908 (SAPS); Odomari, Il [Isl?]. Tonnaichya <66-lower l.>, T. Miyake, Jun. 21, 1908 (SAPS); Okhotskoe, Sedykh Lake <66-lower l.>, S. Tsuji et al. 557, Aug. 5, 1996 (TI); Okhotskoe, Sedykh Lake <66-lower l.>, S. Tsuji et al., Aug. 6, 1996 (TI); Korsakovsky Distr., Okhotskoe, Sedykh Lake <66-lower l.>, S. Noshiro et al., Jul. 6, 1997 (TI); 30 km SE of Yuzhno-Sakhalinsk, S of Okhotskoye <66-lower l.>, H. Takahashi 27853, Jul. 16, 2000 (SAPS); Korsakovsky Distr., Puzin Pen., Krestonoshka <66-lower>, S. Tsuji et al. 583, Aug. 7, 1996 (TI); Korsakovsky Distr., Khazarskoye – Khwalisekoye Lakes <66-lower r.>, S. Tsuji et al. 588, Aug. 8, 1996 (TI); Aniwa Bay, Odomari, Korssakoff <70-upper r.>, T. Miyake, Jun. 19, 1906 (SAPS); Korssakoff <70-upper r.>, K. Miyabe & T. Miyagi, Jul. 12, 1906 (SAPS); Aniwa Bay, Ootomari <70-upper r.>, T. Miyake, May 12, 1907 (SAPS- 3 sheets); Aniwa Bay, Ootomari <70-upper r.>, T. Miyake, Jul. 10, 1907 (SAPS- 2 sheets); Odomari <70-upper r.>, H. Hara, Aug. 12, 1928 (TI); Aniwa Bay, Odomari, Chipisani <71-upper l.>, T. Miyake, Jul. 17, 1908 (SAPS); Nagahama-gun, Tobuchi-mura <71-upper r.>, H. Sase, Aug. 18, 1936 (SAPS); Notoro – Kiridoshi <73-lower r.>, K. Kondo, Sep. 3, 1929 (TI).

Picea glehnii (F. Schmidt) Mast.

Odomari, Rutaka River <64-lower r.>, G. Nakahara, Aug., 1906 (TI); Trecha-paachi <65-lower l.>, G. Nakahara, Aug., 1906 (TI); Susuya Moor, old-Enoura station <65-lower l.>, S. Tsuji et al. 592, 594, Aug. 9, 1996 (TI- 2 sheets); Susuya Moor, Ozeretskoye <65-lower l.>, S. Noshiro et al., Jul. 5, 1997 (TI); Foot of Mt. Susuya <65-upper r.>, H. Hara, Aug. 13, 1928 (TI); 10km E of Korsakov, N of Prigordnoye. E side of Mereya river <70-upper r.>, H. Takahashi 29428, 29429, Jul. 28, 2001 (SAPS- 2 sheets); 45 km SE from Yuzhno-Sakhalinsk, Lake Mal. Chibisanskoye <71-upper l.>, T. Fukuda 1367, Jul. 28, 2001 (SAPS); Aniwa Bay, Odomari, Arakuri <71-upper r.>, T. Miyake, Jul. 18, 1908 (SAPS); Nagahama-gun, Tobuchi <71-upper r.>, H. Sase 71298, Sep. 4, 1936 (TNS); Nagahama-gun, tobuchi-mura, near Ponto <71-upper r.>, H. Sase, Sep. 13, 1936 (SAPS); 45km E of Korsakov, 2km E of Beregovoy <72-upper l.>, H. Takahashi 30659, Aug. 16, 2002 (SAPS).

Picea jezoensis Carrière

Shumidt Penin., N of Piri River <04-lower r.>, Y. Kudo & B. Ishida 7002, Aug. 23, 1923 (SAPS); Shumidt Penin., Ado <04-upper l.>, Y. Kudo & B. Ishida 7488, Sep. 7, 1923 (SAPS); Oha, Uruta, on the hill <07-lower r.>, Y. Kudo & B. Ishida 7265, Sep. 1, 1923 (SAPS); Oha <07-lower r.>, Okada, Sep. 3, 1923 (TI); Niywo, Wiig – Katanguri, in forests <23-lower l.>, Y. Kudo & M. Tatewaki 6556, Aug. 15, 1922 (SAPS); Tymi, Pupuni, in forests <26-lower l.>, Y. Kudo & M. Tatewaki 6338, Aug. 8, 1922 (SAPS); Tymi Pupuni – Adatuim, in forests <26-lower l.>, Y. Kudo & M. Tatewaki 6686, Aug. 20, 1922 (SAPS); Alexandrowsk, Ako, tundra <28-lower l.>, Y. Kudo & M. Tatewaki 6057, Jul. 26, 1922 (SAPS); 40km E of Palevo, N of Changinskiy Pass <34-upper r.>, H. Takahashi 30376, Aug. 8, 2002 (SAPS); Shikka, Hamdasa <37-lower r.>, T. Miyake, Aug. 27, 1906 (SAPS); Shikka, Higashiyama <38-lower l.>, T. Miyake, Aug. 28, 1906 (SAPS); Shisuka-shicho, Asase <40-lower l.>, Y. Hoshino & S. Sugiyama, Jul. 11, 1933 (SAPS); Shisuka-shicho, Atsunai River <45-upper r.>, Y. Hoshino & S. Sugiyama, Aug. 12, 1933 (SAPS); Nairo <48-lower l.>, A. Hiruta (SS 1631), 1936 (SAPS, SAPT); Shikka, Unetonnai <48-lower l.>, K. Miyabe & T. Miyagi, Jul.

28, 1906 (SAPS); E. Coast, Shikka, Nayoro <48-lower l.>, T. Miyake, Sep. 6, 1906 (SAPS); Nayoro <48-lower l.>, I. Namikawa, Aug. 13, 1914 (SAPS); Shisuka <48-upper r.>, A. Hiruta (SS 1630), 1936 (SAPS, SAPT); Shikka <48-upper r.>, K. Miyabe & T. Miyagi, Jul. 23, 1906 (SAPS); Telpenia Bay, Shikka <48-upper r.>, T. Miyake, Aug. 12, 1906 (SAPS); Shisuka <48-upper r.>, I. Namikawa, Aug. 12, 1914 (SAPS); Shisuka <48-upper r.>, B. Yoshimura & M. Hara, Jul. 9, 1937 (TNS); Shisuka-shicho, Nishinokoro <50-upper r.>, Y. Hoshino & S. Sugiyama, Jul. 16, 1933 (SAPS); Kitashiretoko Pen., Noto <51-lower l.>, Y. Hoshino & S. Okada, Jul. 12, 1933 (SAPS); E. Coast, Shikka, Ponkotan <54->, T. Miyake, Sep. 13, 1906 (SAPS); Middle stream of Chinnai River <56-upper r.>, S. Wada, Sep. 25, 1913 (SAPS); 80km N of Dolinsk, Mt. Zhdanko <57-lower l.>, H. Takahashi 30153, Aug. 2, 2002 (SAPS); Mt. Kashipo <57-upper r.>, N. Hiratsuka, Aug. 8, 1928 (SAPS); Tomarioru <58-lower l.>, S. Komat, Aug. 8, 1913 (TI); W. Coast, Mauka, Kusunnai <58-upper r.>, T. Miyake, Sep. 21, 1906 (SAPS); Kitaitada <59-lower r.>, S. Komat, Aug., 1913 (TI); Miho River. <61-lower r.>, K. Fujii, Sep. 3, 1910 (TI); Toyohara-shicho, Aikawa, Tokyo Univ. Forest <61-upper r.>, M. Honda & Y. Kimura, Aug. 11, 1940 (TI); E. Coast, Toyohara, Galkinovlaskoe <62-lower l.>, T. Miyake, Sep. 20, 1906 (SAPS); Toyohara-shicho, around Ochiai. <62-lower l.>, M. Honda & Y. Kimura, Aug. 10, 1940 (TI); 20km E of Sokol town, mouth of Bakhura River <62-lower r.>, H. Takahashi 29085, Jul. 19, 2001 (SAPS); 20km SE of Dolinsk, Shuya River - Bakhura River <62-lower r.>, H. Takahashi 30085, Jul. 31, 2002 (SAPS); Sakaehama <62-upper l.>, S. Komat, Aug. 2, 1913 (TI); Sakaihama <62-upper l.>, S. Saito, Jul. 28-29, 1929 (TI); E. Coast, Sakaehama <62-upper l.>, U. Kimoto, Aug. 25, 1931 (SAPS); 8km N of Dolinski, environs surrounding Nayba River <62-upper l.>, H. Takahashi 29298, Jul. 23, 2001 (SAPS); W. Coast, Mauka <63-upper r.>, T. Miyake, Jul. 3, 1906 (SAPS); W. Coast, Akkeboshi <63-upper r.>, T. Miyake, Jun. 2, 1907 (SAPS); Rutaka River <64-lower r.>, G. Nakahara, Jul., 1906 (TI); Oosaka <64-upper l.>, T. Miyake, Jul. 1, 1906 (SAPS); Oomgari <64-upper r.>, T. Miyake, Jun. 30, 1906 (SAPS); 20km NW of Yuzhno-Sakhalinsk, around Sanatornyy <64-upper r.>, H. Takahashi 31008, Jul. 23, 2003 (SAPS); Trecha-paach <65-lower l.>, G. Nakahara, Jul., 1906 (TI); Perwaya-paach (Odomari) <65-lower l.>, G. Nakahara, Jul. & Aug., 1906 (TI); Odomari, Isl.Tonnaichya <66-lower l.>, T. Miyake, Jun. 21, 1908 (SAPS); Korsakovsky Distr., Puzin pen., Krestonoshka Lake <66-lower l.>, S. Tsuji et al., Aug. 7, 1996 (TI); Okhotskoe, Sedykh Lake <66-lower l.>, S. Tsuji et al. 601, Aug. 14, 1996 (TI); 30 km SE of Yuzhno-Sakhalinsk, S of Okhotskoye <66-lower l.>, H. Takahashi 27866, Jul. 16, 2000 (SAPS); Tonnaichya-sando <66-lower r.>, T. Miyake, Oct. 9, 1906 (SAPS); E. Coast, 73-go gyojo <66-lower r.>, T. Miyake, Jun. 22, 1908 (SAPS)- 2 sheets; Odomari, Airoppu <67-lower l.>, K. Miyabe & T. Miyagi, Jul. 31, 1906 (SAPS); W. Coast, South-Nayashi <68-lower l.>, T. Miyake, Jun. 14, 1907 (SAPS); Odomari, Tomarionnai <69-lower l.>, K. Miyabe & T. Miyagi, Jul. 19, 1906 (SAPS- 2 sheets); Aniva District, Taranai River <69-upper r.>, S. Noshiro et al., Jul. 4, 1997 (TI); Around Korsakov <70-upper r.>, S. Takeo, Sep., 1905 (SAPS); Aniwa Bay, Korssakoff <70-upper r.>, T. Miyake, Jun. 19, 1906 (SAPS- 2 sheets); Korssakoff <70-upper r.>, K. Miyabe & T. Miyagi, Jul. 12, 1906 (SAPS); Odomari, Mereya <70-upper r.>, K. Miyabe, T. Miyagi & T. Miyake, Jul. 14, 1906 (SAPS); Korssakoff <70-upper r.>, K. Miyabe & T. Miyagi, Aug. 4, 1906 (SAPS); Ohdomari <70-upper r.>, S. Saito, Jul. 24, 1929 (TI); Ozerskiy, Lake Mal. Chibisanskoye <71-upper l.>, T. Fukuda 1365, Jul. 28, 2001 (SAPS- 3 sheets); 25km E of Korsakov. Ozerskiy, Lake Mal. Chibisanskoye <71-upper l.>, H. Takahashi 29450, Jul. 28, 2001 (SAPS); Nagahama-gun, Tobuchi <71-upper r.>, H. Sase, Aug. 18, 1936 (TNS); Mt. Omanbetsu <72-lower l.>, T. Miyake, Jul. 15, 1908 (SAPS); Todomoshiri, Shimizutani <73-lower l.>, T. Miyake, Jul. 26, 1906 (SAPS); Kaibato, Kita-kotan <73-lower l.>, Kimoto, Murayama & Takee, Jul. 23, 1931 (SAPS); Odomari, Chiishiya <73-upper r.>, K. Miyabe & T. Miyagi, Aug. 18, 1906 (SAPS).

Pinus pumila (Pall.) Regel

Schmidt Penin., mountain near Pilewo <04-lower r.>, Y. Kudo & B. Ishida 7040, Aug. 24, 1923 (SAPS); Schmidt Penin., Ado <04-upper l.>, Y. Kudo & B. Ishida 7489, Sep. 7, 1923 (SAPS); N Coast of the Peninsula Schmidt, around the Lake Monchiger <04-upper r.>, T. Fukuda 1691, Aug. 6, 2001 (SAPS); Pronge Baikal, Pomeri – Mosukariwo, Takada-shokai peat land <06-lower r.>, Y. Kudo & B. Ishida 7310, Aug. 31, 1923 (SAPS); Oha, Uruta, on the hill <07-lower r.>, Y. Kudo & B. Ishida 7266, Sep. 1, 1923 (SAPS); Oha <07-lower r.>, Okada, Sep. 3, 1923 (TI); Schmidt Penin., Pirituk, dry peat land <07-upper l.>, Y. Kudo & B. Ishida 7131, Aug. 28, 1923 (SAPS); East Coast, along the railway to the Lake Odoptu <11-upper l.>, T. Fukuda 1453, Aug. 3, 2001 (SAPS); Nyiwo, Age Cape, sandy coast <23-lower l.>, Y. Kudo & M. Tatewaki 6683, Aug. 12, 1922 (SAPS); Tymi, Pupuni, in forests <26-lower l.>, Y. Kudo & M. Tatewaki 6339, Aug. 22, 1922 (SAPS); 40km E of Palevo, Mt. Changa <34-upper r.>, H. Takahashi 30333, Aug. 7, 2002 (SAPS); Nabilskiy Mts., Mt. Changa <34-upper r.>, N. Fujii 01151, Aug. 7, 2002 (SAPS); 40km E of Palevo, N of Changinskiy Pass <34-upper r.>, H. Takahashi 30375, Aug. 8, 2002 (SAPS); Pilebo <36-lower l.>, K. Jimbo, Aug. 13, 1907 (TNS); Alexandrowsk, Pilewo-hinan-ekisya – Aoba-eki <36-lower l.>, Y. Kudo & M. Tatewaki 6162, Jul. 20, 1922 (SAPS); Anbetsu, Oiwa-toge <36-lower l.>, Y. Tokunaga & K. Kawai, Sep. 2, 1929 (SAPS); Hamdasa <37-lower r.>, T. Miyake, Aug. 27, 1906 (SAPS); Higashiyama <38-lower l.>, T. Miyake, Aug. 28, 1906 (SAPS); Shisuka-shicho, Chirie-gun, Ennai <40-lower l.>, M. Tatewaki & Y. Takahashi 22476, Jun. 14, 1936 (SAPS); Shisuka, Kyoto Univ. Forest <42-upper r.>, S. Okamoto, Jul. 28, 1928 (KYO); Shisuka-shicho, E. Coast, Naruko River <45-upper r.>, Y. Hoshino & S. Sugiyama, Aug. 13, 1933 (SAPS); Nairo <48-lower l.>, A. Hiruta (SS 1658), 1936 (SAPT); E. Coast, Nayoro <48-lower l.>, T. Miyake, Sep. 6, 1906 (SAPS); Shikka <48-upper r.>, K. Miyabe & T. Miyagi, Jul. 23, 1906 (SAPS, TNS); Telpenia Bay, Shikka <48-upper r.>, T. Miyake, Aug. 12, 1906 (SAPS); Duwatakko <48-upper r.>, T. Miyake, Aug. 16, 1906 (SAPS); Shisuka <48-upper r.>, I. Namikawa, Aug. 12, 1914 (SAPS); Shikka <48-upper r.>, Y. Imai & H. Otani, Jul. 18, 1930 (SAPS); Siska <48-upper r.>, Koidzumi & Kitamura, Aug. 19, 1930 (KYO); Shisuka-shicho, Shisuka-cho, Otasuno-mori <48-upper r.>, Y. Hoshino & S. Sugiyama, Jul. 8, 1933 (SAPS); Shisuka-shicho, Sachi, in forests <48-upper r.>, M. Kawashima, Jul. 2, 1935 (SAPS); Around Shisuka <48-upper r.>, B. Yoshimura & M. Hara, Jul. 9, 1937 (SAPS); Nishitaraika, Nakajima <49-upper l.>, J. Ohwi, Aug. 14, 1932 (KYO); Taraika <49-upper r.>, S. Sugawara 1660, Jul. 20, 1935 (SAPT); Jimutaki <50-upper r.>, K. Miyabe & T. Miyagi, Jul.

24, 1906 (SAPS); Shisuka-shicho, Nishinokoro <50-upper r.>, Y. Hoshino & S. Sugiyama, Aug. 16, 1933 (SAPS); Kitashiretoko Pen., Noto <51-lower l.>, Y. Hoshino & S. Sugiyama, Jul. 12, 1933 (SAPS); Chirihasan <51-lower r.>, K. Miyabe & T. Miyagi, Jul. 25, 1906 (SAPS); Lake Solenuiya <51-lower r.>, K. Miyabe & T. Miyagi, Jul. 26, 1906 (SAPS); Kitashiretoko Pen., Chirie <51-lower r.>, Y. Hoshino & S. Okada, Jul. 15, 1933 (SAPS); Kitashiretoko Pen., Funakoshi <51-lower r.>, Y. Hoshino & S. Sugiyama, Jul. 25, 1933 (SAPS); Kitashiretoko Pen., Funakoshi <51-lower r.>, Y. Hoshino & S. Okada, Jul. 25, 1933 (SAPS); Mt. Isara <52-lower l.>, S. Sugawara 1657, Aug., 1936 (SAPT); Nayoshi, Usutomanai <52-upper l.>, K. Miyabe & T. Miyagi, Aug. 14, 1906 (SAPS); W. Coast, Naikotoru <52-upper l.>, T. Miyake, Aug. 26, 1907 (SAPS); E. Coast, Ponkotan <54->, T. Miyake, Sep. 13, 1906 (SAPS); E. Coast, Chyakamaushinai <54-lower l.>, T. Miyake, Sep. 13, 1906 (SAPS); Kitashiretoko Pen., Rosoku-iwa <55-upper l.>, Y. Hoshino & S. Okada, Jul. 20, 1933 (SAPS); Kitashiretoko Pen., Rosoku-iwa – Funakoshi <55-upper l.>, Y. Hoshino & S. Okada, no date (SAPS); Central mountains, upper stream of Chinnai River. <56-upper r.>, S. Wada, Sep. 25, 1913 (SAPS); E. Coast, Mt. Nupuripo <57-lower l.>, T. Miyake, Aug. 13, 1907 (SAPS); Mt. Tosso (Mt. Nupuripo) <57-lower l.>, H. Hara, Aug. 5, 1931 (TI); Mt. Tosso <57-lower l.>, S. Sugawara 1659, Jul. 11, 1935 (SAPT); Motodomari-shicho, Mt. Tosso <57-lower l.>, M. Honda & Y. Kimura, Aug. 12, 1940 (TI); 80km N of Dolinsk, Tsapko to N peak of Mt. Vladimirovka <57-lower l.>, H. Takahashi 29582, Aug. 2, 2001 (SAPS); E. Coast, Mt. Tosso <57-lower l.>, N. Hiratsuka, S. Iwadare & M. Nagai, no date (SAPS); Kashipo <57-upper r.>, H. Abumiya, G. Takee, Y. Hoshino, Jul. 17, 1932 (SAPS); W. Coast, Kusunnai <58-upper r.>, T. Miyake, Jul. 7, 1906 (SAPS); E. Coast, Manue <59-upper l.>, T. Miyake, Sep. 22, 1906 (SAPS); E. Coast, Shiraraka <59-upper l.>, T. Miyake, Sep. 20, 1907 (SAPS); Manui – Nayori <59-upper l.>, S. Komat, Aug. 6, 1913 (TI); Manui-sando <59-upper l.>, S. Komat, Aug. 6, 1913 (TI); W. Coast, Notasan <60-upper l.>, T. Miyake, Jun. 29, 1907 (SAPS); Sakaihama <62-upper l.>, T. Minami, Nov. 29, 1905 (SAPS); E. Coast, Dubki <62-upper l.>, T. Miyake, Jul. 10, 1906 (SAPS); Naibuchi <62-upper l.>, G. Nakahara, Aug. 24, 1906 (TI, TNS); Dubuki, in littore <62-upper l.>, U. Faurie, Jul., 1908 (KYO- 4 sheets); Sakaehama <62-upper l.>, S. Komat, Aug. 2, 1913 (TI); Sakaihama <62-upper l.>, S. Saito, Jul. 28-29, 1929 (TI); Sakaehama-gun, Sakaehama-kaigan <62-upper l.>, H. Sase, Aug. 5, 1934 (SAPS); 8km N of Dolinsk, environs surrounding Nayba river <62-upper l.>, H. Takahashi 29300, Jul. 23, 2001 (SAPS); East Coast, near the mouth of r. Naiba <62-upper l.>, T. Fukuda 1236, Jul. 23, 2001 (SAPS); Tonnaicha-sando <65-lower r.>, T. Miyake, Oct. 10, 1906 (SAPS); Prope Novo-Alexandrovsk <65-upper l.>, G. Porubinovskaia et al., Sep. 6, 1973 (TI); Mt. Susuya <65-upper r.>, T. Miyake, Jul. 27, 1907 (SAPS); Mt. Ochopoka <65-upper r.>, T. Miyake, Jun. 13, 1908 (SAPS); 8km E of Yuzhno-Sakhalinsk, Chekhovskiy Pass – Mt. Chekhova <65-upper r.>, H. Takahashi 29275, Jul. 22, 2001 (SAPS); Peak Chekhov, at the base <65-upper r.>, T. Fukuda 1165, Jul. 22, 2001 (SAPS); Tonaicha <66-lower l.>, G. Nakahara 5987, Aug., 1906 (TI); Minakeshi <66-lower l.>, T. Miyake, May 30, 1908 (SAPS); Tonnaicha <66-lower l.>, T. Miyake, Jun. 21, 1908 (SAPS); Okhotskoe, Sedykh Lake <66-lower l.>, S. Noshiro et al., Jul. 6, 1997 (TI); 30 km SE of Yuzhno-Sakhalinsk, S of Okhotskoye <66-lower l.>, H. Takahashi 27898, Jul. 19, 2000 (SAPS); Airoppu <67-lower l.>, K. Miyabe & T. Miyagi, Jul. 31, 1906 (SAPS); Mt. Oyakochi <67-lower l.>, T. Miyake, Jun. 25, 1908 (SAPS); Korsakov <70-upper r.>, T. Miwa, Sep. 12, 1906 (SAPS); Nagahama-gun, Nagahama-mura, Mt. Okuhachi <71-upper l.>, H. Sase, Sep. 23, 1936 (SAPS); Aniwa Bay, Arakuri <71-upper r.>, T. Miyake, Jul. 18, 1908 (SAPS); Mt. Ninushi <72->, T. Miyake, Jul. 2, 1908 (SAPS); Mt. Omanbetsu <72-lower l.>, T. Miyake, Jul. 15, 1908 (SAPS); E. Coast, Cheppopo <72-lower l.>, T. Miyake, Jul. 8, 1908 (SAPS); Mt. Shiretoko, Juzozan <74-upper l.>, T. Miyake, Jul. 11, 1908 (SAPS).

CUPRESSACEAE

Juniperus chinensis L. var. *sargentii* Henry

W. Coast, Ushoro, Naikotoru <52-upper l.>, T. Miyake, Aug. 26, 1907 (SAPS); Around Ushiro <52-upper l.>, H. Hara, Aug. 3, 1936 (TI); Chinnai <56-upper l.>, Yamazaki & Chohno, Oct. 20, 1933 (KYO); N of Krasnogorsk, SE of Aynskoye Lake <56-upper l.>, M. Yabe, Jul. 22, 2001 (SAPS-2 sheets); E. Coast, Mt. Tosso <57-lower l.>, N. Hiratsuka, S. Araki, M. Nagai & S. Iwadera, Jul. 20, 1927 (SAPS); E. Coast, Shikka, Soya <57-upper r.>, T. Miyake, Sep. 15, 1906 (SAPS); Mt. Kashipo <57-upper r.>, J. Ohwi, Aug. 18, 1932 (KYO); Kashipo, Kenshindai <57-upper r.>, H. Abumiya, G. Takee & Y. Hoshino, Sep. 25, 1932 (SAPS); W. Coast, 3-ri N of Arakoi, Chikai <58-lower l.>, S. Wada, Sep. 15, 1913 (SAPS); W. Coast, Kusunnai <58-upper r.>, T. Miyake, Jul. 7, 1906 (SAPS); W. Coast, Kusunnai <58-upper r.>, K. Miyabe & T. Miyagi, Aug. 9, 1906 (SAPS-2 sheets); E. Coast, Motodomari, Chikaporonai <59-upper l.>, T. Miyake, Aug. 7, 1907 (SAPS); E. Coast, Motodomari, Soyonkotan <59-upper l.>, T. Miyake, Aug. 15, 1907 (SAPS); Habomai, on sand <60-lower l.>, H. Hara, Aug. 15, 1928 (TI); Maoka-gun, Habomai-gen'ya <60-lower l.>, Harada, Sep. 18, 1929 (KYO); Noda (Tschekhov) <60-upper l.>, S. Saito, Aug. 10, 1929 (TI- 2 sheets); Honto – Kinushi Cape <63-lower l.>, S. Saito, Aug. 15, 1929 (TI- 2 sheets); Mt. Sussuja <65-upper r.>, G. Yamada, Jul., 1918 (KYO); E. Coast, 73-go gyojo <66-lower r.>, T. Miyake, Jun. 22, 1908 (SAPS); E. Coast, Toyomai <67-lower l.>, T. Miyake, Jun. 29, 1908 (SAPS); Prope Schebunino <68-lower l.>, A. K. Skvortsov, Sep. 10, 1967 (KYO, TI); W. Coast, Honto, Atowa <68-upper l.>, T. Miyake, Jun. 10, 1907 (SAPS); W. Coast, Honto, Kenushinaibo <68-upper l.>, T. Miyake, Jun. 10, 1907 (SAPS); E. Coast, Chishinai <72-lower r.>, T. Miyake, Jul. 6, 1908 (SAPS); Isl. Kaiba <73-lower l.>, G. Koidzumi, 1928 (TI); Todomoshiri, Dainanwan <73-lower l.>, T. Miyake, Jul. 23, 1906 (SAPS- 2 sheets); Todomoshiri, Tomarizawa <73-lower l.>, T. Miyake, Jul. 23, 1906 (SAPS); Isl. Kaiba <73-lower l.>, S. Komat, Aug. 12, 1915 (TI); Isl. Moneron (Kaibato) <73-lower l.>, S. Saito 3580, Jul. 19, 1929 (TI-2 sheets); Kaibato, Usu <73-lower l.>, Kimoto, Murayama & Takee, Jul. 17, 1931 (SAPS); Moneron Isl., southern part <73-lower l.>, V. Y. Barkalov. Aug. 24, 2001 (SAPS); Aniwa Bay, Chiishiya <73-upper r.>, K. Miyabe & T. Miyagi, Aug. 18, 1906 (SAPS); Odomari, C. Suryuda <74-upper l.>, K. Miyabe & T. Miyagi, Aug. 1, 1906 (SAPS); Nagahama-gun, Shiretoko-mura, Chikadomari <74-upper l.>, H. Sase, Aug. 31, 1933 (SAPS).

Juniperus communis L. s. l.

Schmidt Penin., Toumi <04-lower r.>, Y. Kudo & B. Ishida 7433, Sep. 6, 1923 (SAPS); Schmidt Penin., Ado <04-upper l.>, Y. Kudo & B. Ishida 7487, Sep. 7, 1923 (SAPS); Eastern coast, south of the Peninsula of Schmidt <05-lower r.>, T. Fukuda 2273, Aug. 16, 2001 (SAPS); N coast of the Peninsula Schmidt, mouth of River Nala <05-upper l.>, T. Fukuda 1771, Aug. 7, 2001 (SAPS); Eastern coast, south of the Peninsula of Schmidt <05-upper l.>, T. Fukuda 2129, Aug. 14, 2001 (SAPS); Luguri – Okha (Oha) <07-lower l.>, Y. Kudo & B. Ishida 7198, Aug. 31, 1923 (SAPS); 15km S of Okha <10-upper r.>, H. Takahashi 31164, Jul. 28, 2003 (SAPS); East Coast, at 52°45' n.l., between Nuso and Chaiwo <19-upper l.>, T. Ishikawa, Jul. 6, 1912 (SAPS- 2 sheets); Tymi, Parukata, in forests <26-upper r.>, Y. Kudo & M. Tatewaki 6446, Aug. 10, 1922 (SAPS); Palkata <26-upper r.>, Okada, Aug. 26, 1923 (TI); Doye, on the hill. <28-lower l.>, H. Ueda, Sep. 1, 1905 (SAPS); Pilebo <36-lower l.>, K. Jimbo, Aug. 13, 1907 (TNS); W. Coast, Nayashi, Anbetsu, in forests <36-lower l.>, T. Ishiyama, Jul. 11(?), 1927 (SAPS); Anbetsu, Ooiwa-toge <36-lower l.>, Y. Tokunaga & K. Kawai, Sep. 2, 1929 (SAPS); Akashiki, near Anbetsu <36-lower l.>, Y. Tokunaga & K. Kawai, Sep. 3, 1929 (SAPS); Shikka, Poronaimura <37-lower r.>, T. Miyake, Aug. 29, 1906 (SAPS); Shikka, vicinity of R. Jobboroit, in forests <37-lower r. – 43>, T. Miyake, Aug. 30, 1906 (SAPS); Onor – Luikof (Tim) <37-upper l.>, Y. Kudo & M. Tatewaki 6244, Aug. 2, 1922 (SAPS); Shisuka-shicho, Chirie-gun, Ennai River, the fifth branch <40-lower l.>, M. Tatewaki & Y. Takahashi 22563, Jun. 17, 1936 (SAPS); Nayoshi-gun, Yokunai <41-upper l.>, H. Hara, Aug. 1, 1936 (TI); Shisuka-gun, Ikeda, Mt. Sekkai <39-lower l.>, B. Yoshimura & M. Hara (81), Jul. 14, 1937 (SAPS, TNS); Shisuka-gun, Ikeda, Mt. Sekkai <39-lower l.>, B. Yoshimura & M. Hara 117, Jul. 15, 1937 (SAPS, TNS); Shisuka-shicho, Chirikoro <45-upper r.>, Y. Hoshino & S. Sugiyama, Aug. 8, 1933 (SAPS); Shisuka-shicho, E. Coast, Atsunai River <45-upper r.>, Y. Hoshino & S. Sugiyama, Aug. 12, 1933 (SAPS); Shisuka-shicho, E. Coast, Naruko River <45-upper r.>, Y. Hoshino & S. Sugiyama, Aug. 13, 1933 (SAPS); Shisuka-shicho, Chirikoro <45-upper r.>, Y. Hoshino & S. Sugiyama, Aug. 14, 1933 (SAPS); Shisuka-shicho, Chirie-gun, Mt. Kawashima <45-upper r.>, M. Tatewaki & Y. Takahashi 22704, Jun. 21, 1936 (SAPS); Shisuka-shicho, Chirie-gun, Mt. Kawashima <45-upper r.>, M. Tatewaki & Y. Takahashi 22748, Jun. 23, 1936 (SAPS); Shisuka-shicho, Chirie-gun, Mt. Naruko-Nirayama <45-upper r.?>, M. Tatewaki & Y. Takahashi 22865, Jun. 26, 1936 (SAPS); Nairo <48-lower l.>, A. Hiruta (SS 1711), 1936 (SAPT); E. Coast, Ponkotan <54->, T. Miyake, Sep. 13, 1906.09.13 (SAPS); Chinnai <56-upper l.>, Yamazaki & Chohno, Oct. 20, 1933 (KYO); Mt. Nupuripo (Mt. Tosso) <57-lower l.>, S. Saito, Aug. 3, 1929 (TI)- "hybrid?"; Maguntan <57-lower l.>, S. Saito 988, Aug. 5, 1929 (TI); Maguntan, around mud volcano <57-lower l.>, G. Koidzumi, Aug. 9, 1940 (KYO); 5km SW of Vostochnyy, Pugacheva <57-lower l.>, H. Takahashi 31094, Jul. 25, 2003 (SAPS); Mt. Kashipo, on rocks <57-upper r.>, N. Hiratsuka, Aug. 8, 1928 (SAPS); Kashipodake, Kashipo <57-upper r.>, H. Abumiya, G. Takee & Y. Hoshino, Jul. 22, 1932 (SAPS); Mt. Kashipo <57-upper r.>, J. Ohwi, Jul. 23, 1932 (KYO); W. Coast, Kusunnai <58-upper r.>, T. Miyake, Jul. 7, 1906 (SAPS); Odasamu <59-lower l.>, S. Suematsu, Jul. 21, 1929.07.21 (TI); Odasamu <59-lower l.>, S. Otagiri, Jul. 1, 1930 (KYO); Toyohara, Galkinovlaskoe <62-lower l.>, T. Miyake, Jul. 11, 1906 (SAPS); Toyohara, Sakaihama <62-upper l.>, T. Minami & T. Konno, Nov. 29, 1905 (SAPS); E. Coast, Toyohara, Dubki <62-upper l.>, T. Miyake, Jul. 10, 1906 (SAPS); E. Coast, Dubki <62-upper l.>, T. Miyake, Sep. 26, 1906 (SAPS); E. Coast, Sakaehama <62-upper l.>, T. Miyake, Sep. 26, 1906 (SAPS); Dubuki, in silvis <62-upper l.>, U. Faurie, Jul., 1908 (KYO); Sakaehama. <62-upper l.>, S. Komat, Aug. 2, 1913 (TI)- "hybrid?"; Sakaihama <62-upper l.>, T. Sawada, Aug. 10, 1923 (TI)- "hybrid?"; Sakaehama. <62-upper l.>, Y. Narita 2864, Aug. 25, 1923 (TI)- "hybrid?"; Sakaehama, seacoast, in Pinus pumila forests <62-upper l.>, H. Koidzumi, Aug., 1921 (TI)- "hybrid?"; Naibuchi <62-upper l.>, S. Otagiri, Jun. 24, 1930 (KYO); Sakaehama <62-upper l.>, G. Koidzumi, Aug. 13, 1930 (KYO); Sakaehama <62-upper l.>, H. Hara, Jul. 31, 1931 (TI); Sakaehama <62-upper l.>, J. Ohwi, Jul. 21, 1932 (KYO); 8km N of Dokinsk, environs surrounding Nayba river <62-upper l.>, H. Takahashi 29294, Jul. 23, 2001.07.23 (SAPS); NW of Oodomari, Rutaka <64-lower r.>, Z. Tashiro, Aug. 29, 1939 (KYO); Oomagari <64-upper r.>, T. Miyake, Jun. 30, 1906 (SAPS); Odomari, Tonnaicha-Sando, in forests <65-lower r.>, T. Miyake, Oct. 8, 1906 (SAPS); Tonnai-gun, Kamikiminai, Takadai <65-lower r.>, H. Sase, Sep. 10, 1939 (SAPS); Mt. Ochopoka <65-upper r.>, T. Miyake, Jun. 13, 1908 (SAPS); Korsakovsky Distr., Puzin Pen., Krestonoshka Lake <66-lower l.>, S. Tsuji et al. 587, Aug. 7, 1996 (TI); 30 km SE of Yuzhno-Sakhalinsk, S of Okhotskoye <66-lower l.>, H. Takahashi 27859, Jul. 16, 2000 (SAPS); Around Korsakov <70-upper r.>, S. Takeo, Sep., 1905 (SAPS); Aniwa Bay, Korssakoff <70-upper r.>, T. Miyake, Jun. 19, 1906 (SAPS); Korssakoff <70-upper r.>, K. Miyabe & T. Miyagi, Aug. 4, 1906 (SAPS); Korsakov <70-upper r.>, T. Miwa, Sep. 12, 1906 (SAPS); Aniwa Bay, Ootomari <70-upper r.>, T. Miyake, Jul. 10, 1907 (SAPS); Korsakof, in silvis <70-upper r.>, U. Faurie, Jun., 1908 (KYO); Odomari <70-upper r.>, Y. Narita 277, Aug. 20, 1923 (TI); Odomari <70-upper r.>, Y. Narita, Aug. 22, 1923 (TI)- "hybrid?"; Odomari <70-upper r.>, H. Hara, Aug. 17, 1928 (TI); Odomari-cho, Nankei-cho, on the hill <70-upper r.>, H. Iwamoto, Sep. 10, 1931 (TI); Chipesani (Chibisani), Naibotcho <71-upper l.>, G. Nakahara, Aug., 1906 (TI, TNS); 2km ESE of Beregovoy, SE of oz. Svirskoye <71-upper r.>, N. Fujii 01439, Aug. 16, 2002 (SAPS); 45km E of Korsakov, 2km E of Beregovoy <72-upper l.>, H. Takahashi 30662, Aug. 16, 2002 (SAPS); Todomoshiri, Mt. Dainan <73-lower l.>, T. Miyake, Jul. 26, 1906 (SAPS); Isl. Moneron (Isl. Kaiba) <73-lower l.>, S. Saito (3581), Aug. 19, 1929 (TI- 2 sheets); Notoro Peninsula, Notoro – Kiridoshi <73-lower l.>, K. Kondo 967, Sep. 3, 1929 (TI); Kaibato, Mt. Dainan <73-lower l.>, Kimoto, Murayama & Takee, Aug. 6, 1931 (SAPS).

Juniperus conferta Parl.

Ushoro, Usutomanai <52-upper l.>, K. Miyabe & T. Miyagi, Aug. 14, 1906 (SAPS); Mouth of Chinnai River, sandy coast <56-upper l.>, S. Wada, Sep. 25, 1913 (SAPS); Mihama-mura, Lake Shosen, on sand <56->, H. Hara, Jul. 30, 1936, (TI)- "hybrid?"; Manui <59-upper l.>, S. Komatsu, Aug. 4, 1913 (TI)- "hybrid?"; Konotoro <60-lower l.>, S. Sugawara 1701, no date (SAPT); W. Coast, Mauka, Tokotan <60-lower l.>, T. Miyake, Jun. 22, 1907 (SAPS); W Coast, Mauka, Soyanaibo <60-lower l.>, T. Miyake, Jun. 22, 1907 (SAPS); Habomai, sandy coast <60-lower l.>, H.

Hara, Aug. 15, 1928 (TI); Sakaehama <62-upper l.>, J. Ito 10234, 10248, no date (TNS); Dubuki, in littore <62-upper l.>, U. Faurie, Jul., 1908 (KYO); Dubuki, in nema littoris <62-upper l.>, U. Faurie, Jul., 1908 (KYO- 3 sheets); Naibuchi <62-upper l.>, K. Fujii, Sep. 10, 1910 (TI); Sakaehama, Kyoto Univ. Forest <62-upper l.>, T. Chohno, Jul. 13, 1928 (TNS); Sakaihama <62-upper l.>, S. Saito, Jul. 28, 1929 (TI- 2 sheets)- "hybrid?"; Sakaehama <62-upper l.>, G. Koidzumi, Aug. 13, 1930 (KYO- 3 sheets); Sakaehama <62-upper l.>, G. Koidzumi, Jul. 25, 1940 (KYO).

TAXACEAE

Taxus cuspidata Siebold et Zucc.

Hinan-ekisya – Aoba-eki (Alexand.) <36-lower l.>, Y. Kudo & M. Tatewaki 6161, Jul. 30, 1922 (SAPS); Anbetsu <36-lower l.>, Y. Tokunaga & K. Kawai, Sep. 2, 1929 (SAPS); Around Anbetsu <36-lower l.>, H. Hara, Aug. 1, 1936 (TI); Aoba-eki – Kami-Onor (Alexandr) <36-upper r.>, Y. Kudo & M. Tatewaki 6181, Jul. 31, 1922 (SAPS); E. Coast, Shikka, Ehorokofunai <48-lower l.>, T. Miyake, Aug. 11, 1906 (SAPS); W. Coast, Nayashi, Mt. Ushoro <52-upper r.>, T. Miyake, Aug. 31, 1907 (SAPS); Chinnai River, middle stream of Shimoohkawa <56-upper r.>, S. Wada, Sep. 25, 1913 (SAPS); E. Coast, Shikka, Makunkotan <57-lower l.>, T. Miyake, Sep. 15, 1906 (SAPS); E. Coast, Shikka, Nupuripo <57-lower l.>, T. Miyake, Sep. 18, 1906 (SAPS); E. Coast, Mt. Tosso <57-lower l.>, N. Hiratsuka, S. Araki, M. Nagai & S. Iwadere, Jul. 20, 1927 (SAPS); Shiraishizawa – Nupuripo <57-lower l.>, S. Saito, Aug. 2, 1929 (TI); Mt. Tosso <57-lower l.>, H. Hara, Aug. 5, 1931 (TI); Motodomari-shicho, Mt. Tosso <57-lower l.>, M. Honda & Y. Kimura, Aug. 12, 1940 (TI); 80km N of Dolinsk, Tsapko <57-lower l.>, H. Takahashi, Aug. 2, 2001 (SAPS); 80km N of Dolinsk, Tsapko to N peak of Mt. Vladimirovka <57-lower l.>, H. Takahashi 29549, Aug. 2, 2001 (SAPS); Mt. Kashipo <57-upper r.>, N. Hiratsuka, Aug. 8, 1928 (SAPS); Kashipo, Ishiyama <57-upper r.>, H. Abumiya, G. Takee, Y. Hoshino, Jul. 17, 1932 (SAPS); E. Coast, Toyohara, Shiraraka <59-upper l.>, T. Miyake, Sep. 20, 1907 (SAPS); East coast, near the mouth of r. Bakhura <62-lower r.>, E. M. Bulakh 1100, Jul. 19, 2001 (SAPS); 20km E of Dolinsk, confluence of Shuya and Bakhura rivers <62-lower r.>, H. Takahashi 30123, Jul. 31, 2002 (SAPS); Honto <63-lower l.>, S. Saito, Aug. 24, 1929 (TI); W. Coast, Tomaribokeshi <63-upper r.>, T. Miyake, Jul. 3, 1906 (SAPS); Semantomari <63-upper r.>, T. Miyake, Jul. 3, 1906 (SAPS); Mauka <63-upper r.>, K. Miyabe & T. Miyagi, Aug. 8, 1906 (SAPS); W. Coast, Akkeboshi <63-upper r.>, T. Miyake, Jun. 2, 1907 (SAPS); W. Coast, Mt. Mauka <63-upper r.>, T. Miyake, Jun. 4, 1907 (SAPS); Odomari, Mt. Ochopoka <65-upper r.>, T. Miyake, Jun. 13, 1908 (SAPS); Mt. Susuya. <65-upper r.>, H. Hara, Aug. 13, 1928 (TI); Mt. Suzuya (Susuya) <65-upper r.>, S. Saito, Jul. 26, 1929 (TI- 2 sheets); Tonnai-gun, Kamikiminai, Mt. Minamihoroto <65-upper r.>, H. Sase, Aug. 30, 1939 (SAPS); Minakeshi <66-lower l.>, T. Miyake, Jun. 5, 1908 (SAPS); 30 km SE of Yuzhno-Sakhalinsk, S of Okhotskoye <66-lower l.>, H. Takahashi 27924, Jul. 19, 2000 (SAPS); Odomari, Airoppu <67-lower l.>, K. Miyabe & T. Miyagi, Jul. 31, 1906 (SAPS); Mt. Oyakochi <67-lower l.>, T. Miyake, Jun. 25, 1908 (SAPS); Nevelsk, prope Gornozavodsk <68-upper l.>, V. Dvorakovskaia & E. Bokina, Sep. 24, 1973 (TI); Aniwa Bay, Korssakoff <70-upper r.>, T. Miyake, Jun. 19, 1906 (SAPS); Korssakoff <70-upper r.>, K. Miyabe & T. Miyagi, Aug. 4, 1906 (SAPS); Korsakov <70-upper r.>, T. Miwa, Sep. 12, 1906 (SAPS); Amiwa Bay, Ootomari <70-upper r.>, T. Miyake, May 12, 1907 (SAPS); Amiwa Bay, Ootomari <70-upper r.>, T. Miyake, May 17, 1907 (SAPS); Amiwa Bay, Odomari, Arakuri <71-upper r.>, T. Miyake, Jul. 18, 1908 (SAPS); 2km ESE of Beregovoy, SE of oz. Svirskoye <71-upper r.>, N. Fujii 01440, Aug. 16, 2002 (SAPS); Mt. Ninushi <72->, T. Miyake, Jul. 2, 1908 (SAPS); E. Coast, Cheppopo <72-lower l.>, T. Miyake, Jul. 8, 1908 (SAPS); Kaibato, Osawa <73-lower l.>, Kimoto, Murayama & Takee, Aug. 6, 1931 (SAPS).

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Chromosome Numbers of Selected Vascular Plant Species from Sakhalin, Moneron and the Kurile Islands

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Abstract Chromosome numbers for 33 vascular plant species of 29 genera and 16 families, from Sakhalin, Moneron and the Kurile Islands, are given. The chromosome numbers were reported here for the first time for following 11 taxa: *Acelidanthus anticleoides, Artemisia unalaskensis, Carex microtricha, Gaultheria miqueliana, Hypericum yezoense, Macropodium pterospermum, Pinguicula macroceras, Poa sugawarae, Rumex regelii, Taraxacum vestitum, Tephroseris kawakamii.* In addition, for 12 species new cytotypes were revealed. At present, in Sakhalin, Moneron and the Kurile Islands chromosome numbers have been counted for 505 species, it means for about 18% of the total number of vascular plants in the Kuriles, and 24.5% in Sakhalin. Chromosome numbers are counted now also for 20 species from Moneron.

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

Introduction

This is our further contribution, concerning new chromosome counts on the vascular plants from the Kurile Islands, now also from Sakhalin and Moneron Islands, as the results of IKIP and ISIP expeditions. The first paper has been published in Japan earlier (Probatova *et al.* 2000). In the present paper chromosome counts for 33 species are given, they were selected as new or noteworthy for some reasons. For 11 species there was no published information on the chromosome numbers before. In addition, for *Arabis glauca, A. stelleri, Crepis hokkaidoensis, Draba kurilensis, Hedysarum austrokurilense, Honckenya oblongifolia, Gentiana jamesii, Juncus leschenaultii, Nesodraba grandis, Noccaea cochleariformis, Oenanthe javanica* and *Taraxacum macilentum,* new chromosome numbers (new cytotypes) are reported here.

Chromosome studies on vascular flora of Sakhalin started in 1957 (first publication: Sokolovskaya 1960), first publication on the flora of the Kuriles (Gurzenkov and Gorovoy 1971), from Moneron Island (Gurzenkov and Pavlova 1984).

Materials and Methods

Counts were made by E.G. Rudyka, on squashed preparations of root tips fixed with Carnoy's solution, in a greenhouse in Vladivostok, where alive plants collected by V.Yu. Barkalov in the field, were growing. Some plants were obtained from seeds taken from herbarium specimens. Preparations were stained with iron hematoxylin or acetocarmin. First counts are indicated with an asterisk (*). Voucher specimens are preserved in the Herbarium of the Institute of Biology and Soil Science, Far East Branch of the Russian Academy of Sciences, Vladivostok (VLA). The plants were identified by V.Yu. Barkalov and N.S. Probatova. The plant names and geographical distribution of the species studied are given mainly according to Vascular Plants of the Soviet Far East, Vols. 1–8 (Kharkevich 1985–1996), and to Cherepanov (1995). For some species new data on species distribution on the islands are included by V.Yu. Barkalov. The manuscript was prepared by N.S. Probatova, as well as translation.

Annotated List of Plants with Chromosome Numbers Studied

Family Apiaceae

1. ***Oenanthe javanica*** (Blume) DC.
(*Oe. decumbens* Koso-Pol. p.p., excl. basionym)

Chromosome number. $2n=22$.

Voucher specimens. VLA 8588, Moneron Island, in vicinity of Staritsky settlement (south-east part of the island), on wet stony maritime slope, near the waterfall, 23.VIII.2001, coll. V. Barkalov; VLA 8041, Kuriles, Kunashir Island, Alyokhina Bay, on the slope, in the tall herbs community, near hot spring, 19.VIII.1999, coll. V. Barkalov.

Distribution. Southern Sakhalin, Moneron, South

Kuriles. East and South Asia. Riverside and wet meadows.

Note. From Sakhalin Sokolovskaya (1960) and later, Gurzenkov and Gorovoy (1971) reported the tetraploid chromosome number $2n$=44 (as "*Oe. decumbens*"), and the same chromosome number has been reported from the Primorsky Territory (Sokolovskaya 1966). In the Russian Far East this plant was known for a long time under the name "*Oe. decumbens*", later it was referred to *Oe. javanica*. Nevertheless, for *Oe. javanica* from Japan (Hokkaido) $2n$=42 was known (Nishikawa 1980), some other authors also give $2n$=42 for this species, but most reports give $2n$=20 (see Bolkhovskikh *et al.* 1969; Goldblatt 1981, 1984, 1988; Goldblatt and Johnson 1990). However, for various *Oenanthe* species $2n$=22 is very common. Probably, this situation results from nomenclatural confusion, or not all the populations from the Russian Far East should be referred to *Oe. javanica* (this species is known to be described from Indonesia).

Family Asteraceae

2. ***Artemisia arctica*** Less.

Chromosome number. $2n$=18.

Voucher specimen. VLA 8190, Kuriles, Shumshu Island, near Baykovo, meadow on marine terrace, 24.VII.2000, coll. V. Barkalov.

Distribution. Northern Sakhalin, Kuriles. Eastern Siberia, Far East; North America. Mountain tundras.

Note. Very polymorphic species. From Kamchatka Peninsula the tetraploid chromosome number $2n$=36 have been reported (Sokolovskaya 1963), but from Japan (Hokkaido) and from North America, $2n$=18 (Nishikawa 1988; Dawe and Murray 1979, respectively). The monographer of the genus *Artemisia* of North-East Asia Korobkov (1981) recognizes some subspecies within *A. arctica*. The most widely distributed (and well studied) is subsp. *ehrendorferi* Korobkov, $2n$=36 (many references, see Agapova *et al.* 1990). Another one is subsp. *psilosantha* Hult., distributed in Kamchatka and on the Kuriles, $2n$=18 (Korobkov 1981, from Kamchatka), we also refer the plant studied by us to this subspecies (perhaps it is also the case of plants studied in Japan). The subsp. *arctica* is also diploid (to this subspecies plants from North America should be referred). Diploid cytotypes could indicate the ancient parts of the area of species distribution. In Kamchatka and Chukotka they are displaced by more recent, tetraploid cytotype.

3. ***Artemisia unalaskensis*** Rydb.

Chromosome number. $2n$=36*.

Voucher specimen. VLA 8300, Kuriles, Shiashkotan Island, near the Cape Obvaljny, at the bottom of maritime slope, 2.VIII.1999, coll. V. Barkalov.

Distribution. Northern Sakhalin, Kuriles. North Pacific. Coastal meadows.

4. ***Cirsium pectinellum*** A. Gray

Chromosome number. $2n$=34.

Voucher specimens. VLA 9067, Moneron Island, in vicinity of Staritsky settlement (south-east part of the island), Asakhi Mt., meadow on the slope (Calamagrostidetum varioso-herbosa), 23.VIII.2001, coll. V. Barkalov; VLA 8042, Kuriles, Kunashir Island, nature reserve "Kurilsky", tall herbs along the river running out of Peschanoye Lake, 17.VIII.1999, coll. V. Barkalov.

Distribution. Southern Sakhalin, Moneron, South Kuriles; Japan. Wet meadows and boggy places.

Note. Chromosome number $2n$=34 was reported for *C. pectinellum* from Japan (Hokkaido), by T. Nishikawa (1984), and he reports at the same time the tetraploid cytotype $2n$=68 for this species. *C. pectinellum* was poorly known in the Russian Far East until now. It has been found that the previously reported chromosome number $2n$=c.70 for "*C. kamtschaticum* Ledeb." from Sakhalin (Sokolovskaya 1960) must be referred to *C. pectinellum*, as resulted from reexamination of the voucher (herbarium) specimen (in LEU), made by Barkalov. And we suppose that chromosome number of this (Kamchatkan) plant was $2n$=68, too.

5. ***Crepis hokkaidoensis*** Babc.

Chromosome number. $2n$=14–16.

Voucher specimen. VLA 8940, Sakhalin, Nabiljsky Mountain Range, Chamginsky Pass, the upper part of the rivulet (the right affluent of Khrebtovy Spring), the spot elevation "1511 m", break-stone deposits on the top of the mountain, 8.VIII.2002, coll. V. Barkalov.

Distribution. Sakhalin, Moneron, South Kuriles; Japan. Rocky places.

Note. C. hokkaidoensis was not hitherto studied caryologically on the Russian Far East. There were few counts from Japan, but all of them, $2n$=8 (see Bolkhovskikh *et al.* 1969; Ikeda 1988). Our chromosome number, most probably, is $2n$=16, and the tetraploid cytotype is new for this species.

6. ***Erigeron peregrinus*** (Pursh) Greene

Chromosome number. $2n$=18.

Voucher specimen. VLA 8306, Kuriles, Paramushir Island, nearby the Pernatoye Lake, wet meadow, 25.VIII.2000, coll. V. Barkalov.

Distribution. North Kuriles. North Pacific. Meadows.

Note. It is the first chromosome count for *E. peregrinus* from Asia. Before it has been studied in North America, $2n$=18 (for references: Bolkhovskikh *et al.* 1969; Goldblatt and Johnson 1990). This is a rare species in the Russian Far East, known only from the Commander Islands and Paramushir Island on the Kuriles.

7. ***Ptarmica macrocephala*** (Rupr.) Kom.
(*P. speciosa* Herd.)

Chromosome number. $2n$=18.

Voucher specimen. VLA 8213, Kuriles, Chirpoi Island, Peschanaya Bay, on the slope of marine terrace, 3.VIII.2000, coll. V. Barkalov.

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

Note. The chromosome counts for this species were known from Sakhalin (Sokolovskaya 1960, as "*Achillea*

ptarmica var. *speciosa*"; Probatova and Sokolovskaya, 1990, as "*P. speciosa*") as well as from Kamchatka Peninsula (Sokolovskaya 1963), all of them, $2n$=18. The present result confirmed the previous counts.

8. ***Taraxacum macilentum*** Dahlst.

Chromosome number. $2n$=16.

Voucher specimen. VLA 8884, Sakhalin, Nabiljsky Mountain Range, Chamginsky Pass, the upper part of the rivulet (the right affluent of Khrebtovy Spring), the spot elevation "1511 m", stony places in the valley of rivulet, 8.VIII.2002, coll. V. Barkalov.

Distribution. Northern Sakhalin (mountains); Eastern Europe, Siberia, North America. Arcto-montane. Rocky habitats.

Note. The diploid chromosome number $2n$=16 in *T. macilentum* was revealed for the first time. Previously for this species only polyploid chromosome numbers were known: $2n$=24 and 32, from Chukotka and Wrangel Island (Tzvelyov and Zhukova 1986), $2n$=24 and 40, from Tajmyr Peninsula, Siberia (Krogulevich and Rostovtseva 1984).

9. ***Taraxacum vestitum*** Worosch.

Chromosome number. $2n$=16*.

Voucher specimen. VLA 8910, Sakhalin, Schmidt Peninsula, Taliki River, maritime slope, on the silt, 14.VIII.2001, coll. V. Barkalov.

Distribution. North Sakhalin. Endemic. Coastal rocky habitats. The species was described from Schmidt Peninsula (Boljshaya Longri River).

Note. The diploid chromosome number $2n$=16 in *Taraxacum* species is rare, especially among the numerous Far Eastern representatives of the genus: it was known until now only for West Chukotka endemic species, *T. leucocarpum* Jurtz. et Tzvel., coastal psammophyte (Tzvelyov and Zhukova 1986). It is noteworthy on this subject, that in Japan at least 7 species of *Taraxacum* are known to be diploids, $2n$=16 (see Bolkhovskikh *et al.* 1969; Goldblatt and Johnson 1990), so we could suppose one of the ancient centers of differentiation (insular Pacific) for this huge apomictic genus. It is also noticeable that most counts in this genus reveal the triploid level: $2n$=24 (see Bolkhovskikh *et al.* 1969 etc.).

10. ***Tephroseris kawakamii*** (Makino) Holub
(*Senecio kawakamii* Makino)

Chromosome number. $2n$=48*.

Voucher specimen. VLA 8782, Sakhalin, Schmidt Peninsula, Taliki River, mountain slope with scarce vegetation, near the sea coast, on the break-stone and silt deposits, 14.VIII.2001, coll. V. Barkalov.

Distribution. Sakhalin, South Kuriles (Shikotan Island). West Pacific. Meadows and rocky habitats.

Note. The early report $2n$=c.40 for "*Senecio kawakamii*" from the Primorsky Territory (Probatova & Sokolovskaya 1990) was incorrect, and, moreover, we actually refer the plant, studied before, not to *T. kawakamii*, but to *T. subscaposa* (Kom.) Czer.

Family Brassicaceae

11. ***Arabis glauca*** Boissieu
(*A. serrata* var. *glauca* (Boissieu) Ohwi)

Chromosome number. $2n$=16.

Voucher specimen. VLA 8810, Moneron Island, in vicinity of Staritsky settlement (south-east part of the island), on silt slope, near the rocks, 23.VIII.2001, coll. V. Barkalov.

Distribution. Moneron, Kuriles; Japan. Screes and rocky habitats.

Note. Only one chromosome number was known for *A. glauca*, from Japan (Hokkaido): $2n$=32 (Nishikawa, 1985, as "*A. serrata* var. *glauca*"). So we revealed the diploid cytotype for this species, which is found to be polymorphic caryologically.

12. ***Arabis stelleri*** DC.

Chromosome number. $2n$=16.

Voucher specimens. VLA 8711, Sakhalin, Tonino-Anivsky Peninsula, in vicinity of Lebyazhje Lake, near Cape Menaputzy, 21.VIII.2001, coll. V. Barkalov; VLA 8102, Kuriles, Zeljony Island, the bay northwards from Cape Glushnevsky, sandy-gravelly bar between sea coast and the lake Utinoye, 20.VIII.1998, coll. M. Iljushko.

Distribution. Sakhalin, Moneron, Kuriles; Eastern Siberia, Far East (also Kamchatka, Commander Islands); Japan. Screes and rocky habitats.

Note. *A. stelleri* was studied before in Kamchatka, but the chromosome number obtained there, was tetraploid, $2n$=32 (Zhukova and Petrovsky 1984). The species is polymorphic (as to pubescence of plants, density of inflorescences when fruiting). The southern Sakhalin-South Kurilean part of the area of species distribution (where the species is revealed to be diploid) could obviously be more ancient (in comparison to Kamchatka).

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

Chromosome number. $2n$=32.

Voucher specimens. VLA 8107, Kuriles, Matua Island, Dvoynaja Bay, on volcanic scoria, 3.VIII.1999, coll. V. Barkalov; VLA 8113, Kuriles, Shiashkotan Island, near the Cape Obvaljny, stony slope of marine terrace, 2.VIII.1999, coll. V. Barkalov.

Distribution. Sakhalin, Moneron, Kuriles; Japan. Coastal rocky habitats.

Note. We revealed a new cytotype in *D. kurilensis*, because for this species the only one chromosome number report existed: $2n$=16, from Sakhalin (Gurzenkov 1973). *D. kurilensis* belongs to the North Pacific complex *D. borealis* DC. aggr., and it is not unanimously recognized as a species. But for *D. borealis* s. str. only high polyploid levels are known: $2n=8x=64$, from East Chukotka (Zhukova and Petrovsky 1984), $2n=10x=80$ (Heilborn 1927, see Bolkhovskikh *et al.* 1969). We suppose that chromosome numbers could provide some additional reasons to consider *D. kurilensis* as a separate species, more ancient entity in comparison to high polyploid northern cytotypes of *D. borealis* DC. aggr.

14. ***Macropodium pterospermum*** Fr. Schmidt

Chromosome number. 2*n*=30*.

Voucher specimen. VLA 9061, Sakhalin, Makarovsky District, in vicinity of Tikhaya railway station, at the mouth of Tikhaya River, on the slope in the water gap, tall herbs community, 20.VIII.2003, coll. V. Barkalov.

Distribution. Sakhalin; Japan. Also reported from Sikhote-Alinj Mountain Range (Khor R. basin). Mainly, rocky habitats in forests.

Note. The genus *Macropodium* Fr. Schmidt is considered to be one of the most ancient within Brassicaceae (Berkutenko 1988), it comprises 2 species: the chromosome number of the second species, Southern Siberian montane *M. nivale* (Pall.) R. Br. has been counted several times in Siberia: 2*n*=30 (see Agapova *et al.* 1990; Goldblatt 1981, 1988; Goldblatt and Johnson 1994). The basic chromosome number (x) in this relict genus is still unclear: x=5 or 15?

15. ***Nesodraba grandis*** (Langsd.) Greene
(*Draba grandis* Langsd., *D. hyperborea* auct.)

Chromosome number. 2*n*=32.

Voucher specimen. VLA 8204, Kuriles, Raikoke Island, on the slope of marine terrace, 30.VII.2000, coll. V. Barkalov.

Distribution. Kuriles (North, Middle: Onekotan Island, South: Iturup Island). North Pacific. Coastal rocky habitats. Halophyte.

Note. This chromosome number is new for this species, which is better known under the name of "*Draba grandis*". Earlier chromosome report (from Iturup Island) was 2*n*=14–16 (Probatova *et al.* 2000), and there were two other previous reports from North America: 2*n*=36, 38 (Mulligan 1966, as "*Draba hyperborea* (L.) Desv."; see Bolkhovskikh *et al.* 1969). The existence of several cytotypes within this species needs further reassurances. Recent data on distribution and habitat of "*Draba grandis*" on the Kuriles were published in a special paper of Takahashi *et al.* (2000). As we suppose, this very peculiar species, slightly succulent coastal halophyte, belongs to the anciently proposed genus *Nesodraba* Greene, rather than to *Draba*.

16. ***Noccaea cochleariformis*** (DC.) A. et D. Löve
(*Thlaspi cochleariforme* DC.)

Chromosome number. 2*n*=14.

Voucher specimen. VLA 8942, Sakhalin, Nabiljsky Mountain Range, Chamginsky Pass, the upper part of the rivulet (the right affluent of Khrebtovy Spring), the spot elevation "1511 m", break-stone screes, by the rocks, 8.VIII.2002, coll. V. Barkalov.

Distribution. Sakhalin; Eastern Europe, Siberia, Far East (relatively rare). Rocky places.

Note. The diploid chromosome number in this species, usually known under the name *Thlaspi cochleariforme* DC., is revealed for the first time. Until now only polyploid cytotypes were reported for it: from Siberia, 2*n*=28, Putorana Plateau (Krogulevich 1976) and 2*n*=56, Tajmyr Peninsula (Zhukova *et al.* 1973), and from the Russian Far East (Chukotka, Anyujskoye Upland), 2*n*=84, 12 x (Zhukova and Petrovsky 1980). There is little doubt, that the diploid cytotype might indicate the most ancient part of the area of species distribution. For another species, the North Pacific *N. kamtschatica* (Karav.) Czer. (*Thlaspi camtschaticum* Karav.), which is not present on Sakhalin and the Kuriles, the diploid chromosome number 2*n*=14 was reported from South Chukotka (Zhukova 1980).

Family Caryophyllaceae

17. ***Honckenya oblongifolia*** Torr. et Gray
(*H. frigida* Pobed.; *H. peploides* subsp. *major* (Hook.) Hult.; *Ammodenia peploides* auct.)

Chromosome number. 2*n*=34.

Voucher specimen. VLA 8715, Moneron, Ussova Rivulet (south part of the island), on maritime sands, 24.VIII.2001, coll. V. Barkalov.

Distribution. Sakhalin, Moneron, Kuriles. North Pacific. Coastal halophyte.

Note. The diploid chromosome number in this species was revealed for the first time (it was obtained on seedlings). Previous reports were: 2*n*=68–70 from Sakhalin (Sokolovskaya 1960, as "*Ammodenia peploides*"), 2*n*=66, 68, 68–70, 70 from Wrangel Island, East Chukotka, as well as from the islands of Peter the Great Bay (the Primorsky Territory), under various names (see Agapova *et al.* 1990; Goldblatt 1985). Very close to *H. oblongifolia* is the Arctic species *H. diffusa* (Hornem.) A. et D. Löve, with the same chromosome numbers (and with 2*n*=c.40). For European *H. peploides* (L.) Ehrh. chromosome numbers 2*n*=c.48, 48, 64, 66, 68 are known (see Bolkhovskikh *et al.* 1969), among them 2*n*=68 is the most common (Goldblatt and Johnson 1998, 2000 etc.), the same is for *H. oblongifolia*, so this chromosome number seems to be tetraploid. The small genus (2–3 species), appears to be very peculiar as supralittoral halophytic succulent plants. This genus seems to occupy a very separate position within *Caryophyllaceae*.

18. ***Minuartia verna*** (L.) Hiern

Chromosome number. 2*n*=24.

Voucher specimen. VLA 9113, Sakhalin, Schmidt Peninsula, the mountain "223 m", northwards from the confluence of Malaya Longri and Boljshaya Longri Rivers, break-stone and silt slope with poor vegetation, 16.VIII.2001, coll. V. Barkalov.

Distribution. Sakhalin. Holarctic. Rocks and stony slopes.

Note. This is the most common, diploid cytotype (x=12) and the first count for *M. verna* in Russia. There is a series of chromosome numbers within this species, reported in the world literature: 2*n*=24, 26, 48, 78, 120 (see Bolkhovskikh *et al.* 1969; Goldblatt 1981, 1984, 1985; Goldblatt and Johnson 1990, 1996, 1998, 2000).

Family Cyperaceae

19. ***Carex microtricha*** Franch.
(*C. nervata* auct.)

Chromosome number. 2*n*=30–32*.

Voucher specimen. VLA 8220, Kuriles, Chirpoi Island, Peschanaya Bay, on the slope of marine terrace, 3.VIII.2000, coll. V. Barkalov.

Distribution. Sakhalin, Moneron, Kuriles. West Pacific. Woodside habitats.

Note. We have not found any chromosome report in the literature for this species. For its closely relative species, *C. nervata* Franch. et Savat., $2n$=76 is known; for another relative *C. caryophyllea* Latourr. (which is absent on the Russian Far East), $2n$=62, 64, 66, 68 were reported (see Bolkhovskikh *et al.* 1969). *C. nervata* might be more ancient that two other species in his group.

Family Ericaceae

20. ***Gaultheria miqueliana*** Takeda

Chromosome number. $2n$=22*.

Voucher specimen. VLA 8290, Kuriles, Shiashkotan Island, Zakatnaya Bay, on the climb to Pikovaya Mt., the glades in the thickets of *Pinus pumila*, 29.VII.2000, coll. V. Barkalov.

Distribution. Northern Sakhalin, Kuriles; Japan. Montane forests.

Note. This diploid chromosome number $2n$=22 is common to many of *Gaultheria* species (Middleton and Wilcock 1990).

Family Fabaceae

21. ***Hedysarum austrokurilense*** (N. S. Pavlova) N.S. Pavlova

(*H. sachalinense* subsp. *austrokurilense* N.S. Pavlova)

Chromosome number. $2n$=16.

Voucher specimen. VLA 9088, Sakhalin, Makarovsky District, Maguntan mud volcano, boggy places around volcanic field, 12.IX.2003, coll. V. Barkalov.

Distribution. Southern Sakhalin, Moneron, South Kuriles. Endemic (?). Meadows.

Note. Our earlier chromosome study of this species was made on the root tips of the seedlings, and it showed $2n$=14, 16, 20, 21 (Sokolovskaya *et al.* 1989). Now the chromosome number, obtained on adult plants (newly collected) is correct.

Family Gentianaceae

22. ***Gentiana jamesii*** Hemsl.

Chromosome number. $2n$=26.

Voucher specimen. VLA 8879, Sakhalin, Nabiljsky Mountain Range, Chamginsky Pass, the upper part of the rivulet (the right affluent of Khrebtovy Spring), the spot elevation "1511 m", low shrub-mossy tundra on the slope, 8.VIII.2002, coll. V. Barkalov.

Distribution. Sakhalin, South Kuriles (Iturup Island); Japan. Also occurs in Sikhote-Alinj Range and China. Montane meadows.

Note. We found in the literature for *G. jamesii* only $2n$=36 (Shigenobu 1982, 1984), the same chromosome number is reported by this author for two close relative species, *G. nipponica* Maxim. and *G. squarrosa* Ledeb. (they are also presented in the Russian Far East). However, other sources give for *G. squarrosa* $2n$=c.28, 38 and 76 (for references, Goldblatt and Johnson 2000). At the same time, for one more species, relative to *G. jamesii, G. uniflora* Georgi from Siberia, $2n$=26 is reported (Krasnoborov *et al.* 1980). As we see, within this aggregate the chromosome numbers are variable. Further studies are needed.

Family Hypericaceae

23. ***Hypericum yezoense*** Maxim.

Chromosome number. $2n$=16*.

Voucher specimen. VLA 8773, Moneron Island, in vicinity of Staritsky settlement, Asakhi Mt., stony slope, on the rocks, 23.VIII.2001, coll. V. Barkalov.

Distribution. Southern Sakhalin, Moneron, South Kuriles; Japan. Rocky places and meadows.

Family Juncaceae

24. ***Juncus ensifolius*** Wikstr.

Chromosome number. $2n$=40.

Voucher specimen. VLA 8285, Kuriles, Urup Island, Aleutka Bay, sedge-mossy bog in the valley of rivulet, 7.VIII.2000, coll. V. Barkalov.

Distribution. South Kuriles. North Pacific. Boggy places.

Note. The chromosome number $2n$=40 was reported by Snogerup (1963) and by Harriman and Redmond (1976) from North America. Our count is consistent with these previous reports.

25. ***Juncus leschenaultii*** J. Gay ex Laharpe

(*J. wallichianus* Laharpe)

Chromosome number. $2n$=30.

Voucher specimen. VLA 7875, Kuriles, Simushir Island, Browton Bay, boggy place near the rivulet, 8.VIII.1999, coll. V. Barkalov.

Distribution. Kuriles (Middle and South). East and South Asia. Riverside banks.

Note. The chromosome number was studied previously in *J. leschenaultii* on the Amur River basin (near Khabarovsk), $2n$=c.80 (Probatova and Sokolovskaya 1981). It was the only one count for this species made before.

Family Lentibulariaceae

26. ***Pinguicula macroceras*** Pall. ex Link

(*P. vulgaris* auct., p. p.)

Chromosome number. $2n$=16 *.

Voucher specimen. VLA 8467, Kuriles, Urup Island, Tetyajeva Bay, by the road covered with vegetation, 8.VIII.2000, coll. V. Barkalov.

Distribution. Kuriles. North Pacific (mainly insular, but also present in Kamchatka Peninsula). Boggy places in tundras.

Note. For a very close related species *P. vulgaris* L. we found in the literature various polyploid, chromosome numbers, among them $2n$=64 prevail (for references, see

Bolkhovskikh *et al.* 1969 etc.). It is obvious that besides some floral characters distinguishing *P. macroceras* from *P. vulgaris* (Tzvelyov, 1996), the diploid chromosome number $2n$=16 of *P. macroceras* also distinguishes these species. In the Russian Far East another species with $2n$=16 exist, *P. vIllosa* L., Holarctic by distribution (Zhukova 1967; Sokolovskaya 1968).

Family Melanthiaceae

27. ***Acelidanthus anticleoides*** Trautv. et C.A. Mey.

Chromosome number. $2n$=16*.

Voucher specimen. VLA 8876, Sakhalin, Nabiljsky Mountain Range, Chamginsky Pass, the upper part of the rivulet (the right affluent of Khrebtovy Spring), the spot elevation "1511 m", low shrub-mossy tundra on the slope, 8.VIII 2002, coll. V. Barkalov.

Distribution. Northern Sakhalin. The Sea of Okhotsk basin. Montane tundras.

Note. The genus *Acelidanthus* is monotypic genus, closely related to *Veratrum* L. In *Veratrum*, the tetraploid chromosome number $2n$=32 is generally common (see Bolkhovskikh *et al.* 1969), but in *V. maackii* Regel, which is the most close to the genus *Acelidanthus*, the chromosome number $2n$=16 was reported, based on plants collected in the Primorsky Territory (Sokolovskaya 1966). For another related taxon, *Zigadenus sibiricus* (L.) A. Gray, the chromosome number $2n$=32 is known, from the Primorsky Territory (Probatova and Sokolovskaya 1986), as well as from Siberia (see Agapova *et al.* 1990).

28. ***Veratrum grandiflorum*** (Maxim. ex Baker) Loes. fil.

Chromosome number. $2n$=32.

Voucher specimen. VLA 8758, Moneron Island, in vicinity of Staritsky settlement (southeast part of the island), wet meadow in the upper part of a rivulet, 23.VIII.2001, coll. V. Barkalov.

Distribution. Sakhalin, Moneron, South Kuriles. West Pacific. Meadows (tall herbs communities).

Note. This species have been studied in Sakhalin: $2n$=32 (Sokolovskaya 1960).

Family Poaceae

29. ***Deschampsia tzvelevii*** Probat.

Chromosome number. $2n$=26.

Voucher specimen. VLA 8530, Sakhalin, Makarovsky District, Maguntan mud volcano, on the mud around volcanic field, 4.VIII.2001, coll. A. Smirnov.

Distribution. Sakhalin (Maguntan mud volcano). Endemic.

Note. This very peculiar species was described 20 years ago, nevertheless it is still known only from one locality (*locus classicus*), where it is abundant. Its chromosome number was published at the time of species describing (Probatova 1984). *D. tzvelevii* can be distinguished perfectly well by its very rigid erect folded leaf blades, bright yellow sheaths of numerous sterile shoots, broad smooth obtuse glumes, by awn emergent from the middle third of lemma back (not near the bottom), as well as by its ecology. A plant with pseudoviviparous spikelets was found once.

30. ***Poa sugawarae*** Ohwi

Chromosome number. $2n$=28*.

Voucher specimen. VLA 8617 (10928), Sakhalin, Schmidt Peninsula, Longri Cape, near the mouth of Boljshaya Longri River, break-stone and silt screes on the mountain slope, 16. VIII. 2001, coll. V. Barkalov.

Distribution. Sakhalin (rare). Endemic.

Note. This is another very peculiar species of Sakhalin flora. Its chromosome number $2n$=28 is of great interest, because it seems to be unusually low for representatives of subsection *Malacanthae* (Roshev.) Probat. (section *Poa*), where high polyploids are presented (*Poa malacantha* Kom., *P. platyantha* Kom., *P. macrocalyx* Trautv. et C.A. Mey., *P. neosachalinensis* Probat. etc.) (Probatova 2003). Besides, the analysis of the plants studied has shown that low internodes of *P. sugawarae* are very abbreviated (so blades of leaves on the numerous vegetative shoots are closely crowded), leaf blades shortened, rigid, loosely convolute (prickly when dry), the tufts are dense but connected by rather long rhizomes, the number of lemma veins is augmented, callus with a very small scanty flexuous hairs, but the anthers are unusually long (3.1–3.5 mm). All that could testify to some separate position of *P. sugawarae* within *Malacanthae* group and perhaps - to significant age of this species (paleo-endemic?).

Family Polygonaceae

31. ***Rumex regelii*** Fr. Schmidt

Chromosome number. $2n$=40*.

Voucher specimen. VLA 8460, Kuriles, Kunashir Island, Alyokhina Bay, the mouth of Alyokhina River, on the gravel, 19.VIII.1999, coll. V. Barkalov.

Distribution. Southern Sakhalin, South Kuriles; Japan (?). Riverside and bank habitats.

Note. This species has been described from Sakhalin (Tunai). In the estimation of Tzvelyov (1989), *R. regelii* is close to *R. japonicus* Houtt., and also to *R. stenophyllus* Ledeb., the herbarium specimens being not numerous, further studies are needed to approve the validness of *R. regelii* as a species. From caryological point of view, these species are different in chromosome number: in *R. stenophyllus* (which is absent in Sakhalin and the Kuriles) we revealed a hexaploid number $2n$=60, from the Primorsky Territory (Probatova & Sokolovskaya, 1989), which is typical for *R. stenophyllus* (see in: Bolkhovskikh *et al.* 1969) and for *R. japonicus* the decaploid chromosome number $2n$=100 have been reported (Kihara and Ono 1926), while *R. regelii* is shown to be tetraploid.

Family Ranunculaceae

32. ***Miyakea integrifolia*** Miyabe et Tatew.
(*Pulsatilla integrifolia* (Miyabe et Tatew.) Worosch.)

Chromosome number. $2n$=16.

Voucher specimen. VLA 8949, Sakhalin, Nabiljsky Mountain Range, Chamginsky Pass, the upper part of the rivulet (the right affluent of Khrebtovy Spring), the

spot elevation "1511 m", stony slope, 8.VIII.2002, coll. V. Barkalov.

Distribution. Northern Sakhalin. Endemic. Rare species. Rocky places.

Note. The chromosome number in *M. integrifolia* has been reported by Volkova and Ulanova (1986), Zakharjeva, in Agapova *et al.* (1993), Starodubtsev (1997, as *Pulsatilla integrifolia*).

Family Scrophulariaceae

33. ***Pedicularis schistostegia*** Vved.
(*P. venusta* var. *schmidtii* Nakai; *P. venusta* auct., p.p.)

Chromosome number. $2n=16$*.

Voucher specimen. VLA 8464, Kuriles, Urup Island, Tetyajeva Bay, on the slope of marine terrace, meadow, 8.VIII.2000, coll. V. Barkalov.

Distribution. Southern Sakhalin, South Kuriles; Japan. Rocks and meadows.

Note. *P. schistostegia* (described from Sakhalin: Manue) is close to continental southern Siberian-Far East species *P. venusta* Schang. ex Bunge, for the latter the chromosome number $2n=16$ was known from Siberia (see Agapova *et al.* 1993).

General remarks

Now chromosome numbers are known for 340 species of vascular plants of Sakhalin, accounting for about 24 % of the total number of vascular plant species, in the Kuriles, 251 species (nearly 18% of the total flora), and in Moneron, 20 species are studied. In total, for 505 species from these islands chromosome counts now exist. The compiling of the book on caryology of the flora of Sakhalin and the Kurile Islands is in progress, with complete data and a brief analysis.

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The Chemophylogenetic Taxonomy of the Genus *Aconitum* (Ranunculaceae) in Hokkaido and its neighboring territories

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Abstract The accuracy of the species and its varieties ranking was indicated by the analysis of geohistory (g) on physical (p) and chemical (c) characters. In the genus *Aconitum* distributed in Hokkaido and its neighboring territories, the *A. sachalinense* F. Schmidt group showed all the physical variations [var. (p)]. *A. yesoense* Nakai is the subspecies [var. (p-c)] of the above *A. sachalinense* based on physical and chemical considerations. *A. macroyesoense* Nakai was revealed as a natural mutant [var. (c)] of *A. yesoense* based on chemical consideration. *A. ito-seiyanum* Miyabe et Tatew. is an independent species [var. (p-c-g)] of *A. sachalinense* from the geohistorical consideration joined with both selections.

Introduction

The tribe Delphinieae is characterized by the zygomorphic flowers in the Ranunculaceae, and includes three genera; i.e., *Aconitum, Delphinum* and *Consolida. Aconitum* is characterized by having two long stalked calcarate petals, and two unguiculate and ecalcarate petals, and three or more carpels. It is well known that a number of diterpenoidal alkaloids are contained in the above Delphinieae as the characteristic components in the secondary metabolitic products (Tamura 1995).

The genus *Aconitum* is clearly divided into three distinct subgenera; i.e., *Gymnaconitum, Aconitum* and *Lycoctonum.*

1) Subgenus *Gymnaconitum* is characterized by annual habit and root without abnormal growth. This is the monotypic subgenus composed of *A. gymnandum* Maxim. which is distributed in the central region of China, the Eurasian Continent.

2) Subgenus *Aconitum* is characterized by leaving the daughter tubes in winter. Furthermore, it includes the species having chain tubes of the daughter as *A. soongaricum* Staph. and *A. karakolicum* Rapaics.

3) Subgenus *Lycoctonum* is characterized by having perennial rhizomes separated into several stands, for example, *A. gigas* Lev. et Van't.

In the diterpenoidal alkaloids of subgenus *Aconitum* the isolation of C19-protoaconines shows the formation of C19-aconines from it, which is proceeded from Mannich reaction of the C19-protoaconines via the Wagner-Meerwein rearrangement of C20-atisines.

The biosynthesis of subgenus *Lycoctonum* is mainly characterized by the oxygenation of 7.8-double bond of the C19-protoaconines. The phenomenon was also observed in several hybridized species in subgenus *Aconitum*. Further evolution of *Lycoctonum* metabolism occurred to the esterification with anthranilic acid derivatives or Baeyer-Villiger oxidation on 4-hychoxymethyl function of C19-lycoctonums except methylation.

The systematic classification of subgenus *Aconitum* has long been considered quite difficult because its species show high levels of morphological and ecological variability (Nakai 1953). However, Kita *et al.* (1995) reported recently on the studies of molecular phylogeny of Asian species of subgenus *Aconitum* based on RFLP and sequences of the intergenic spacer between the *trn* L (UAA) 3'exon and *trn* F (GAA), and of the trn L intron of the chloroplast DNA.

In this paper, authors describe in detail on the chemophylogenetic taxonomy of subgenera *Aconitum* and *Lycoctonum* in Hokkaido and its neighboring territories based on the above theoretical terms and experimental results. It is concluded that the species and its varieties are expressed by the evolutional location of three dimensional coordination consisting of physical, chemical and geohistorical selections.

Fundamental unit of organization, the species was distinguished by the research on the history of physical and chemical characters concerning to an individual plant of Aconite.

Consideration and Discussions

1) Morphological consideration

Morphospecies is the orthodox nomenclature for biological species. This is called Linnean species. From particular classification came the term of the biological species for subspecies. Variation, speciation and mutation etc. are generally used (Darwin, 1859; Singh, 1999).

In the twentieth century, the fine words were reported as ecospecies for ecological (Turesson 1922 cited Yasugi *et al.* 1996, p. 752d), deme for Mendelian (Gilmour 1939 cited Yasugi *et al.* 1996, p. 963h), and sister species for geographic or sibling species for morphological terms (Mayr 1954 cited Yasugi *et al.* 1996, p. 597b, 996i). Then, Templeton (1981 cited Yasugi *et al.* 1996, p. 800g, 1007g) used the expression of evolutional words, e.g. divergence mode (for adaptation, cline and habitat etc.) and transilience mode (for recombined gene, and genetic revolution etc.) (Yasugi *et al.* 1996). These words are all meaning physical (morphological) observation from the naked eye to electronic microscope.

In the above mentioned category, *A. sachalinense* F. Schmidt and its allied species are well classified in the previous paper (Ichinohe *et al.* 2002). From an interest of the island bio-geography, the investigation was first made on the genus *Aconitum* of Rebun and Rishiri which are isolated from Hokkaido by sea. Specifically, *A. sachalinense* F. Schmidt var. *compactum* Miyabe et Tatew. has no opportunity of a hybrid between proper species and the other varieties, because it only propagates by the roots than flowers (Table 1).

Consequently, on the varieties of *A. sachalinense* F. Schmidt, the sorts of C19-norditerpene alkaloids, jesaconitine, aconitine and mesaconitine, are observed in the quality although they are different in the quantity, respectively. They have in all diversities of the physical (morphological and geographical) selection except *A. itoseiyanum* Miyabe et Tatew. as shown in Table 1.

A. gigas Lev. et Van't of subgenus *Lycoctonum* is characterized by the pedicels covered with rough-surfaced curved hairs, but this massive collection revealed that most plants had pedicels which were clothed with a mixture of rough-surfaced curved hairs and rough-surface patent hair.

Kadota (2001) reported that the type of intermediate pedicel indumentum suggests putative hybrid derivatives between *A. gigas* and an unknown species with pedicels villose with rough–surfaced patent hair. Thereupon, Kadota (2001) found *A. mashikense* Kadota et Umezawa as a new type of species.

A. gigas Lev. et Van't contains atisine as C20-bases, and so exist lycoctonine, gigactonine and lycaconitine as C19-bases (Sakai *et al.* 1978). On the basis of these data and the spectrum of *A. umbrosum* (Korsh) Kom. (Fig. 3), both are shown as the related species. However, these species are different from *A. barbatum* Pers. and *A. kirinense* Nakai which contain C18-bisnor-diterpenoidal alkaloids. Here is shown the skeletal biosynthesis of *Aconitum* alkaloids is shown in Fig. 1.

2) Chemotaxonomical consideration

The first chemical work was begun by Shimoyama (1881) on Japanese *Aconitum* plants in 1882. Then, Makoshi (1909) reported on the isolation of jesaconitine from *Aconitum* species of Hokkaido under the supervision of Schmidt, Marburg University, Germany. In the latter half of the 20th century, the school of Ochiai began the chemical studies on Japanese *Aconitum* (Ochiai *et al.* 1955). Jesaconitine is the major alkaloid of the both species, *A. sachalinense* and *A. yesoense*. Majima and Morio (1924) purely isolated jesaconitine. The absolute structure of jesaconitine was determined by X-ray crystallographic analysis (Pelletier *et al.*, 1979).

Transplantation of *A. grossedentatum* Nakai from Mt. Kongosan, Honshu Island to the Botanic Garden of Hokkaido University in Sapporo allowed jesaconitine to produce the variation on the index of leaf form. Thus the above species belonging to the *A. japonicum* group. Figure 4 shows the Lc/Ms spectrum of root on wild and native *Aconitum japonicum* Thunb. (var. *subcuneatum* Nakai) collected at Kodomari, Aomori Prefecture. An elegant and clear J-pattern appears in the spectrum, but it change to complex and complicated m-pattern spectrum by the hybridization with others.

It is interesting to note the place when and where the specimen of *A. japonicum* Thunb. was collected, now preserved in Upsala University, Sweden. One of the authors (Y. I.) proposed that it is *A. subcuneatum* Nakai collected by Tomonoshin Abe at South Hokkaido or Tsugaru Peninsula (e.g. *sino surku* meaning the true aconite by Ainu words) on the basis of the historical and ethnical references (Ichinohe 1992). Concerning to cytochemistry, hetero-chromatin is an important factor for the information of the synthetic time or the existence pattern on DNA. The karyomorphological researches were reported by Okada (1979, 1990) and Tamura on *A. grossedentatum* ($2n$=32) and *A. sanyoense* ($2n$=16).

The investigation of chemical selection proceeded one more step than that of the above mentioned physical selection. Of course, DNA (chloroplast) analysis examines the distribution of nucleic acid in molecular inheritance as the primary metabolic products. This fact is also caused by the results based on a change of the skeletal rearrangement on the secondary metabolites e.g. characteristic components, diterpene alkaloids. The method demonstrated clearly not only the close relationships among *A. yuparense* Takeda, *A. yamazakii* Tamura et Namba and *A. apoiense* Nakai; that is, the alpine type ($2n$=16) of Hokkaido, but also the relationships among *A. iidemontanum* Kadota, *A. sanyoense* Nakai (Kita *et al.* 1995) and *A. tonense* Nakai (Kita pers. com.) in Honshu.

In 1940, Suginome and Shimanouchi (1940) isolated kobusine (German; kobusin*), one of C20-atisine group

*: Kobusine was named in comparison with *A. sachalinense* (small root; Karafuto-kobushi) and *A. neosachalinense* (large root; Karafuto-ohbushi) in Sakhalin (Karafuto) island of Russia. From either a failure to find older work or neglecting the earlier work, the same nomenclature is observed also in the lignans. (Suginome 2003)

Table 1. Classification of varieties on *Aconitium sachalinense* and *A. ito-seiyanum*.

Taxa	Inflorecence	Carpel number and pubescence	Locality	Crude bases (Weak bases)	J*	A*	M*	Voucher specimen
A. sachalinense [2*] var. *sachalinese* (Karafuto-bushi)	dense raceme to corymb	3 no hair	Sakhalin; Poronaisk Kitami; Yuchi (wet ground)	0.85	ca.9	0.5	0.5	Ichinohe No.0101-2002
			Yuchi	1.22	6	2	2	Ichinohe No.0101-1968[6*]
A. sachalinense var. *compactum* (Rishiri-bushi)	dense corymb	3 no hair	Rishiri; Mt. Rishiri Rebun; Momoiwa (alpine meadow)	Rebun 1.29	6	2	2	Ichinohe No.0102-1968[6*]
A. sachalinense var. *lasiocarpum* (Kemino-karafutobushi)	– (dense corymb)	3 dense hair	Kitami; Yuchi Kitami; Bakkai[3*] (wet ground)	Yuchi 1.59	8	1.5	0.5	Ichinohe No.0103-1968[6*]
A. sachalinense var. *nemuroense* (Kokarafuto-bushi)	corymb to panicle	3–5 no hair or rare hair	Nemuro; Atsutoko Kushiro; Otanoshike[3*] (wet ground)	Opporo 1.10	4	4	trace[4*]	Ichinohe No.0104-1975[6*]
A. ito-seiyanum (Seiya-bushi)	lax panicle to corymb hair	3 dense curled (serpentine zone)	Teshio; Toikanbetsu Nupromapporo[3*]	Nupro-mapporo 2.81 (0.72)	(699,	661,	633)[5*]	Ichinohe No.0105-1968[6*]

* This is classified as subspecies and the varieties mean each synonymy.

[*] J: jesaconitine A: aconitine M: mesaconitine

[2*] Majima and Morio, 1930. J. Chem. Soc. Jpn. 51. p.200 (in Japanese).

[3*] Each population corresponds to the parenthesized taxa adopted by Tamura and Namba (1959).

[4*] This population contains ratio 2 of hypaconitine.

[5*] Each values are molecular weight.

[6*] Herbarium specimens deposited at The Hokkaido University Museum.

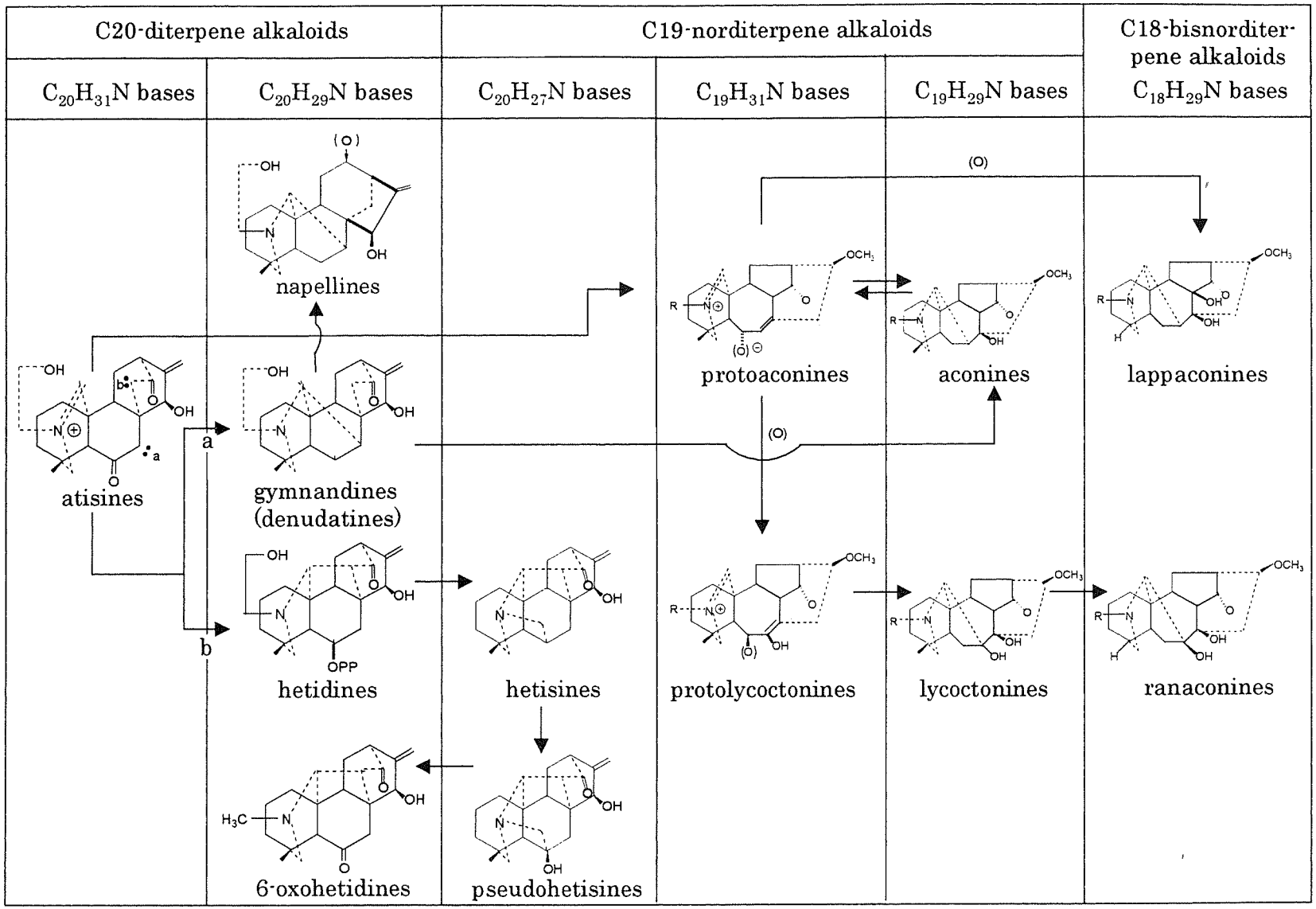


Figure 1. Skeletal biogenesis of diterpene alkaloids in Delphinieae.

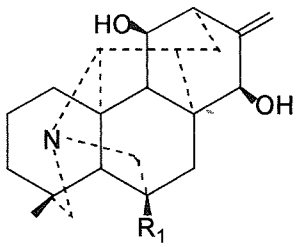
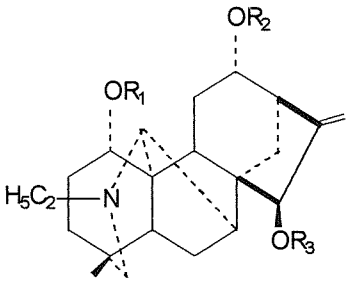
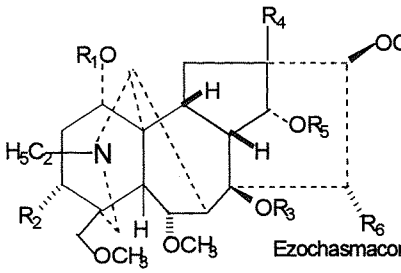
A. yesoense Nakai	Content*
 Kobusine R_1=H Pseudokobusine R_1=OH	4.74 17.38
 Napelline (R_1=R_2=R_3=H) (Lucidine) Luciduscline R_1=R_2=H R_3=Ac 1 acetyl napelline R_1=Ac R_2=R_3=H	1.58 4.09 0.14
 Neoline R_1~R_6 = H 14-Acetyl-neoline R_5 = Ac.,Others=H Chasmanine R_1=CH_3,R_2~R_6=H Ezo-chasmanine R_1=CH_3,R_2=R_4=OH R_3=R_5=H Ezochasmaconitine R_1=CH_3,R_2=R_4=H,R_3=Bz,R_5=Ac Aniso-ezochasmaconitine R_1=CH_3,R_3=As,R_5=Ac,R_2=R_4=R_6=OH Pyrochasmanine (F=OR_3-R_6)R_1=CH_3,Others=H Jesaconitine R_1=CH_3,R_2=R_4=R_6=OH,R_3=Ac.,R_5=As Mesaconitine N-C_2H_5→N-CH_3 R_1=CH_3,R_2=R_4=R_6=OH R_3=Ac.,R_5=Bz	3.36 0.12 13.81 0.12 2.04 0.10 0.08 3.65 0.55
* The percentage based on Crude base	

Table 2a. Isolated alkaloids and their yields from *A. yesoense* Nakai (Takayama *et al.* 1982).

from *A. sachalinense* F. Schmidt.

In 1950, Suginome and Imato reported that *A. kamtchaticum* Wild. et Reichb. contains kobusine as C20-bases and mesaconitine and hypaconitine as C19-bases. *A. neosachalinense* Le'v., which is hybridized with the above *A. kamtchaticum* and *A. fischerii* Reichb., distributes over Sakhalin and was confirmed the existence of miyaconitine as C20-bases (Ichinohe *et al.* 1970) and sachaconitine, benzoylisodelphonine and isodelphinine as C19 bases (Pelletier *et al.* 1977). These facts show the predominant course of morphological and biochemical selections. In this case, especially, the absolute structure of proto-aconines becomes a key alkaloids and acts as an important intermediate. From the consideration of the structure on secojesaconitine (Bando *et al.* 1988), one of us (Y.I.) suggested the existence of the stage of protoaconine group as a determining step, thus proposing a common ionic structure of proto-aconines (Ichinohe 1989, Fig. 1).

Kadota (1987) reported that *A. yesoense* Nakai is the subspecies of *A. sachalinense* F. Schmidt and is also chemically a few steps in the series connection. Moreover, Tamura and Namba (1959) reported already that *A. macroyesoense* Nakai and *A. luciduscum* Nakai are the ecospecies of *A. yesoense* Nakai as shown in Fig. 5b. It is well known that some toxic aconite plants are mingled with nontoxic ones. Appearance of the instrument on HPL-Lc/Ms using ESI method was achieved at the possibility with super-accuracy of the individual plant in the species population. It is actually observed that the retrogression of aconitines occurs as the biotransformation to lycoctonines via protoaconine skeleton in comparison with *A. yesoense* and *A. macroyesoense*. Consequently, *A. macroyesoense* Nakai

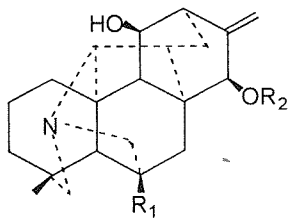
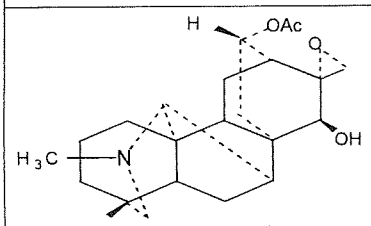
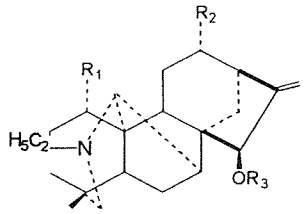
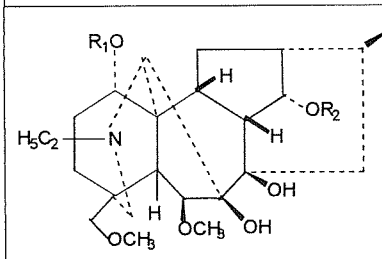
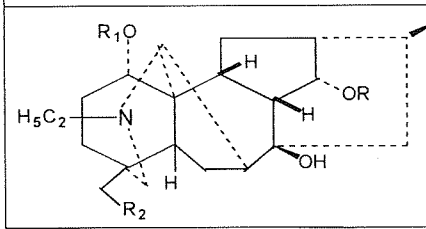
A. macroyesoense Nakai		Content*
	Kobusine R_1=R_2=H	2.14
	Pseudokobusine R_1=OH,R_2=H	4.26
	15-Benzoylpseudokobusine R_1=OH,R_2=Bz	0.30
	15-Veratoylpseudokobusione R_1=OH,R_2=Vr	0.55
	Yesoxine	0.40
	Napelline R_1=R_2=R_3=H	7.50
	Luciduscline R_1=R_2=H R_3=Ac	9.30
	1 Acetyl napelline R_1=Ac R_2=R_3=H	3.00
	Dehydronapelline	0.90
	N-Diethyl dehydro napelline	0.10
	Virescenine R_1=R_2=H	0.06
	Delcosine R_1=H,R_2=CH_3	9.00
	14-Acetyldelcosine R_1=H,R_2=Ac	15.10
	Browniine R1=CH_3,R_2=H	0.80
	14-Acetylbrowniine R_1=CH_3,R_2=Ac	0.10
	Karakoline R_1=R_2=R_3=H	0.10
	Isotalatizdine R1=R3=H R_3=OCH_3	0.20
* The percentage based on Crude bases		

Table 2b. Isolated alkaloides and their yields from *A. yesoense* var. *macroyesoense* (Nakai) Tamura (Bando *et al.* 1987).

proves to be a natural mutant of *A. yesoense* and may be called a chemical variation of *A. yesoense* (Table 2-a, b). On the chemical analysis the variation of the diterpenoidal alkaloids was not observed by the transplantation of *A. macroyesoense* from Hokkaido to Kanto region, but it was varied in leave morph (coefficient heterophylly).

It is also observed the impurity in the variety and the metabolism in the structural investigations as well as the case of massive collection of the above mentioned in the morphomic study. The problem was solved by the analysis of the individual body of the plant. Accordingly, *A. macroyesoense* Nakai, a natural mutant, is definitely a chemical variety (var. c) of *A. yesoense* Nakai. On the case of crossbreeding on mutual metabolites of C-20 diterpenoidal alkaloids (e. g. atisines → hetidines → hetisines →), the mutation occurred in a new skeletal rearrangement to napellinies via (in situ) an alavistic gymnandine skeleton by the action of potential gene (Ichinohe *et al.* 2002).

There are several species in Subgen. *Aconitum* having creeping character although no distributing in Hokkaido. *A. karafutense* Miyabe et Nakai (Nakai 1953), *A. sczukinii* Turcz. (Liao-ning province Institute for Forestry and Soils 1975) and *A. consaguneum* Vorosch. (Charkevicz 1995) are distributed through Provinces Primorskaya to Sakhalin. They contain a trace of gibbererllin-like substances. In comparison with *A. consaguineum* and *A. sczuknii*, the former contains hypaconitine and the latter exists as karakoline in the main C19-norditerpeenoidal alkaloids.

3) Geohistorical consideration

It is well known that the Eurasian and North American Continents were connected with the Aleutian Islands like point-bridges. Tsukada (1984) made up a vegetation map of the Japanese Archipelago

approximately 20,000 years B. P. based on the pollen analysis. *A. delphinifolium* DC is distributed to the Kamchatka Peninsula via the Aleutian Islands from Alaska of the U.S. It contains delphinifoline (lycoctonie skeleton) and 14-acetylsachaconitine (aconitine skeleton) as C19-norditerpenoidal alkaloids. These facts suggest the process to lycoctonies via protoaconines from aconines that is, the evolution of the species is in the direction to Subgen. *Lycoctonum* or *Paraconitium* from *Aconitum*.

Tamura and Namba (1959) classified subgenus *Aconitum* of Hokkaido into four groups (e.g. three as the lowland type and one as the alpine type)

1. *A. japonicum* (*A. subcuneatum*)
2. *A. sachalinense* (*A. yesoense*)
3. *A. maximum*
4. *A. yuparense*

This classification suggests some geohistorical problems before the formation of the Japanese Archipelago as well as the observation of Nakai (1917, 1953).

The treatment of DNA (chloroplast), the analyses of nucleic acid belonging to the primary metabolic products were classified on the relationships of the alpine ($2n$=16) type in Hokkaido and Honshu although it could not articulate on *A. japonicum* Thunb., and its species ($2n$=32) (Kita *et al.* 1995) as described in the previous section.

Before the formation of the Japanese Archipelago, the *A. sachalinense* group distributed over northern Hokkaido. Similarly, the *A. japonicum* group was also distributed over southern Hokkaido (Fig. 5a, b).

Then, although the formation of the Soya and Tsugaru straits happened, Hokkaido had been still divided by Ishikari Depression into two islands.

Volcanic eruptions of Mt. Tarumae and Mt. Eniwa were connected with north and south of Hokkaido. Thus *A. yesoense* was occurred as the natural mutant by the spread of the *A. japonicum* group (Fig. 6).

A. ito-seiyanum Miyabe et Tatew. grows in the marsh zone on the superbasic serpentinite belt (Mg-Fe exchange reaction system; $Mg_6SiO_{14}(OH)_8$-Fe-Ni-Cr redox) particularly geological area (Fig. 6) (Toyokuni 1982; Matsui and Banno 1992). This species shows the difference from p-varieties of other *A. sachalinense* in comparison with Lc/Ms spectra (Ichinohe *et al.* 2002). According to the consideration of the spectrum, it is possible to describe the physiological course as in Fig. 2

A. misaoanum Tamura et Namba, which belongs to *A. maximum* Pall., is distributed over the Kurile Island from the Kamchatka Peninsula, is in progress of the bearing direction.

Consequently, *A. ito-seiyanum* Miyabe et Tatew. is not only p-variety but also chemical and geohistorical varieties of *A. sachalinense* F. Schmidt. The species-level of *A. ito-seiyanum* is confirmed by the results of the analytical considerations.

Results and Conclusion

The function of metabolism on the characteristic components, diterpenoidal alkaloids, formulates based on a new direction of the respirative reaction. The phenomenon is caused by a variation of the environments (e. g. meteological warmth index, the water or soil quality etc).

A sample of the species was obtained in the bloom season. Spectrum of the pure species shows the peaks of brevity on the characteristic alkaloids (Fig. 3). The

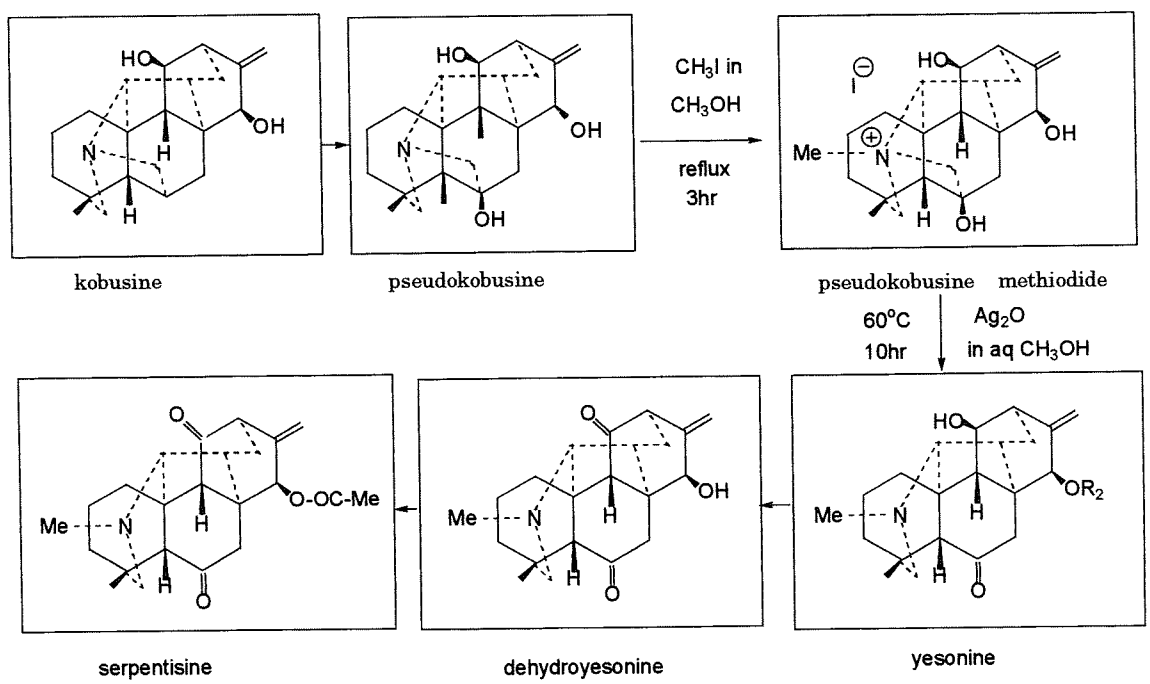


Figure 2. Biogenetic route of the hetisines in *A. ito-seiyanum* Miyabe et Tatew.

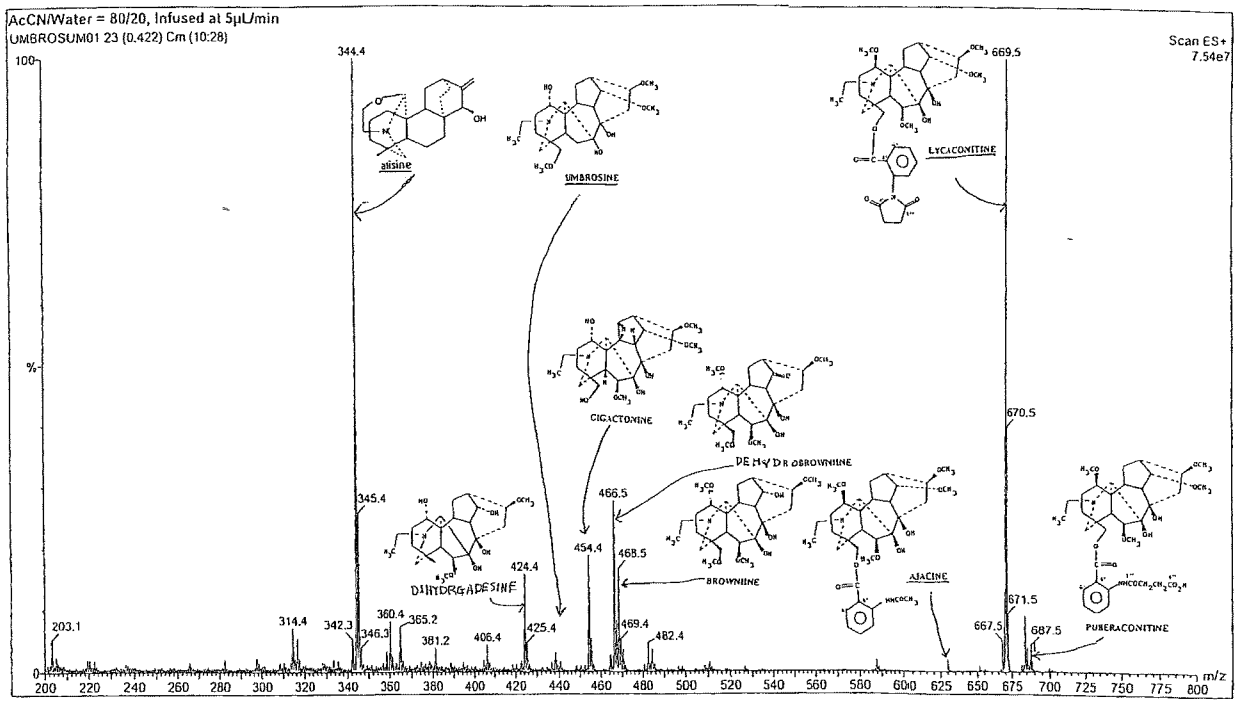


Figure 3. Lc/Ms spectrum of the ethanolic extract from *A. umbrosum* (Korsh) Kom.

mongrel on cross-pollinated species shows very complex peaks. In the case of mass collection due to the structural determination, frequently, it is observed that an existence of other species is suggested from the description of novel alkaloids (Table 2-a, b).

There are four patterns (J., L., M. and W. types) in pure species and one for hybrid species type (example: m-pattern) in the spectra of Lc/Ms.

The authors would like to propose that the species are shown by geohistory of physical and chemical characters on an individual *Aconitum* plant. They are expressed by the evolutional location of three dimensional coordinations consisting of X-axis (p-selection), Y-axis (c-selection) and Z-axis (g-selection).

1. p-variety; var. (p) (physical selection)
   a) Embryological morphology
   b) Ecological geography
2. c-variety; var. (c) (chemical selection)
   a) Molecular heredity
   b) Physiological chemistry
3. g-variety; var. (g) (geohistorical selection)
   a) Pedological geology
   b) Absolute chronology

The authors would like to name the physiological species to the above biological species.

The chemical investigation of *A. miyabei* Nakai (a local meaning of Kadohari-bushi distributed in Sakhalin) proved the presence of miyaconitinone having α-diketone moiety, the oxidative product of miyaconitine having α-hydroxy-ketone of transannular carbonyl function. This fact means only the substitutional transformation as the chemical selection, and is rather considered by the geological factor. By the use of the above mentioned presentation method, their examples are shown by *A. sachalinense* F. Schmidt p-var. *compactum* Miyabe et Tatew., *A. yesoense* Nakai, c-var. *macroyesoense* Nakai and *A. sachalinense* F. Schmidt g-var. *ito-seiyanum* Miyabe et Tatew., respectively. However, there are also double and/or triple variety well as the above single selection. Exact species must be uniformed by varieties of the three, and must be exactly distinguished from Linnean species. Then, the origin of new species is the combination of the three varieties [var. (p-c-g)], for example, as in *A. ito-seiyanum* Miyabe et Tatew.

Acknowledgements

Authors are grateful to Professor Feng-peng Wang (West China College of Pharmacy, Sichuan University, China) and Dr. Maria V. Kryukova (Far East Branch, Academy of Science, Russia) for their gifting of invaluable key plants of *Aconitum* species. We wish to express our sincere thanks to Dr. Hideki Takahashi for his valuable advice by reading this paper on the manuscript stage.

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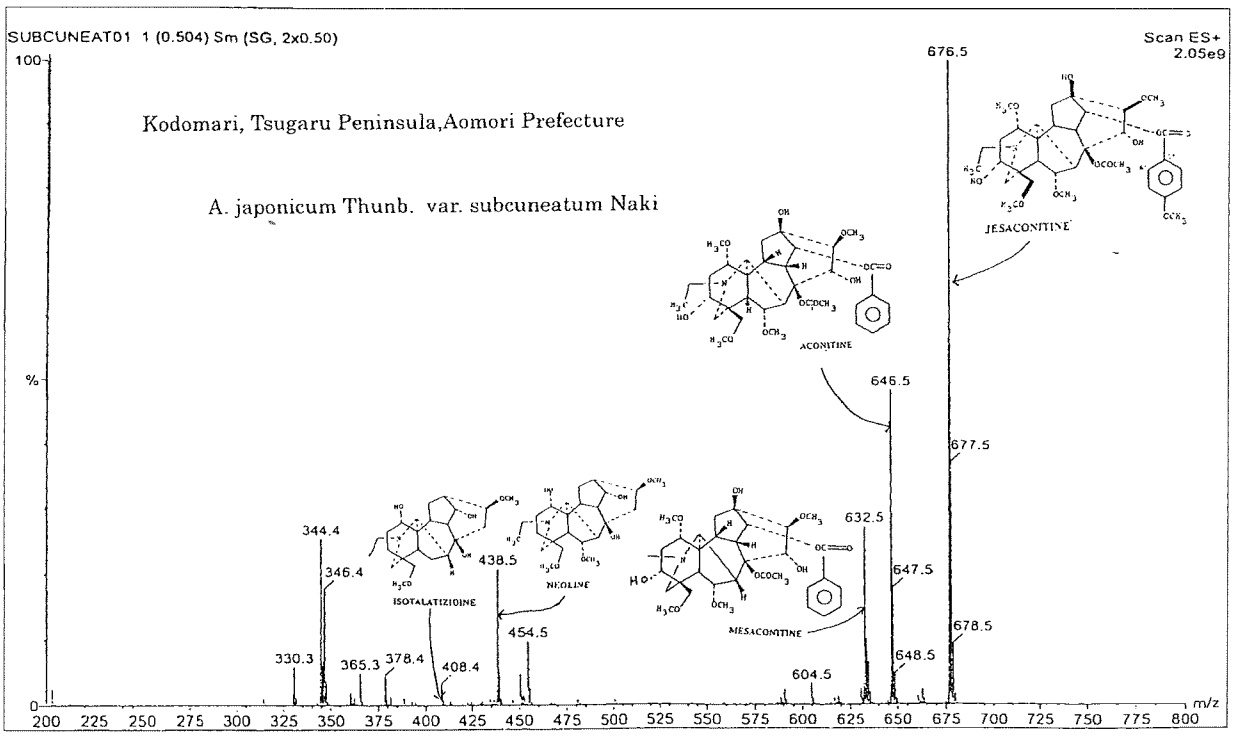

Figure 4. Lc/Ms spectrum of the ethanolic extraction form *A. japonicum* Thunb. (*subcuneatum* Nakai).

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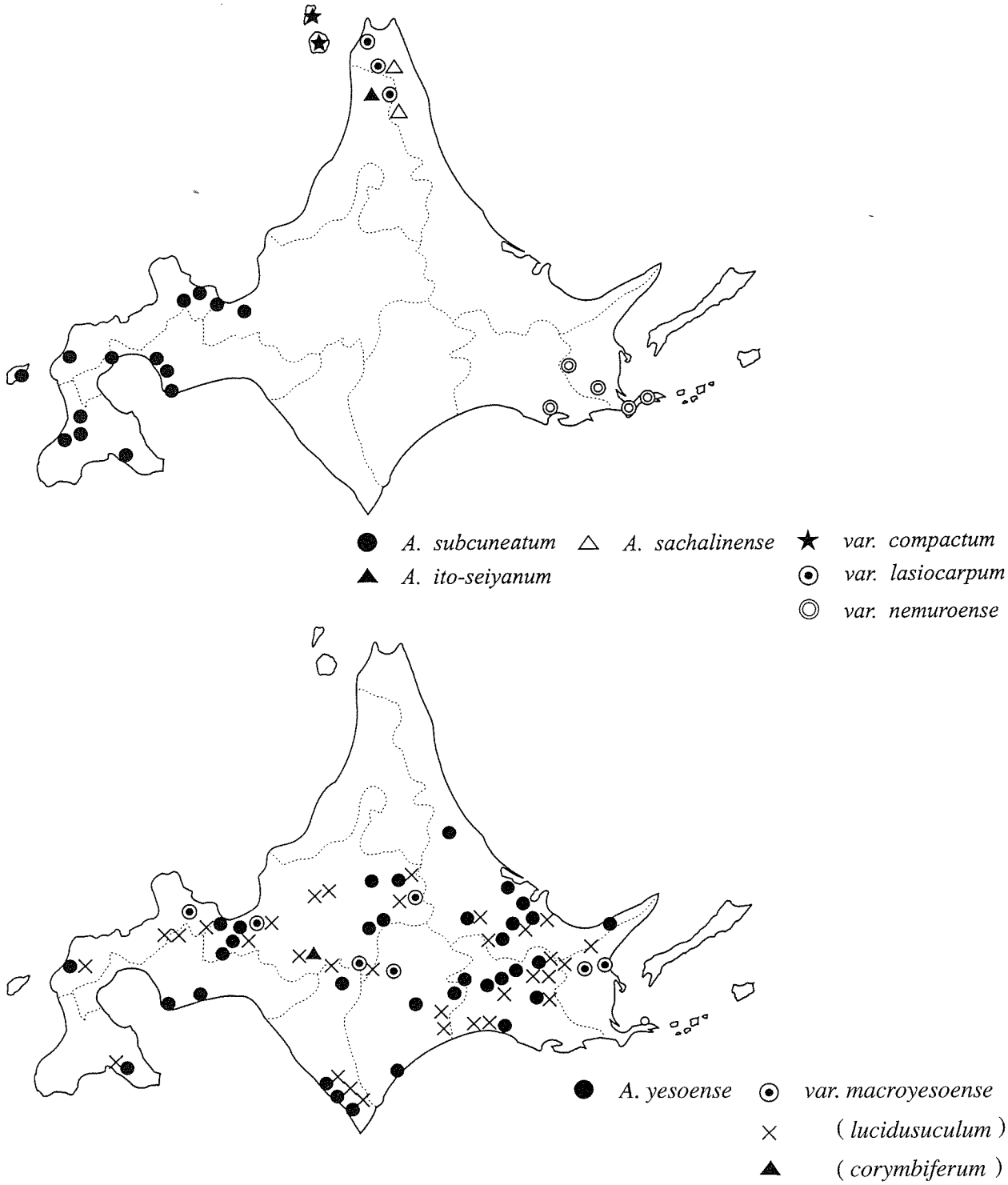

Figure 5. Geographical distributions of the subgenus *Aconitum* in Hokkaido (cf. Tamura and Namba 1959).

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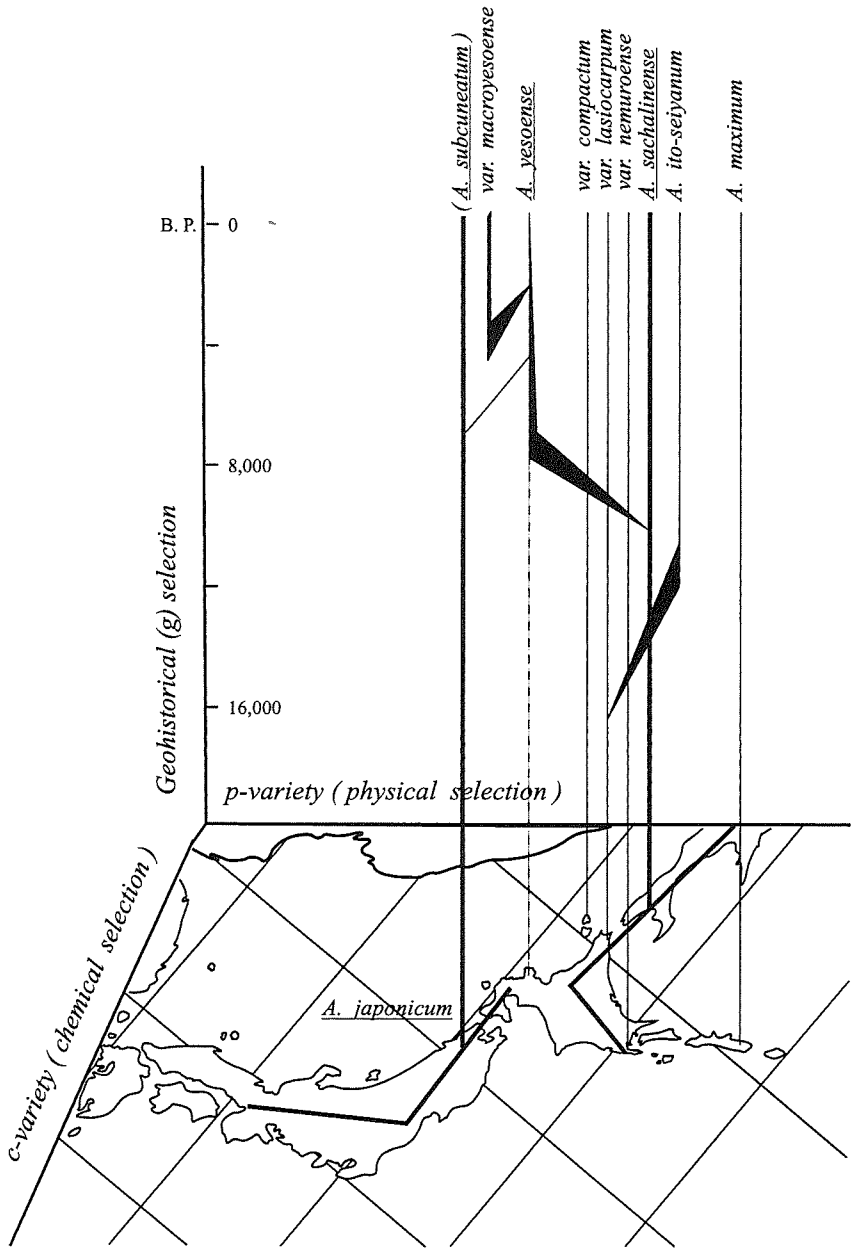

Figure 6. Chemophylogenetic distribution of the subgenus *Aconitum*, in Hokkaido and its neighboring terriotries.

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Biodiversity and Biogeography of the Kuril Islands and Sakhalin (2004) 1, 37–44.

Lathrobium japonicum and its new relatives (Coleoptera, Staphylinidae) from the Kuril Islands

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Abstract The brachypterous members of the staphylinid genus *Lathrobium* from the Kuril Islands are dealt with. *Lathrobium japonicum* Bernhauer is redescribed and its male genital organ is illustrated for the first time. Two new subspecies of *Lathrobium japonicum* are described under the names *L.* (s. str.) *japonicum kunashirense* and *L.* (s. str.) *japonicum konoi*. Two new species of this species-group are described under the names *L.* (s. str.) *minakawai* and *L.* (s. str.) *oharai*.

Key words: Coleoptera, Staphylinidae, *Lathrobium*, new species, new subspecies, the Kuril Islands

Lathrobium japonicum Bernhauer (1907, p. 384) was described from the Island of Iturup of the southern Kurils as the first brachypterous species of the genus from the Kuril Archipelago. Since then, a species of the same species-group was reported as *Lathrobium* sp. 2 by Naomi *et al.* (2000, p. 109) based on a specimen obtained on the Island of Paramushir of the northern Kurils. A specimen of the same group was obtained on the Island of Paramushir also by Dr. A. Saitô in the course of the Biological expedition of the Natural History Museum and Institute, Chiba, to the Kamchatcka Peninsula and the North Kuril Islands in 1996. Additional specimen obtained on the same island was found in the Kôno collection at the National Science Museum (Nat. Hist.), Tokyo. Besides, a short series of brachypterous *Lathrobium* was collected in the southern Kurils by the biological survey of the International Kuril Island Project (IKIP) in 1996 and 1997. These specimens of the group of *L. japonicum*, ten specimens in total, are taxonomically studied together with the lectotype of *L. japonicum* which is preserved in the collection of the Field Museum of Natural History, Chicago.

After a careful study, it became clear that the so-called *Lathrobium japonicum* should be classified into three subspecies, two of which are new, and two species also new to science. In the present paper, *Lathrobium japonicum* is redescribed and its male genital organ is illustrated for the first time, and two new subspecies of *L. japonicum* and two new species of the same species-group will be described.

***Lathrobium* (s. str.) *japonicum japonicum* Bernhauer**

[Figs. 1–8, 9–11]

Lathrobium japonicum Bernhauer, 1907, Verh. zool.-bot. Ges. Wien, 57: 384.

Lathrobium (s. str.) *japonicum*: Gusarov, 1991, Vestn. Leningr. Univ. Biol., (3): 8.

Other references are omitted.

Body length: 6.2 mm (from front margin of head to apex of 6th abdominal segment); 4.1 mm (from front margin of head to elytral apices).

Body elongate, parallel-sided and somewhat depressed above; brachypterous. Colour reddish brown and moderately shining, with maxillary palpi and legs yellowish brown, antennae brownish red, latero-basal areas of head and near posterior area of pronotum more or less darkened.

Male (lectotype). Head subquadrate, somewhat elevated medially, slightly longer than broad (length/width=1.05), widest near the middle and slightly more distinctly narrowed posteriad than anteriad; lateral sides gently arcuate; surface sparsely, somewhat coarsely and setiferously punctured, the punctures becoming much closer in latero-posterior parts, and covered with microscopic coriaceous ground sculpture; eyes nearly flat, their longitudinal diameter about one-third as long as postocular part. Antennae somewhat slender, not reaching the middle of pronotum and not thickened towards the apical segment, two proximal segments polished, 3rd subopaque, the remainings opaque, 1st segment robust,

strongly dilated apicad, more than twice as long as broad, 2nd to 11th equal in width to one another, 2nd constricted at the base, 1.4 times as long as broad, remarkably shorter (2ns/1st = 0.47) and distinctly narrower (2nd/1st = 0.71) than 1st, 3rd elongate, almost twice as long as broad, apparently longer than 2nd (3rd/2nd = 1.43) but distinctly shorter than 3rd (4th/3rd = 0.70), 5th to 10th equal in length to one another, each somewhat longer than broad (length/width = 1.20) but slightly shorter than 4th (each of 5th to 10th/4th = 0.86), 11th fusiform, much longer than broad (length/width = 1.80) and about 1.5 times as long as 10th, subacuminate at the tip.

Pronotum moderately elevated medially, widest just behind anterior angles and distinctly narrowed posteriad, apparently longer than broad (length/width = 1.17), distinctly longer (pronotum/head = 1.23) and somewhat broader (pronotum/head = 1.10) than head, lateral sides almost straight except near anterior and posterior angles, anterior margin broadly though slightly emarginate at the middle, posterior margin nearly truncate, anterior angles obtuse and not visible from above, posterior ones narrowly rounded; surface sparingly covered with much coarser punctures than those on head except for a narrow smooth space through the length of pronotum. Scutellum small and subtriangular, provided with a few obscure punctures on the surface. Elytra slightly dilated posteriad and somewhat depressed above, very slightly longer than broad (length/width = 1.02), a little longer (elytra/pronotum = 1.04) and distinctly broader (elytra/pronotum = 1.20) than pronotum, lateral sides slightly arcuate, posterior margin apparently emarginate at the middle, posterior angles broadly rounded; surface densely, roughly and superficially punctured. Legs relatively short, profemur strongly thickened, though abruptly constricted near the apex and excavated on the inner face in apical half, so that the basal part of the excavation forms a blunt subtriangular tooth; meso- and metafemora normal; protibia somewhat dilated apicad and hollowed in basal half on the inner face and provided with five or so transverse rows of yellowish comb-like setae within the hollow; meso- and metatibiae simple; 1st to 4th protarsal segment strongly widened; meso- and metatarsi thin.

Abdomen elongate, gradually dilated from 3rd to 6th segments, each tergite transversely depressed along the base, covered with dense, extremely fine and superficial punctures and fine brownish pubescence, 7th to apical segments missing.

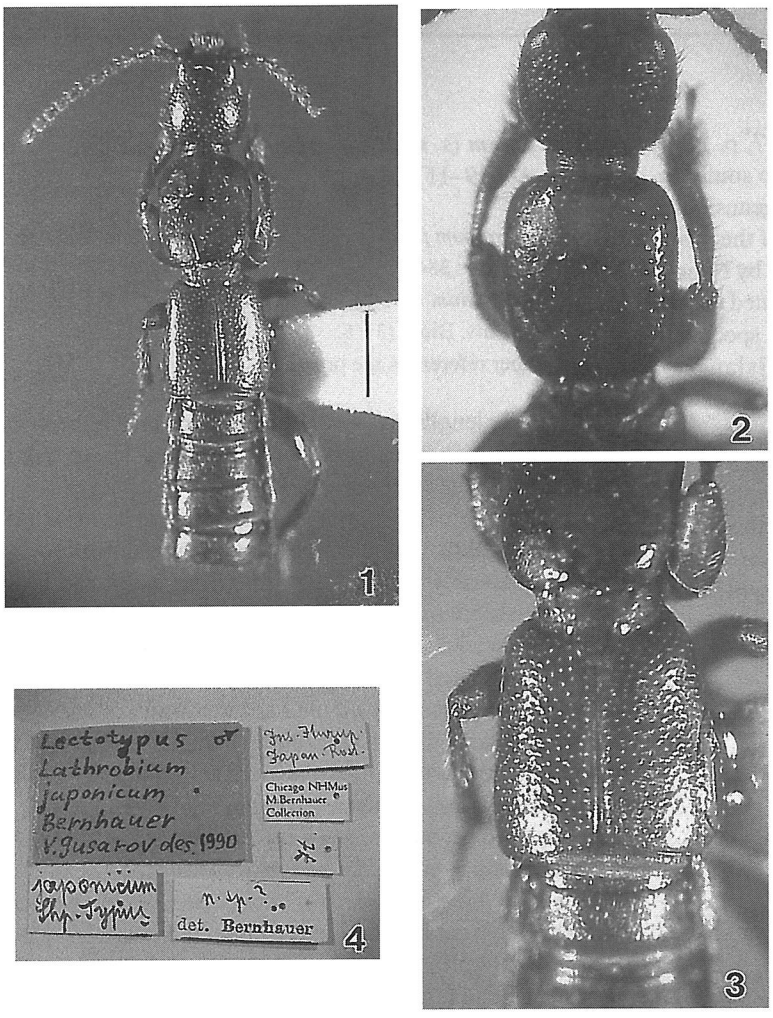
Genital organ elliptical and almost symmetrical, moderately sclerotized except for ventral side of median lobe which is membraneous. Median lobe distinctly shorter than fused paramere, widest at basal fourth and more strongly narrowed apicad than basad, bearing a weakly sclerotized ventral piece which is gradually narrowed towards the relatively broad and subtruncated apex.

Fused paramere as broad as median lobe, gently narrowed basad in basal two-thirds though abruptly so in apical third, apex divided into two small lobes by a minute apical excision, and provided with a short longitudinal carina in front of the excision as seen from dorsal side.

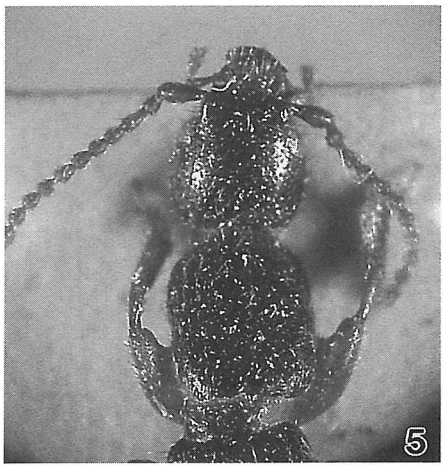
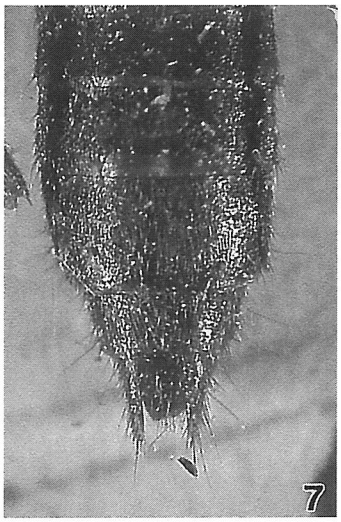
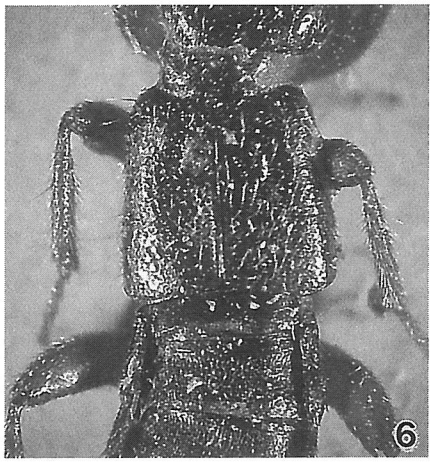
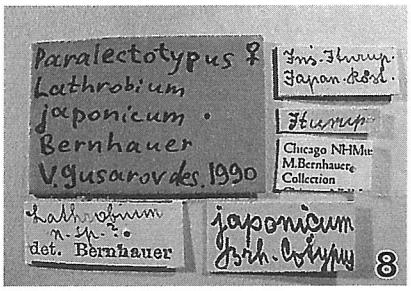
Female (paralectotype). Similar in general apearance to male, but different from it in the 8th abdominal sternite some what produced posteriad and narrowly rounded at the apex, and the 7th abdominal sternite is simple.

Specimens examined. Type series: 1 ♂ (lectoytpe), 1 ♀ (paralectotype), Ins. Iturup, Japan.

Distribution. Southern Kurils (Iturup Is.)



Figures 1–4. Lectotype of *Lathrobium* (s. str.) *japonicum japonicum* Bernhauer deposited in the collection of the Field Museum of Natural History, Chicago; havitus (1), head and pronotum (2), elytra (3), and labels (4). Scale: 1.0 mm (1).

Figures 5–8. Paralectotype of *Lathrobium* (s. str.) *japonicum japonicum* Bernhauer: head and pronotum (5), elytra (6), last four abdominal sternites (7), and labels (8).

***Lathrobium* (s. str.) *japonicum kunashirense* subsp. nov.**
[Figs. 12–14]

Body length: 9.5 mm (from front margin of head to anal end; abdomen extended); 3.9 mm (from front margin of head to elytral apices).

The present new subspecies is similar in external features to the nominotypical subspecies from the Island of Iturup, but differs from the latter in the following points: head almost as long as broad and slightly narrowed anteriad, surface more sparingly and less coarsely punctured; elytra more distinctly dilated posteriad than in the nominotypical subspecies and more superficially punctured on the surface; 8th abdominal sternite deeply excised in a U-shape at the middle of posterior margin and strongly, longitudinally depressed in front of the excision, each side of the depression clearly raised, and surface of the depression provided with a fine obscure longitudinal smooth line at the middle, 7th sternite arcuately emarginate at the middle of posterior margin and depressed in the shape of a horseshore before the emargination, surface of the depression coarsely asperate except for a glabrous longitudinal median space; 6th sternite subtruncate at the middle of posterior margin and weakly semicircularly depressed in front of the subtruncated part.

Male genital organ also similar in configuration to that of the nominotypical subspecies, but differs from it in the following details: a little broader as a whole, median lobe relatively short, ventral sclerotized piece shorter than that of the nominotypical subspecies and apparently narrowed towards the apex which is narrowly rounded, the apical projection of fused paramere much smaller and much more distant from the apex as seen from lateral side.

Type series. Holotype: ♂, IKIP: [IT-97-EMS-003] Russia: Kuril Iss.: Kunashir Is., 40° 15.52'N, 147° 55.41'E, about 4 km east of Kitovyiby road enviorns of Podoshevka river, 29-VII-1997, E. M. Sayenko leg. The holotype is deposited in the collection of the Hokkaido University Museum.

Distribution. Southern Kurils. (Kunashir Is.).

Bionomics. The type specimen was obtained by hand picking from wet leaf litter of vegetation, bamboo and *Petasites* sp., along a river bank near abandoned fish hatchery at an altitude of 1,130–1,140 m.

Etymology. The subspecific epithet of the present new subspecies is given after the type locality "Kunashir Island".

***Lathrobium* (s. str.) *japonicum konoi* subsp. nov.**
[Figs. 15, 17–19]

Lathrobium sp. 2: Naomi *et al.*, 2000, Nat. Hist. Res., Spec. Iss., (7): 109.

Body length: 8.1 mm (holotype; abdomen extended), 5.6 mm (allotype) (from front margin of head to anal end); 3.4 mm (holotype), 3.2 mm (allotype) (from front margin of head to elytral apices).

Male and female. The present new subspecies is similar in general appearance to the preceding subspecies, *L. japonicum kunashirense*, but is distinguishable from it by the following points: head narrower and more distinctly narrowed anteriad than in the preceding subspecies, posterior angles much more angulate, surface more coarsely and more numerously punctured, pronotum more distinctly narrowed posteriad, lateral sides gently arcuate in the whole length, surface more sparingly punctured except for a longitudinal smooth median space; elytra more densely and much more superficially

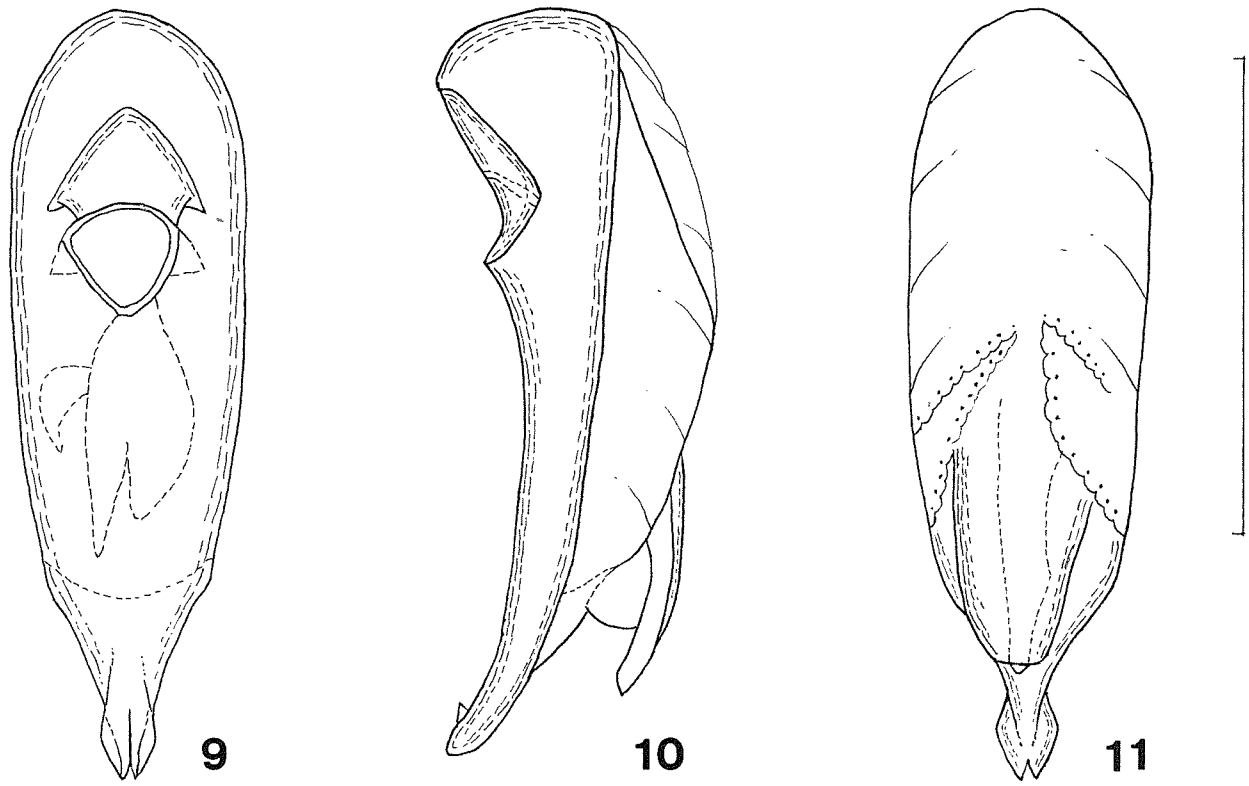
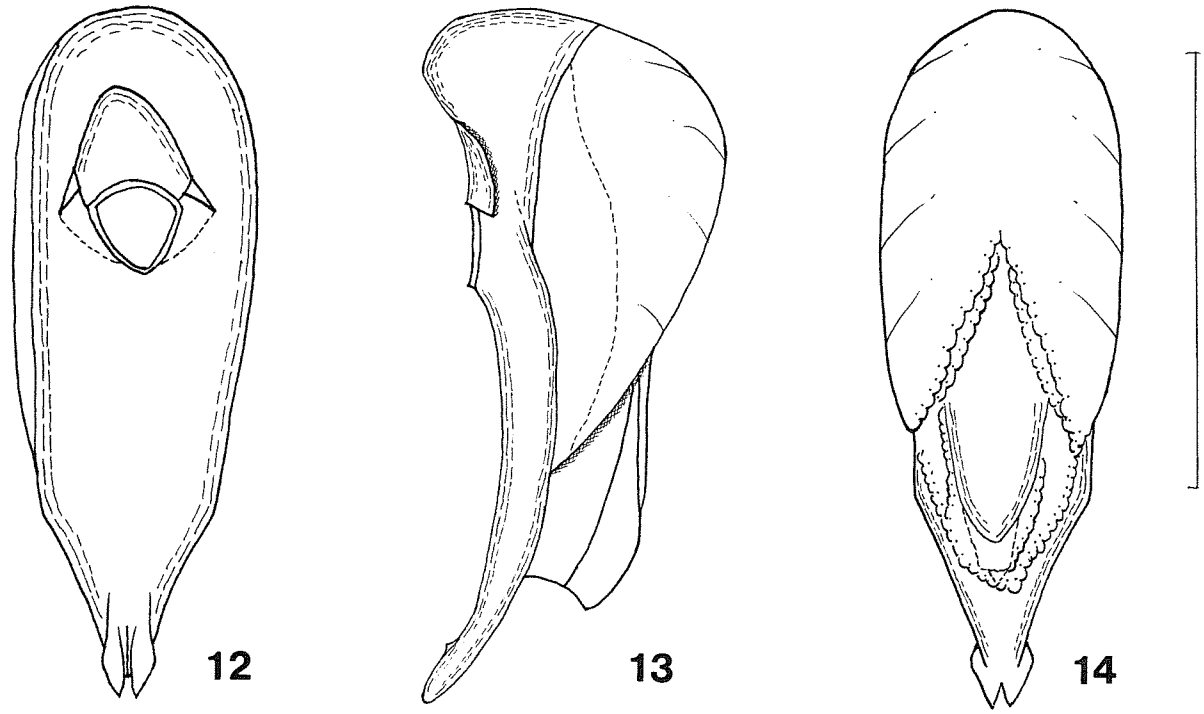


Figure 9–11. Male genital organ of *Lathrobium* (s. str.) *japonicum japonicum* Bernhauer; dorsal view (9), lateral view (10), and ventral view (11). Scale: 1.0 mm.

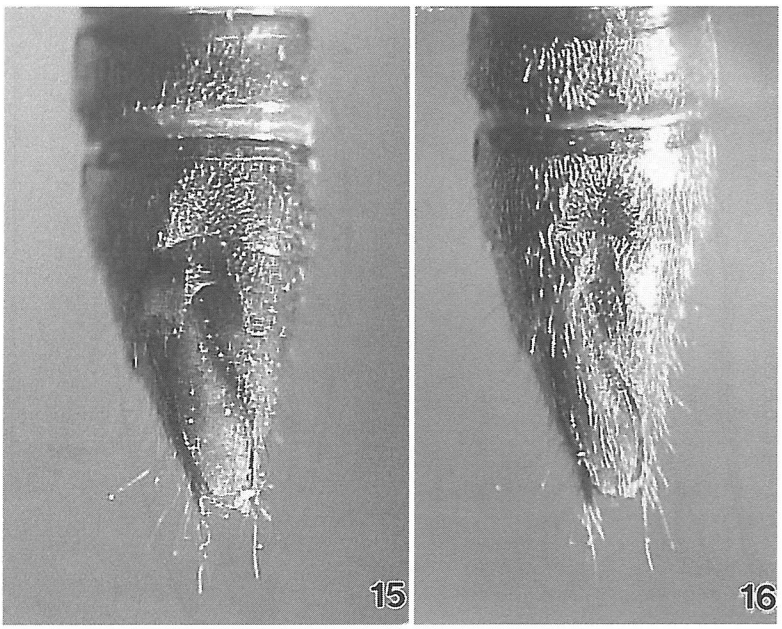


Figures 12–14. Male genital organ of *Lathrobium* (s. str.) *japonicum kunashirense* subsp. nov.; dorsal view (12), lateral view (13), and ventral view (14). Scale: 1.0 mm.

punctured on the surface; 8th abdominal sternite more broadly excised than in the preceding subspecies at the middle of posterior margin.

Male genital organ also similar in configuration to that of the preceding subspecies, but somewhat different from it in the following details: median lobe with ventral sclerotized piece more elongate and gradually narrowed towards the apex which is more broadly rounded; fused paramere with a minute projection relatively distant from the apex as in the preceding subspecies though much more acutely pointed at the tip.

Type series. Holotype: ♂, Kashihara-Iwôzan, Paramushir Is., Kuril Iss., 21-VII-1941, H. Kôno & S. Sumimiya leg. (NSMT-I-C38234); allotype: ♀, Severo-



Figures 15–16. Last four abdominal sternites in the male of *Lathrobium* (s. str.) spp.; *L.* (s. str.) *japonicum konoi* subsp. nov. (15), and *L.* (s. str.) *minakawai* sp. nov. (16).

Kuril'sk, Paramushir Is., Kuril Iss., Russia, 11 to 25-VII-1997, T. Komai leg. (CBM-ZI 83533).

The holotype is deposited in the collection of the National Science Museum (Nat. Hist.), Tokyo, and the allotype is preserved in the collection of the Natural Histroty and Institute, Chiba.

Distribution. Northern Kurils (Paramushir Is.).

Remarks. The present new subspecies was previously recorded as *Lathrobium* sp. 2 by Naomi *et al.* (2000, p.109).

Bionomics. Unknown.

Etymology. This subspecies is dedicated to the late Dr. Hiromichi Kôno, who collected the holotype.

***Lathrobium* (s. str.) *minakawai* sp. nov.**
[Figs. 16, 20–22]

Body length: 6.9–7.3 mm (from front margin of head to anal end); 3.7–3.9 mm (from front margin of head to elytral apices).

Male and female. Closely similar in general appearance to *L. japonicum japonicum*, but can be distinguished from it by the following points: head slightly more strongly narrowed anteriad, lateral sides more weakly arcuate, surface more sparingly and finely punctured; pronotum nearly oblong, slightly narrowed posteriad, lateral sides almost straight, surface more densely and much more coarsely punctured than in head; elytra relatively long, a little longer than broad (length/width = 1.08) and equal in length to though somewhat broader than pronotum (elytra/pronotum = 1.19), posterior margin more strongly emarginate at the middle, surface more densely and much more superficially punctured; abdomen somewhat dilated from 3rd to 7th segment, and then abruptly narrowed towards the apical end, 8th sternite deeply excised in the form of U at the middle of posterior margin and longitudinally depressed in front of the excision, surface of the depression granulate except for the globular medio-apical area, 7th sternite much more shallowly emarginate at the middle of posterior margin than in 8th sternite and distinctly, semicircularly depressed before the emargination, surface of the depression provided with an obscure smooth line along the middle, both sides of which are somewhat granulate, 6th sternite slightly depressed at the middle in front of posterior margin.

Genital organ closely similar in general appearance to those of the other members of the *L. japonicum* group, but different from them in the following points: median lobe much more elongate and distinctly longer than fused paramere, with ventral sclerotized piece elliptical, almost parallel-sided in about the middle, though gently narrowed both anteriad and posteriad, and bluntly pointed at the apex.

Type series. Holotype: ♂, [IKIP:IT-97-NM-015] Russia: Kuril Iss.: Iturup Is.; 45°20.04'N: 147°59.80'E; Eastern side of Chirip Peninsula, inland coastal margin of Konsarvnaya bay, 30-VII-1997, N. Minakawa leg.; allotype: ♀, [IKIP:IT-97-NM-006] Russia: Kuril Iss.: Iturup Is., 45°15.87'N; 147°55. 71'E; about 4 km east of Kitovyiby road, near abandoned fish hatchery, 29-VII-1997, N. Minakawa leg. Paratype: 1♂, same data as for the holotype. The holo- and allotypes are deposited in the collection of the Hokkaido University Museum, and a paratype (♂) is preserved in the collection of the Laboratory of Insect Resources, Tokyo University of Agriculture.

Distribution. Southern Kurils (Itrup Is.).

Bionomics. The holo- and paratypes were obtained from hand picked litter in wild plants, including *Petasites, Sasa, Alnus* and *Salix*, at 1 km from bank of a creek running into bay, stream dried up 300 m upstream from shore (1,440–1,500 m alt.). Allotype was obtained by beating riparian vegetation, including *Petasites, Sasa* and *Salix*, near abandoned fish hatchery environs of Podoshevka River at an altitude of 1,150–1,330 m.

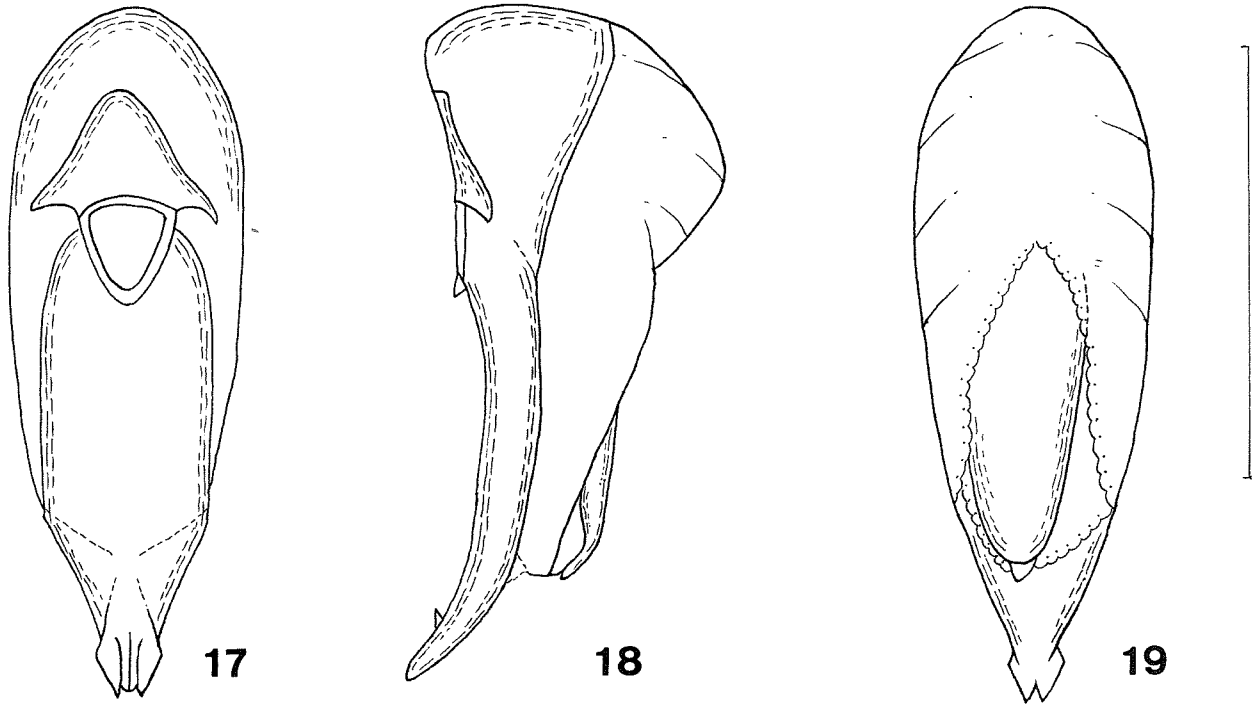
Etymology. The specific epithet of this new species is given after N. Minakawa, who collected the type series.

***Lathrobium* (s. str.) *oharai* sp. nov.**
[Figs. 23–27]

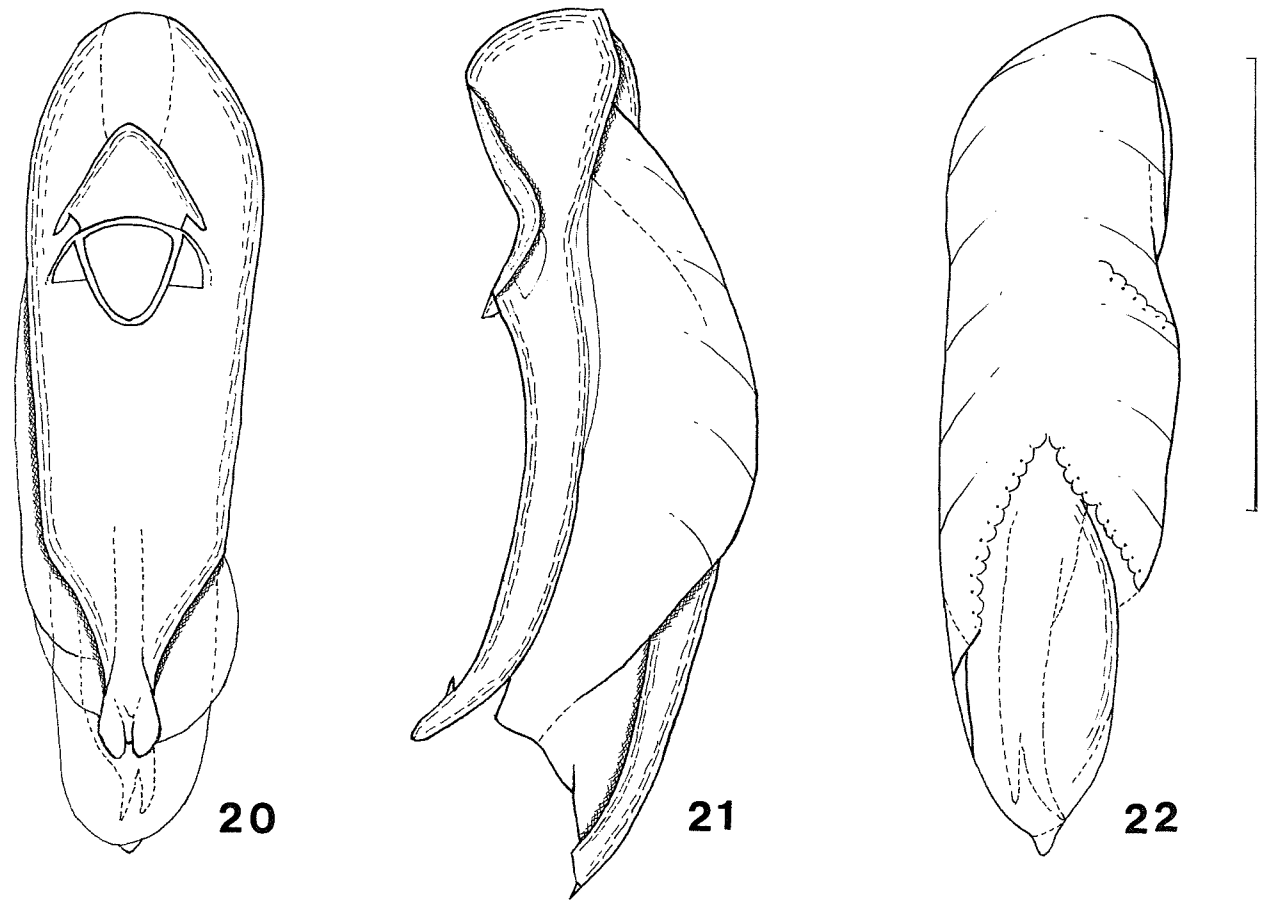
Body length: 6.9–7.3 mm (from front margin of head to anal end); 3.8–3.9 mm (from front margin of head to elytral apices).

The present new species somewhat resembles the preceding in body size and facies, but can be easily distinguished from them by different configuration of head and longer elytra.

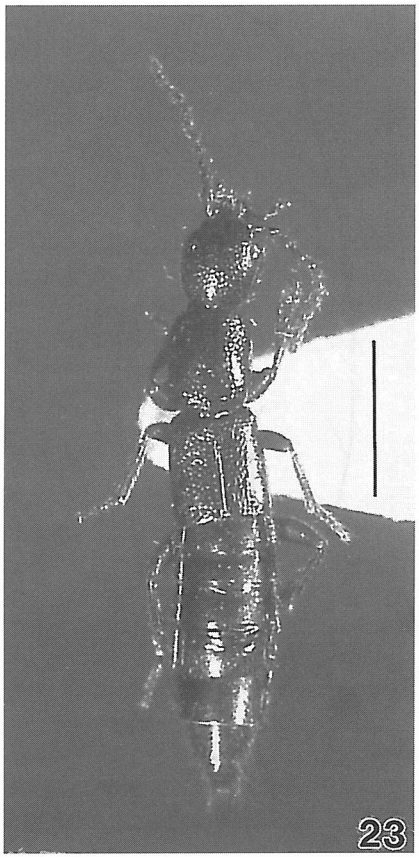
Body elongate and subparallel-sided. Colour blackish and moderately shining, with mouth parts,

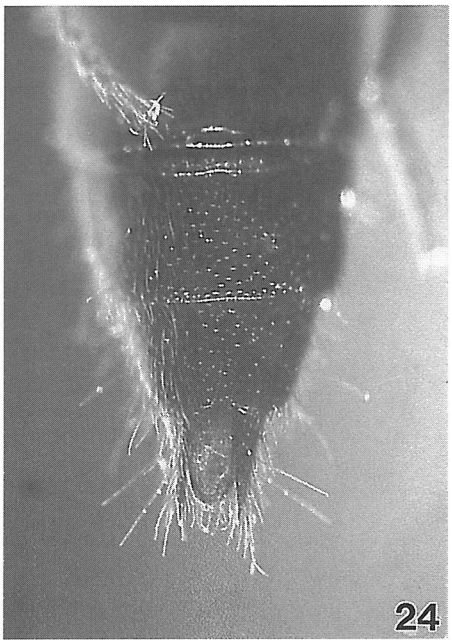


Figures 17–19. Male genital organ of *Lathrobium* (s. str.) *japonicum konoi* subsp. nov.; dorsal view (17), lateral view (18), and ventral view (19). Scale: 1.0 mm.



Figures 20–22. Male genital organ of *Lathrobium* (s. str.) *minakawai* sp. nov.; dorsal view (20), lateral view (21), and ventral view (22). Scale: 1.0 mm.





Figures 23–24. *Lathrobium* (s. str.) *oharai* sp. nov.; habitus (23), and last three abdominal sternites in the male (24). Scale: 1.0 mm (23).

antennae and legs reddish brown.

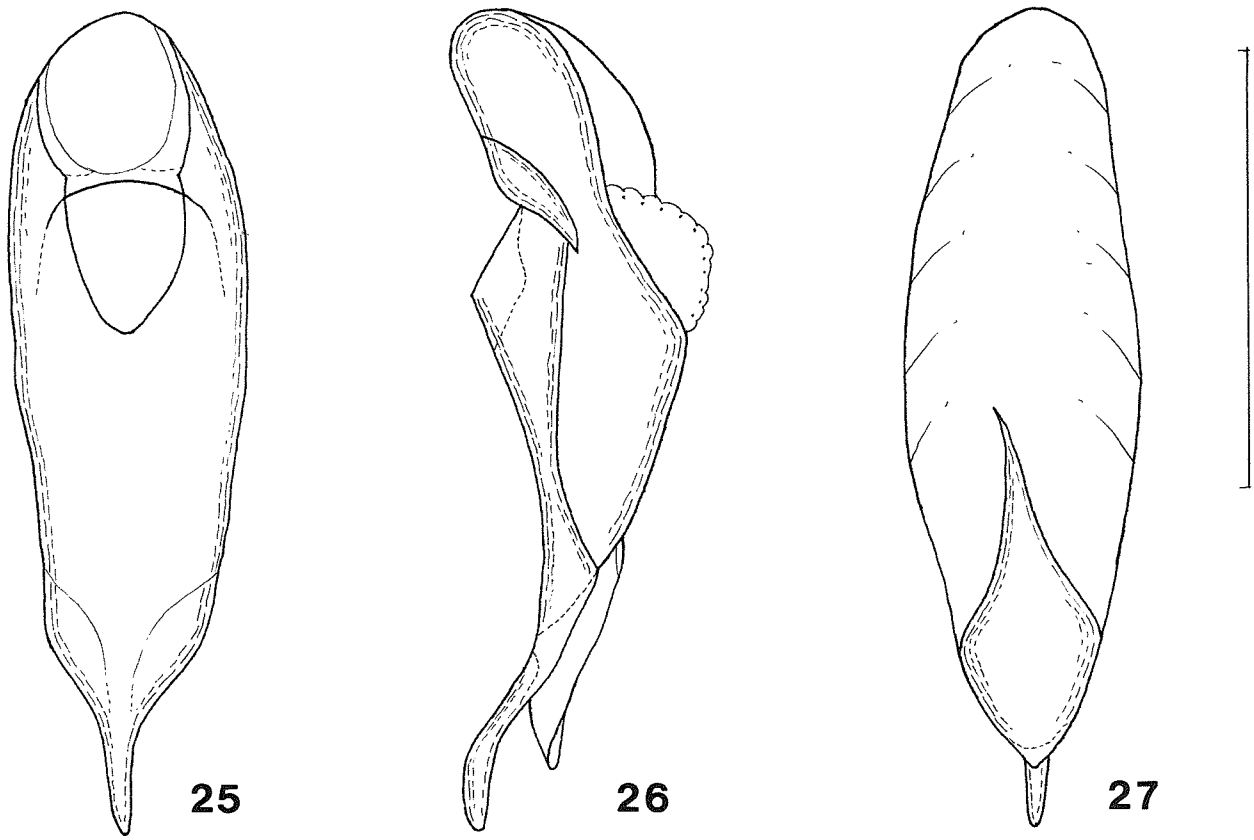
Male. Head subtrapezoidal, somewhat dilated anteriad and a little convex medially, distinctly longer than broad (length/ width = 1.13), widest just behind eyes and gently narrowed posteriad, lateral sides nearly straight in anterior two-thirds though clearly arcuate in posterior third, frontal area between antennal tubercles flattened and glabrous; surface moderately closely, distinctly and setiferously punctured, the punctures becoming much sparser and stronger in medio-frontal part and covered with extremely fine coriaceous ground sculpture visible under high magnification; eyes relatively small, their longitudinal diameter about one-third as long as postocular part. Antennae elongate, extending a little beyond the middle of pronotum and not thickened apicad, 5th to 10th segments more or less moniliform, two proximal segments polished, the remainings opaque; 1st segment robust, strongly dilated apicad and more than twice as long as broad, 2nd constricted at the base, about 1.5 times as long as broad, though remarkably shorter (2nd/1st = 0.57) and a little narrower (2nd/1st = 0.83) than 1st, 3rd to 11th equal in width to one another, 3rd conspicuously longer than broad (length/width = 1.89), slightly longer (3rd/2nd = 1.06) but slightly narrower (3rd/2nd = 0.90) than 2nd, 4th a little longer than broad (length/width = 1.44), but distinctly shorter than 3rd (4th/3rd = 0.74), 5th to 10th equal in length to one another, each somewhat longer than broad (length/width = 1.33), but slightly shorter than 4th (each of 5th to 10th/4th = 0.09), 11th fusiform, twice as long as broad and 1.5 times as long as 10th, subacuminate at the tip.

Pronotum suboblong and elevated medially, distinctly longer than broad (length/width = 1.24), distinctly longer (pronotum/head = 1.18) and somewhat broader (pronotum/head = 1.08) than head; lateral sides almost straight except near anterior and posterior angles, anterior margin gently rounded, posterior margin subtruncate, anterior angles obtuse and not visible from above, posterior ones narrowly rounded; surface more numerously and more coarsely punctured than in vertexal area of head, and covered with fine brownish pubescence except for a narrow smooth median space. Elytra nearly oblong and depressed above, apparently longer than broad (length/width=1.17), somewhat longer (elytra/pronotum=1.08) and a little broader (elytra/pronotum=1.14) than pronotum; lateral sides nearly straight, posterior margin broadly emarginate at the middle, posterior angles narrowly rounded; surface densely and superficially punctured and covered with pubescnce similar to that on pronotum. Legs moderately long and relatively slender; profemora and protibiae similar in structure to those of the preceding species.

Abdomen elongate, almost parallel-sided from 3rd to 7th segments, and then abruptly narrowed towards the anal end; 3rd to 7th tergites each closely, finely and superficially punctured and covered with fine brownish pubescence, 8th tergite somewhat more sparingly punctured than the preceding tergites; 8th sternite shallowly and subtriangularly emarginate at the middle of posterior margin and narrowly longitudinally depressed at the middle before the emargination, surface of the depression glabrous; 7th sternite simple or slightly flattened at the middle before posterior margin.

Genital organ elliptical and slightly asymmetrical, moderately sclerotized except for membraneous ventral side of median lobe. Median lobe distinctly shorter than fused paramere, widest at the middle and gently narrowed both basad and apicad; ventral sclerotized piece widest at apical third, abruptly and strongly narrowed in basal two-thirds, and gently narrowed towards the pointed tip in apical third. Fused paramere relatively broad and long elliptical, though abruptly and strongly narrowed in apical part which is prolonged like a spearhead as seen from dorsal side.

Female. Resembles the male in general appearance,



Figures 25–27. Male genital organ of *Lathrobium* (s. str.) *oharai* sp. nov.; dorsal view (25), lateral view (26), and ventral view (27). Scale: 1.0 mm.

but differs from it in the 8th strenite gently rounded at the middle of posterior margin.

Type series. Holotype: ♂, allotype: ♀, URUP, Kuril Arch. Russia, [IKIP-UR-96-MO-049D], 45°39.04'N, 149°28.78'E, 21-VIII-1996, M. Ôhara leg. Paratypes: 1 ♂, 1 ♀, same data as for the holotype. The type specimens are deposited in the collection of the Hokkaido University Museum, except for a paratype (♂) preserved in the collection of the Laboratory of Insect Resources, Tokyo University of Agriculture.

Distribution. Central Kurils (Urup Is.).

Bionomics. All the specimens were obtained from grassland under coniferous trees, *Alnus maximowiczii*, at about 2 km in land from Tetyava Bay.

Etymology. This new species is named after Prof. Masahiro Ôhara, who kindly supplied me with the specimens of the type series used in this study.

Acknowledgements

I wish to express my hearty thanks to Dr. Shun-Ichi Uéno, Visiting Professor at Tokyo University of Agriculture, for his kind advice on the present study. Deep gratitude is also due to Dr. Masahiro Ôhara, Hokkaido University Museum, Dr. Akiko Saitô, Natural History Museum and Institute, Chiba, and Dr. Shuhei Nomura, National Science Museum (Nat. Hist.), Tokyo, for their kindness in giving me the opportunity of studying on the apterous species of *Lathrobium* obtained from the Kurils. And I extend my sincere apprecation to Dr. Alfred F. Newton, Field Museum of Natural History, Chicago, and Dr. Lee H. Herman, American Museum of Natural History, New York, for loan of the type series of *Lathrobium japonicum*, and Mr. Arata Ishizuka, Tokyo University of Agriculture, for his assistance in taking the photographs inserted in this paper.

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Biodiversity and Biogeography of the Kuril Islands and Sakhalin (2004) 1, 45–47.

Scirtid Beetles (Insecta, Coleoptera, Scirtidae) from Sakhalin and the Kuril Islands

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Abstract A total of fifteen species of the family Scirtidae (Insecta: Coleoptera) are recorded from Sakhalin and the Kuril Islands. Of these, four species, *Elodes inornata*, *Elodes wilsoni*, *Sacodes minuta*, and *Cyphon kongsbergensis*, are newly recorded from the Kuril Islands.

Introduction

Klausnitzer (1982) recorded eleven species of the family Scirtidae from Sakhalin and the Kuril Islands for the first time. Since then no other paper has been published until now.

In this short paper, we are going to show a faunal list of the family based on the previous papers and on some additional materials obtained by IKIP (International Kuril Island Project) and the second author's survey.

The specimens used in the present paper are preserved in University of Washington (Seattle, WA, USA), the Hokkaido University Museum (Sapporo, Japan), Moscow Lomonosov State University (Moscow, Russia), and in H. Yoshitomi's private collection.

List of the scirtid species recorded and collected from Sakhalin and the Kuril Islands

Genus *Elodes* Latreille, 1796

Elodes inornata Lewis, 1895

Elodes inornata Lewis, 1895, 107; Yoshitomi, 1997, 354.

Specimen examined. Kuril Islands. Kunashir Isl.: 1 female, near Mendeleevo, 15 km, sulpharic source, 3-VIII-1985, N. Nikitsky leg.

Remarks. This species is newly recorded from the Kuril Islands.

Distribution. Japan (Hokkaido, Honshu, Shikoku, Kyushu); Korea; Kuril Islands (Kunashir Isl.).

Elodes wilsoni Pic, 1918

Elodes wilsoni Pic, 1918, 17; Yoshitomi, 1997, 364.

Specimens examined. Kuril Islands. Kunashir Isl.: 2 males, near Alekhino, 13-VI-1973, M. Kurorosov leg.; 1 female, near Mendeleevo, 29-VI-1985, N. Nikitsky leg.

Remarks. This species is newly recorded from the Kuril Islands.

Distribution. Japan (Hokkaido, Honshu, Shikoku, Kyushu); Kuril Islands (Kunashir Isl.).

Elodes piceata Klausnitzer, 1982

Helodes(!) *piceata* Klausnitzer, 1982, 277, figs. 8–13 [Type: Kunashir, not examined].

Remarks. No specimen of this species has been available for this paper. "*Helodes*" is incorrect spelling of the generic name "*Elodes*" (see Pope 1976).

Distribution. Kuril Islands (Kunashir Isl.).

Elodes kojimai Nakane, 1963

Elodes kojimai Nakane, 1963a, 140; Yoshitomi, 1997, 375.

Flavohelodes nigrata Klausnitzer, 1982, 275, synonimized by Yoshitomi, 1997, 375.

Remarks. No specimen of this species has been available for this paper.

Distribution. Japan (Hokkaido, Honshu); Kuril Islands (Kunashir Isl.).

Genus *Sacodes* LeConte, 1853

Sacodes minima (Klausnitzer, 1973)

Helodes minima Klausnitzer, 1973, 107.

Sacodes minima: Yoshitomi, 1997, 396.

Specimens examined. Kuril Islands. Kunashir Isl.: 1 female, near Mendeleevo, 6-VII-1985, N. Nikitsky leg.; 1 female, near Mendeleevo, 26-VII-1985, N. Nikitsky leg.

Remarks. This species is newly recorded from the Kuril Islands.

Distribution. Japan (Hokkaido, Honshu, Shikoku, Kyushu); Kuril Islands (Kunashir Isl.).

Genus *Cyphon* Paykull, 1799

Cyphon obscuratus Klausnitzer, 1982

*Cyphon obscuratus*Klausnitzer, 1982, 283; Klausnitzer and Yoshitomi, 2003, 94.

Remarks. No specimen of this species has been available for this paper.

Distribution. Japan (Hokkaido, Honshu); Kuril Islands (Kunashir Isl.).

Cyphon ainu Nakane, 1963

Cyphon ainu Nakane, 1963b, 31; Klausnitzer and Yoshitomi, 2003, 94.

Cyphon kerzhneri Klausnitzer, 1982, 283, syononimized in Klausneitzer and Yoshitomi, 2003, 94.

Specimens examined. Sakhalin: 1 male, near Yuzhno-Sakhalinsk, 17-V-1985, N. Nikitsky leg. Kuril Islands. Kunashir Isl.: 1 male, near Mendeleevo, 20-V-1985, N. Nikitsky leg.; 3 males, near Mendeleevo, 15 km, sulpharic source, 25-VI, 4-VII-1985, N. Nikitsky leg.; 2 males, near Tretiakovo, 21 to 28-VII-1985, N. Nikitsky leg.

Distribution. Japan (Hokkaido); Kuril Islands (Kunashir Isl.); Sakhalin.

Cyphon fuscomarginatus Nakane, 1963

Cyphon fuscomarginatus Nakane, 1963b, 139; Klausnitzer and Yoshitomi, 2003, 94.

Cyphon aberratus Klausnitzer, 1982, 279, synonymized by Klausnitzer and Yoshitomi, 2003, 94.

Specimens examined. Kuril Islands. Kunashir Isl.: 2 exs., near Tretiakovo, 21-VII-1985, N. Nikitsky leg. Iturup Isl.: 3 males & 1 female, inland of NE Kasatka Bay, 45°00.47'N, 147°43.57'E, 1-VIII-1998, B. K. Urbain, IT-98-BKU-037 (IKIP-98); 4 males, inland of NE Kasatka Bay, 45°00.45'N, 147°43.68'E, 1-VIII-1998, D. J. Bennett, IT-98-DJB-042 (IKIP-98); 1 male, inland of Slavnaya Bay, 45°29.47'N, 148°37.13'E, 1-VIII-1998, D. J. Bennett, IT-98-DJB-071 (IKIP-98); 1 female, inland of NE Kasatka Bay, 45°00.35'N, 147°43.65'E, 1-VIII-1998, B. K. Urbain, IT-98-BKU-043 (IKIP-98).

Distribution. Japan (Hokkaido, Honshu); Kuril Islands (Kunashir and Iturup Isls.).

Cyphon kongsbergensis Munster, 1924

Cyphon kongsbergensis Munster, 1924, 292; Nyholm, 1972, 36.

Specimens examined. Kuril Islands. Iturup Isl.: 4 males, inland of Slavnaya Bay, 45°29.47'N, 148°37.13'N, 6-VIII-1998, D. J. Bennett, IT-98-DJB-071 (IKIP-98). Tanfilyeva Isl.: 5 males, Inland Tanfil'yevka Bay, 43°26.62'N, 145°55.89'E, 19-VIII-1998, B. Urbain, TA-98-BKU-121 (IKIP-98); 1 male, Inland Tanfil'yevka Bay, 43°26.62'N, 145°55.89'E, 19-VIII-1998, D. J. Bennett, TA-98-DJB-119 (IKIP-98); 1 female, inland Tanfil'yevka Bay, 43°26.62'N, 145°55.89'E, 19-VIII-1998, D. J. Bennett, TA-98-DJB-117 (IKIP-98). Polonskogo Isl.: 1 male, inland from western side, 43°38.38'N, 146°18.58'E, 21-VIII-1998, D. J. Bennett, PO-98-DJB-135 (IKIP-98).

Remarks. This species is newly recorded from the Kuril Islands. The species is closely related to *Cyphon consobrinus* Nyholm, 1950, and is distinguished from it by the characteristics of male 9th sternite and female prehensor.

Distribution. Europe; Kuril Islands (Iturup, Tanfilyeva, Polonskogo Isls.).

Cyphon consobrinus Nyholm, 1950

Cyphon consobrinus Nyholm, 1950, 1–5 [Type: female, Amur, not examined]; Klausnitzer, 1980, 123 [description of male, Ussuri]; 1982, 285 [recorded from Kuril Islands]; Yoshitomi, 2002a, 214.

Specimens examined. Kuril Islands. Kunashir Isl.: 5 males, BtwL ks Aliger Lagunnoye, 44°03.25'N, 145°44.91'E, 11-VIII-1998, B. K. Urbain, KU-98-BKU-072 (IKIP-98).

Remarks. This species was redescribed in detail by Yoshitomi (2002a) based on the Japanese specimens.

Distribution. Japan (Hokkaido, Honshu, Shikoku, Tsushima); Kuril Islands (Kunashir Isl.); Russia (Amur, Ussuri).

Cyphon patiens Klausnitzer, 1982

Cyphon patiens Klausnitzer, 1982, 280, figs. 17–20 [Type: Kunashir, not examined].

Remarks. No specimen of this species has been studied for this paper.

Distribution. Kuril Islands (Kunashir Isl.).

Cyphon echinatus Klausnitzer, 1982

Cyphon echinatus Klausnitzer, 1982, 282, figs. 27–31 [Type: Kunashir, not examined].

Remarks. No specimen of this species has been studied for this paper.

Distribution. Kuril Islands (Kunashir Isl.).

Cyphon pubescens (Fabricius, 1792)

Cistela pubescens Fabricius, 1792, 47.

Cyphon pubescens: Nyholm, 1972, 53; Klausnitzer, 1982, 284 [recorded from Sakhalin].

Remarks. No specimen of this species has been studied for this paper.

Distribution. Europe; Russia (Sakhalin).

Cyphon variabilis (Thunberg, 1787)

Cantharis variabilis Thunberg, 1787, 54.

Cyphon variabilis: Nyholm, 1972, 44; Klausnitzer, 1982, 284 [recorded from Kuril].

Remarks. No specimen of this species has been studied for this paper.

Distribution. Japan (Hokkaido); Kuril Islands (Kunashir, Iturup Isls.); Europe; Asia; N. America; N.

Africa; C. America; New Zealand.

***Cyphon padi* (Linnaeus, 1758)**

Chrysomela padi Linnaeus, 1758, 369.

Cyphon padi: Nyholm, 1972, 60; Klausnitzer, 1982, 284 [recorded from Kuril Islands and Sakhalin].

Remarks. No specimen of this species has been studied for this paper. Yoshitomi (2002a) in his PhD thesis, which will be contributed in near future, recorded this species from Hokkaido for the first time.

Distribution. Japan (Hokkaido); Kuril Islands (Kunashir Isl.); Russia (Sakhalin); Europe; Asia; North America.

Discussion

Thirteen scirtid species are recorded from Kunashir Island in this paper. Of these, ten species are also distributed in Hokkaido where sixteen scirtid species are recorded (Yoshitomi 2002b; Yoshitomi and Hori 2003). This suggests high similarity of the scirtid fauna between Hokkaido and Kunashir. However, information of the species is too scarce to discuss the scirtid fauna in the Russian Far East (except for Kunashir Isl.). Therefore futher survey in this area will be expected.

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Caddisflies (Trichoptera) of the Kuril Archipelago

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Abstract We report the complete data of the caddisfly specimens collected during the seven annual expeditions of the International Kuril Island Project, and provide a list of caddisfly species known from the Kuril Islands. Caddisflies were collected from 21 out of 30 major islands, and collected from 14 islands for the first time. A total of 19 families, 45 genera and 98 species were collected during the expeditions, including 28 new species distribution records for the archipelago. These records bring the present total numbers to 20 families, 50 genera and 123 species. *Glossosoma inops* is placed in the junior subjective synonym of *G. ussuricum*.

Introduction

The caddisfly fauna of the Kuril Islands was first reported for Shumshu, Paramushir and Iturup in 1930's (Uéno 1933; Miyadi 1933, 1937). These reports were limited to immature stages, and species level identification was not available except for *Praecosmoecus kamtshaticus* Martynov (present name: *Ecclisomyia kamtshatica*) collected from Shumshu (Schmid 1949). For adult caddisflies, Kuwayama (1936) reported eight species from Shumshu, Paramushir, Urup, Iturup and Kunashir. Later Tsuda (1939, 1942) added four species from Shumshu, Paramushir and Kunashir.

In the 1950's and 1960's, Schmid (1952, 1953, 1955, 1964, 1965) and Kuwayama (1967a, 1967b, 1973) added considerably to the knowledge of the Kuril caddisfly fauna. In the 1970's and 1980's, Russian scientists actively studied the caddisflies of the Kuril Islands (Levanidova and Schmid 1977; Levanidova 1979, 1980, 1982, 1986, 1989; Vshivkova 1986; Botosaneanu 1988; Botosaneanu and Levanidova 1988; Arefina *et al.* 2003). Since the collapse of the Soviet Union, Russian and Japanese scientists have collaborated closely in studying caddisfly specimens from the Kurils (Ito *et al.* 1992; Vshivkova *et al.* 1994; Levanidova *et al.* 1995; Kuranishi 2000).

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Despite the long history of research in the Kuril Islands, the caddisfly fauna of the central Kurils has not been reported except for Simushir. This is mainly due to the remoteness of the islands. During the International Kuril Island Project (IKIP; 1994–2000), American, Japanese and Russian scientists surveyed 30 islands including eight central islands (Pietsch *et al.* 2001). Including new data from the earlier IKIP expeditions, over 100 caddisfly species were recorded from the Kuril Islands (Arefina 1997a, 1997b, 1997c, 1997d, 1997e, 1997f, 1997g; Arefina and Levanidova 1997; Ito 1997; Levanidova and Arefina 1997a, 1997b; Nimmo *et al.* 1997; Arefina *et al.* 1999; Arefina 2001). In this paper, we report the complete data of the caddisfly specimens collected during the seven annual expeditions of IKIP, and provide a list of caddisfly species known from the Kuril Islands.

Methods

Sweep nets and canvas beating sheets were mostly used for collecting adult caddisflies during the expeditions. Canvas beating sheets were effective in small streams on the central and northern islands when the air temperature was low. Although the beating sheets became wet and heavy on rainy or foggy days, they were still more effective than sweep nets. On sunny days, however, adult caddisflies became too active to capture on beating sheets, and then sweep nets became a better collecting method. In swamps with short grass, sweep

nets were used. Sweeping was also used for tree branches along streams on the southern islands where air temperature was higher. Light traps and Malaise traps were used when the collectors were able to return to the traps next day. Caddisfly larvae were collected by kick nets and dip nets. Some newly emerged caddisflies were collected by turning rocks in water.

Collected caddisflies were immediately preserved in 80% ethanol in the field. Collections were identified by T. I. Arefina, T. Ito, V. D. Ivanov, N. Kuhara, I. M. Levanidova, H. Nishimoto, T. Nozaki and M. Uenishi. The caddisfly materials were deposited in the Institute of Biology and Soil Sciences, Russian Academy of Sciences, Far Eastern Branch, Vladivostok, Russia, the California Academy of Sciences, San Francisco, California, USA and Clemson University, Clemson, South Carolina, USA.

Results

Species record

Caddisflies were collected from 21 out of 30 major islands, and collected from 14 islands for the first time (Table 1). A total of 19 families, 45 genera and 98 species were collected during the expeditions, including 28 newly recorded species (including three undescribed species) for the archipelago (Arefina 1997a; Arefina *et al.* 1999). These records bring the present total numbers to 20 families, 50 genera and 123 species.

Following is a list of the caddisflies recorded from the Kuril Islands. Genera and species with an asterisk (*) are those whose presence on the Kuril Islands was verified by our collections; Kuril Island occurrences for the remaining taxa are based on a survey of the available scientific literature. An island name with an asterisk (*) indicates that the caddisfly species was recorded from the island for the first time. Taxa with two asterisks (**) were recorded from the Kuril Island for the first time.

1. Family Rhyacophilidae Stephens, 1836

(1) Genus *Rhyacophila* Pictet, 1834*

1. *Rhyacophila arefini* Lukyanchenko, 1993*; Iturup, Kunashir, Shikotan (Kuwayama 1967a; Vshivkova *et al.* 1994).
   IKIP records: Urup*, Iturup, Kunashir, Shikotan (Arefina 2001).
2. *Rhyacophila brevicephala* Iwata, 1927*; Kunashir (Levanidova 1980).
   IKIP record: Iturup*, Kunashir, Shikotan* (Arefina 2001).
3. *Rhyacophila coreana* Tsuda, 1940; Iturup (Levanidova 1986).
   Remarks: Levanidova (1986) recorded this species without precise data.
4. *Rhyacophila hokkaidensis* Iwata, 1927*; Urup, Iturup, Kunashir (Kuwayama 1967a; Levanidova 1986; Vshivkova *et al.* 1994; Arefina 1997b).
   IKIP records: Simushir*, Urup, Iturup, Kunashir, Shikotan*, Zelionyi* (Arefina 1997b; Arefina 2001).
5. *Rhyacophila kawamurae* Tsuda, 1940*; Kunashir (Vshivkova *et al.* 1994).
   IKIP records: Iturup*, Kunashir (Arefina 2001).
6. *Rhyacophila lata* Martynov, 1918; southern Kurils (Levanidova 1980).
7. *Rhyacophila mirabilis* Levanidova and Schmid, 1977*; Urup, Iturup, Kunashir (Levanidova and Schmid 1977; Vshivkova *et al.* 1994).
   IKIP records: Ketoi*, Simushir*, Urup, Iturup, Kunashir (Arefina 2001).
8. *Rhyacophila nipponica* Navás, 1933*; Kunashir (Vshivkova *et al.* 1994).
   IKIP records: Kunashir, Shikotan*, Zelionyi* (Arefina 1997b; Arefina 2001).
9. *Rhyacophila retracta* Martynov, 1914*; Iturup, Kunashir (Levanidova 1986; Vshivkova *et al.* 1994).
   IKIP records: Urup*, Iturup, Kunashir.
10. *Rhyacophila transquilla* Tsuda, 1940*; Kunashir (Levanidova 1986).
    IKIP records: Kunashir.

2. Family Hydrobiosidae Ulmer, 1905

(2) Genus *Apsilochorema* Ulmer, 1907*

11. *Apsilochorema sutshanum* Martynov, 1934*; Iturup (Levanidova 1986).
    IKIP records: Iturup, Kunashir*, Shikotan* (Levanidova and Arefina 1997a).

3. Family Glossosomatidae Wallengren, 1891

(3) Genus *Agapetus* Curtis, 1834

12. *Agapetus inaequispinosus* Schmid, 1970; Kunashir (Levanidova 1989; Vshivkova *et al.* 1994).

(4) Genus *Anagapetus* Ross, 1938*

13. *Anagapetus schmidi* (Levanidova, 1979)*; Kunashir (Levanidova 1989).
    IKIP records: Ketoi*, Simushir*, Urup*, Iturup*, Kunashir, Shikotan* (Arefina and Levanidova 1997).

(5) Genus *Glossosoma* Curtis, 1834*

14. *Glossosoma altaicum* (Martynov, 1914); Kunashir, (Levanidova 1989; Vshivkova *et al.* 1994).
15. *Glossosoma dulkejti* (Martynov, 1934)*; Iturup, Kunashir (Vshivkova 1986).
    IKIP records: Iturup, Kunashir, Shikotan* (Arefina and Levanidova 1997).
16. *Glossosoma intermedium* (Klapálek, 1892)*; Paramushir (Kuranishi 2000).
    IKIP records: Shumshu*, Paramushir.
17. *Glossosoma ussuricum* (Martynov, 1934)*; Iturup, Kunashir (Vshivkova 1986; Vshivkova *et al.* 1994).
    IKIP records: Simushir*, Urup*, Iturup, Kunashir, Shikotan* (Arefina and Levanidova 1997).
    See also "synonymic note" (p. 56).

Table 1. Numbers of caddisfly species recorded from the Kuril Islands.

Island	Previous records	New records	Total	IKIP records
Kuril Islands	95	28	123	98
Northern Group:				
Atlasova	0	4	4	4
Shumshu	16	11	27	19
Paramushir	24	8	32	26
Antsiferova	0	0	0	0
Makanrushi	0	5	5	5
Onekotan	0	9	9	9
Kharimkotan	0	7	7	7
Chirinkotan	0	0	0	0
Ekarma	0	2	2	2
Shiashkotan	0	8	8	8
Central Group:				
Lovushki	0	0	0	0
Raikoke	0	0	0	0
Matua	0	4	4	4
Rasshua	0	8	8	8
Ryponkicha	0	0	0	0
Yankicha	0	0	0	0
Ketoi	0	14	14	14
Simushir	5	11	16	15
Southern Group:				
Broutona	0	0	0	0
Chirpoi	0	0	0	0
Brat Chirpoev	0	0	0	0
Urup	14	19	33	32
Iturup	34	26	60	53
Kunashir	66	21	87	59
Shikotan	11	23	34	29
Habomai Group:				
Polonskogo	0	2	2	2
Zelionyi	0	10	10	10
Iurii	0	1	1	1
Anuchina	0	1	1	1
Tanfilyeva	0	9	9	9

The genus *Glossosoma* was also recorded from Ketoi* for the first time (Appendix I).

4. Family Hydroptilidae Stephens, 1836

(6) Genus *Hydroptila* Dalman, 1819*/**
18. *Hydroptila* sp.*/**
IKIP records: Iturup*, Polonskogo*.

(7) Genus *Orthotrichia* Eaton, 1873*/**
19. *Orthotrichia* sp.*/**
IKIP records: Zelionyi* (Arefina *et al.* 1999).

(8) Genus *Palaeagapetus* Ulmer, 1912*/**
20. *Palaeagapetus flexus* Ito, 1991*/**
IKIP records: Iturup* (Arefina 1997c).

The genus *Palaeagapetus* was also recorded from Urup* for the first time (Appendix I).

(9) Genus *Stactobia* McLachlan, 1880
21. *Stactobia makartschenkoi* Botosaneanu and Levanidova, 1988; Kunashir (Botosaneanu and Levanidova 1988).

5. Family Philopotamidae Stephens, 1829

(10) Genus *Dolophilodes* Ulmer, 1909*
22. *Dolophilodes* (*Dolophilodes*) *japonicus* (Banks, 1906)*; Kunashir (Levanidova 1982; Vshivkova *et al.* 1994).
IKIP records: Kunashir.
23. *Dolophilodes* (*Dolophilodes*) *kunashirensis* Ivanov, 1996*; Kunashir (Arefina *et al.* 1996).
IKIP records: Paramushir*.
24. *Dolophilodes* (*Dolophilodes*) *nomugiensis* (Kobayashi 1980)*; Kunashir (Vshivkova *et al.* 1994).
IKIP records: Shumshu*, Kharimkotan*,

Simushir*, Urup*, Iturup*.

The genus *Dolophilodes* was also recorded from Ketoi* and Shiashkotan* for the first time (Appendix I).

(11) Genus *Kisaura* Ross, 1956*
25. *Kisaura borealis* (Kuhara, 1999)*/**
IKIP records: Kunashir*.
26. *Kisaura hattorii* (Kuhara, 1999)*/**
IKIP records: Iturup*, Kunashir*, Shikotan*.
27. *Kisaura tsudai* (Botosaneanu, 1970); Kunashir (Ivanov, 1997).
Remarks: Arefina *et al.* (1999) misidentified *K. hattorii* as *K. tsudai*.
28. *Kisaura* sp.*/**
IKIP records: Kunashir*.
Remarks: This species was different from any other species. N. Kuhara and T. I. Arefina will describe this as a new species.

(12) Genus *Wormaldia* McLachlan, 1865*
29. *Wormaldia* sp.*/**
IKIP records: Kunashir* (Arefina *et al.* 1999).

6. Family Stenopsychidae Martynov, 1924

(13) Genus *Stenopsyche* McLachlan, 1866*
30. *Stenopsyche marmorata* Navás, 1920*; Iturup, Kunashir (Kuwayama 1967a).
IKIP records: Iturup, Kunashir, Shikotan*.

7. Family Hydropsychidae Curtis, 1835

(14) Genus *Cheumatopsyche* Wallengren, 1891*
31. *Cheumatopsyche infascia* Martynov, 1934*/**
IKIP records: Paramushir*, Kunashir* (Arefina *et al.* 1999).
Schmid (1965) also recorded a female of this genus from Iturup.

(15) Genus *Hydropsyche* Pictet, 1834*
32. *Hydropsyche albicephala* Tanida, 1986*/**
IKIP records: Kunashir* (Arefina *et al.* 1999).
33. *Hydropsyche orientalis* Martynov, 1934*; Kunashir (Vshivkova *et al.* 1994).
IKIP records: Iturup*, Kunashir.

8. Family Arctopsychidae Martynov, 1924

(16) Genus *Parapsyche* Betten, 1934*
34. *Parapsyche shikotsuensis* (Iwata, 1927)*; Kunashir (Vshivkova *et al.* 1994).
IKIP records: Kunashir.

9. Family Psychomyiidae Curtis, 1835**

(17) Genus *Lype* McLachlan, 1879*/**
35. *Lype excisa* Mey, 1991*/**
IKIP records: Iturup*, Kunashir* (Arefina *et al.* 1999).

10. Family Polycentropodidae Ulmer, 1903

(18) Genus *Plectrocnemia* Stephens, 1836
36. *Plectrocnemia levanidovae* Vshivkova *et al.*, 2003; Kunashir (Vshivkova *et al.* 1994; Arefina *et al.* 2003).

11. Family Ecnomidae Ulmer, 1903

(19) Genus *Ecnomus* McLachlan, 1864*
37. *Ecnomus tenellus* (Rambur, 1842)*; Kunashir (Vshivkova *et al.* 1994).
IKIP records: Iturup*, Kunashir.

12. Family Phryganeidae Leach, 1815

(20) Genus *Agrypnia* Curtis, 1835*
38. *Agrypnia acristata* Wiggins, 1998*; Kunashir (Kuwayama 1967a; Wiggins 1998).
IKIP records: Iturup*.
Remarks: *Agrypnia ulmeri* by Kuwayama (1967a, 1973) is likely misidentification of this species.
39. *Agrypnia czerskyi* (Martynov, 1924)*/**
IKIP records: Iturup*.
40. *Agrypnia picta* Kolenati, 1848*; Urup, Paramushir (Schmid 1965; Kuranishi 2000).
IKIP records: Shumshu*, Paramushir, Shiashkotan*, Rasshua*, Iturup*.
41. *Agrypnia sahlbergi* (McLachlan, 1880)*; Paramushir (Vshivkova *et al.* 1994).
IKIP records: Shumshu*, Paramushir.
42. *Agrypnia sordida* (McLachlan, 1871)*; Iturup (Vshivkova *et al.* 1994; Wiggins 1998).
IKIP records: Urup*, Iturup, Kunashir* (Arefina 1997d).

(21) Genus *Eubasilissa* Martynov, 1930*
43. *Eubasilissa regina* (McLachlan, 1871)*; Kunashir (Schmid 1965).
IKIP records: Kunashir.

(22) Genus *Hagenella* Martynov, 1924*
44. *Hagenella apicalis* (Matsumura, 1904)*; Kunashir (Schmid 1965).
IKIP records: Kunashir, Polonskogo*.
45. *Hagenella sibirica* (Martynov, 1909)*; Shumshu, Paramushir (Kuwayama 1973; Kuranishi 2000).
IKIP records: Paramushir.

(23) Genus *Oligotricha* Rambur, 1842*
46. *Oligotricha hybridoides* Wiggins and Kuwayama, 1971; Kunashir (Vshivkova *et al.* 1994).
47. *Oligotricha lapponica* (Hagen, 1864)*/**
IKIP records: Paramushir*, Onekotan* (Arefina *et al.* 1999).

The genus *Oligotricha* was also recorded from Urup*

and Shumshu* for the first time (Appendix I).

(24) Genus *Phryganea* Linnaeus, 1758

48. *Phryganea (Colpomera) japonica* (McLachlan, 1866); Kunashir (Schmid 1965).

(25) Genus *Semblis* Fabricius, 1775

49. *Semblis melaleuca* (McLachlan, 1871); Iturup, Kunashir (Schmid 1965; Kuwayama 1967a; Vshivkova *et al.* 1994; Wiggins 1998).

13. Family Brachycentridae Ulmer, 1903

(26) Genus *Brachycentrus* Curtis, 1834*

50. *Brachycentrus americanus* (Banks, 1899)*/**
IKIP records: Kunashir* (Arefina *et al.* 1999).

51. *Brachycentrus* sp.*
IKIP records: Shumshu.
Remarks: This species is not *B. americanus*. See also Uéno (1933).

(27) Genus *Micrasema* McLachlan, 1876*

52. *Micrasema hanasensis* Tsuda, 1942*/**
IKIP records: Ketoi*, Urup*, Iturup*, Kunashir*.

53. *Micrasema (gelidum) kurilicum* Botosaneanu, 1988; Kunashir (Botosaneanu 1988).

The genus *Micrasema* was also recorded from Simushir* for the first time (Appendix I).

14. Family Limnephilidae Kolenati, 1848

(28) Genus *Asynarchus* McLachlan, 1880*

54. *Asynarchus sachalinensis* Martynov, 1914*; Iturup, Kunashir (Kuwayama 1967a; Vshivkova *et al.* 1994).
IKIP records: Urup*, Iturup, Shikotan*.

(29) Genus *Dicosmoecus* McLachlan, 1875*

55. *Dicosmoecus jozankeanus* (Matsumura, 1931)*; Iturup, Shikotan (Kuwayama 1967a; Nagayasu and Ito 1993).
IKIP records: Urup*, Iturup, Kunashir*, Shikotan (Nimmo *et al.*, 1997).

(30) Genus *Ecclisocosmoecus* Schmid, 1964*/**

56. *Ecclisocosmoecus spinosus* Schmid, 1964*/**
IKIP records: Urup*, Iturup*, Kunashir*, Shikotan*, Tanfilyeva*.

(31) Genus *Ecclisomyia* Banks, 1907*

57. *Ecclisomyia kamtshatica* (Martynov, 1913)*; Shumshu (recorded as Simushir), Paramushir (Uéno 1933).
IKIP records: Shumshu, Paramushir, Ketoi*, Simushir*, Urup*, Iturup* (Nimmo *et al.* 1997).

(32) Genus *Grammotaulius* Kolentai, 1848*

58. *Grammotaulius inornatus* Schmid, 1964*; Paramushir (Kuwayama 1936; Vshivkova *et al.* 1994).
IKIP records: Paramushir.

59. *Grammotaulius signatipennis* McLachlan, 1876*; Paramushir (Kuranishi 2000).
IKIP records: Shumshu*, Paramushir, Onekotan*.

(33) Genus *Halesus* Stephens, 1836*

60. *Halesus sachalinensis* Martynov, 1914*; Urup, Iturup, Kunashir (Schmid 1965; Vshivkova *et al.* 1994).
IKIP records: Urup, Iturup, Kunashir, Shikotan*.

(34) Genus *Hydatophylax* Wallengren, 1891*

61. *Hydatophylax festivus* (Navás, 1920)*; Urup, Iturup, Kunashir, Shikotan (Vshivkova *et al.* 1994; Nozaki, 1999).
IKIP records: Urup, Iturup, Kunashir, Shikotan, Zelionyi*.

62. *Hydatophylax magnus* (Martynov, 1914); Iturup (Vshivkova *et al.* 1994).

63. *Hydatophylax variabilis* (Martynov, 1910)*; Kunashir (Vshivkova *et al.* 1994).
IKIP records: Kunashir, Shikotan*.

64. *Hydatophylax* sp.*/**
IKIP records: Ketoi*, Simushir*, Urup*, Iturup*, Kunashir*, Shikotan* (Arefina *et al.* 1999).
Remarks: Arefina *et al.* (1999) reported this species as *H. soldatovi*, however we confirmed that this is different from any other species after careful reexamination. T. Nozaki and N. Minakawa will describe this as a new species.

The genus *Hydatophylax* was also recorded from Paramushir* for the first time (Appendix I).

(35) Genus *Lenarchus* Martynov, 1914*

65. *Lenarchus fuscostramineus* Schmid, 1952*; Iturup, Kunashir (Schmid 1965).
IKIP records: Urup*, Iturup, Shikotan*, Tanfilyeva*.

(36) Genus *Limnephilus* Leach, 1815*

66. *Limnephilus alienus* Martynov, 1914*; Shumshu, Simushir, Urup, Iturup, Kunashir (Schmid 1965; Vshivkova *et al.* 1994).
IKIP records: Shumshu, Onekotan*, Shiashkotan*, Rasshua*, Urup, Iturup, Kunashir.

67. *Limnephilus diphyes* McLachlan, 1880; Shumshu, Paramushir (Kuranishi 2000).

68. *Limnephilus elegans* Curtis, 1834*; Shumshu, Paramushir (Vshivkova *et al.* 1994; Kuranishi 2000).
IKIP records: Paramushir.

69. *Limnephilus femoralis* Kirby, 1837*; Shumshu, Paramushir (Vshivkova *et al.* 1994; Kuranishi 2000).
IKIP records: Shumshu, Paramushir.

70. *Limnephilus femoratus* Zetterstedt, 1840*/**
IKIP records: Iturup* (Arefina *et al.* 1999).
Remarks: The previous record of this species from Paramushir was an error (Arefina *et al.* 1999).

71. *Limnephilus fenestratus* (Zetterstedt, 1840)*; Paramushir (Vshivkova *et al.* 1994).
IKIP records: Shumshu*, Paramushir.

72. *Limnephilus fuscovittatus* Matsumura, 1904*; Shumshu, Paramushir, Simushir, Urup, Iturup, Kunashir, Shikotan (Schmid 1965; Kuwayama 1967a; Vshivkova *et al.* 1994).
IKIP records: Shumshu, Atlasova*, Paramushir, Onekotan*, Kharimkotan*, Matua*, Rasshua*, Ketoi*, Simushir, Urup, Iturup, Kunashir, Shikotan, Tanfilyeva*.
73. *Limnephilus incisus* Curtis, 1834*/**
IKIP records: Paramushir* (Arefina *et al.* 1999).
74. *Limnephilus major* (Martynov, 1909)*; Paramushir (Vshivkova *et al.* 1994).
IKIP records: Shumshu*.
75. *Limnephilus nigriceps* (Zetterstedt, 1840)*/**
IKIP records: Paramushir*.
76. *Limnephilus nipponicus* Schmid, 1964*; Simushir, Urup, Iturup, Kunashir (Schmid 1965; Kuwayama 1967a; Vshivkova *et al.* 1994).
IKIP records: Ketoi*, Simushir, Urup, Iturup, Kunashir, Shikotan*.
77. *Limnephilus orientalis* Martynov, 1935*; Urup, Iturup, Kunashir, Shikotan (Schmid 1965; Kuwayama 1967a; Vshivkova *et al.* 1994).
IKIP records: Urup, Iturup, Kunashir.
78. *Limnephilus ornatulus* Schmid, 1965*; Iturup, Kunashir (Schmid 1965; Kuwayama 1967a; Vshivkova *et al.* 1994).
IKIP records: Kunashir.
79. *Limnephilus picturatus* McLachlan, 1875*; Shumshu, Paramushir (Tsuda 1942; Schmid 1955; Vshivkova *et al.* 1994).
IKIP records: Shumshu, Paramushir.
80. *Limnephilus quadratus* Martynov, 1914*; Kunashir (Vshivkova *et al.* 1994).
IKIP records: Kunashir, Tanfilyeva*, Iurii*.
81. *Limnephilus rhombicus* (Linnaeus, 1758)*; Paramushir, Kunashir (Konakov 1956; Vshivkova *et al.* 1994).
IKIP records: Iturup*.
82. *Limnephilus sericeus* (Say, 1824)*; Shumshu, Paramushir, Simshir, Urup, Iturup (Tsuda 1942; Schmid 1955, 1965; Kuwayama 1967a; Vshivkova *et al.* 1994).
IKIP records: Shumshu, Paramushir, Makanrushi*, Onekotan*, Kharimkotan*, Shiashkotan*, Matua*, Rasshua*, Ketoi*, Simushir, Urup, Iturup, Shikotan*.
83. *Limnephilus sparsus* Curtis, 1834*; Paramushir, Simushir, Urup, Iturup, Kunashir, Shikotan (Tsuda 1942; Schmid 1965; Kuwayama 1967a; Vshivkova *et al.* 1994).
IKIP records: Atlasova*, Shumshu, Paramushir, Makanrushi*, Onekotan*, Kharimkotan*, Shiashkotan*, Matua*, Rasshua*, Ketoi*, Simushir, Urup, Iturup, Kunashir, Shikotan, Zelionyi*, Tanfilyeva*.
84. *Limnephilus stigma* Curtis, 1834*; Paramushir, Kunashir (Kuwayama 1967a; Vshivkova *et al.* 1994).
IKIP records: Shumshu*, Paramushir, Onekotan*, Kharimkotan*, Iturup*.
85. *Limnephilus subcentralis* Brauer, 1857*/**
IKIP records: Iturup*.

(37) Genus *Nemotaulius* Banks, 1906*
86. *Nemotaulius admorsus* (McLaclan, 1866); Kunashir (Kuwayama 1967a).
87. *Nemotaulius miyakei* (Nakahara, 1914)*; Iturup, Kunashir (Kuwayama 1936; Kuwayama 1967a).
IKIP records: Iturup, Kunashir.
88. *Nemotaulius mutatus* (McLachlan, 1872); Shumshu, Paramushir (Kuranishi 2000).

(38) Genus *Nothopsyche* Banks, 1906*/**
89. *Nothopsyche* sp.*/**
IKIP records: Kunashir* (Arefina *et al.* 1999).

(39) Genus *Onocosmoecus* Banks, 1943*
90. *Onocosmoecus unicolor* (Banks, 1897)*; Shumshu, Shikotan (Kuwayama 1936; Vshivkova *et al.* 1994).
IKIP records: Atlasova*, Shumshu, Paramushir*, Makanrushi*, Onekotan*, Kharimkotan*, Ekarma*, Shiashkotan*, Rasshua*, Ketoi*.

15. Family Apataniidae Wallengren, 1886

(40) Genus *Allomyia* Banks, 1916*
91. *Allomyia coronae* Levanidova and Arefina, 1995*; Kunashir (Levanidova *et al.* 1995).
IKIP records: Iturup*, Shikotan* (Levanidova and Arefina 1997b).
92. *Allomyia delicatula* Levanidova and Arefina, 1995*; Kunashir (Levanidova *et al.* 1995).
IKIP records: Simushir*.

(41) Genus *Apatania* Kolenati, 1848*
93. *Apatania aberrans* (Martynov, 1933); Kunashir (Vshivkova *et al.* 1994).
94. *Apatania insularis* Levanidova, 1979; Kunashir (Levanidova 1979).
95. *Apatania parvula* (Martynov, 1935)*; Shumshu, Urup, Iturup, Kunashir, Shikotan (Schmid 1965; Kuwayama 1967a; Levanidova 1979; Vshivkova *et al.* 1994).
IKIP records: Rasshua*, Ketoi*, Simushir*, Urup, Iturup, Kunashir, Shikotan, Anuchina* (Levanidova and Arefina 1997b).
96. *Apatania sinensis* Martynov, 1914; Paramushir (Levanidova 1982).
97. *Apatania stigmatella* (Zetterstedt, 1840); Shumshu, Paramushir (Kuranishi 2000).
98. *Apatania zonella* Zetterstedt, 1840*; Shumshu, Paramushir (Vshivkova *et al.* 1994).
IKIP records: Atlasova*, Shumshu, Paramushir, Makanrushi*, Onekotan*, Kharimkotan*, Shiashkotan*, Matua*, Rasshua*, Iturup* (Levanidova and Arefina 1997b).

The genus *Apatania* was also collected from Ekarma* for the first time (Appendix I).

16. Family Goeridae Ulmer, 1903

(42) Genus *Goera* Stephens, 1829*

99. *Goera japonica* Banks, 1906*; Urup, Iturup, Kunashir (Schmid 1965; Kuwayama 1967a; Vshivkova *et al.* 1994).
IKIP records: Urup, Iturup, Kunashir, Shikotan* (Arefina 1997e).
100. *Goera* sp.; Shikotan (Vshivkova *et al.* 1994).
Remarks: This species differs from the other species of *Goera* recorded from Russia and Japan (Vshivkova *et al.* 1994).

17. Family Uenoidae Iwata, 1927

(43) Genus *Neophylax* McLachlan, 1871*

101. *Neophylax japonicus* Schmid, 1964*/**
IKIP records: Kunashir*.
102. *Neophylax ussuriensis* (Martynov, 1914)*; Urup, Iturup, Kunashir (Kuwayama 1936).
IKIP records: Urup, Iturup, Kunashir, Shikotan* (Arefina 1997f).

18. Family Lepidostomatidae Ulmer, 1903

(44) Genus *Lepidostoma* Rambur, 1842*

103. *Lepidostoma albardanum* (Ulmer, 1906); Kunashir (Ito *et al.* 1992; Weaver 2002).
104. *Lepidostoma complicatum* (Kobayashi, 1968)*; Kunashir (Ito *et al.* 1992; Weaver 2002).
IKIP records: Iturup*, Kunashir, Shikotan*.
105. *Lepidostoma crassicorne* (Ulmer, 1907)*; Kunashir (Ito *et al.* 1992; Weaver 2002).
IKIP records: Urup*, Shikotan*.
Remarks: Vshivkova *et al.* (1994) suggested that *Neoseverinia* sp. recorded from Shikotan by Kuwayama (1967a) was this species. We confirmed that *L. crassicorne* occurs on Shikotan.
106. *Lepidostoma hiurai* (Tani, 1971)*; Iturup, Kunashir (Ito *et al.* 1992; Weaver 2002).
IKIP records: Iturup, Kunashir, Shikotan*, Zelionyi*, Tanfilyeva* (Ito 1997).
107. *Lepidostoma naraense* (Tani, 1971); Kunashir (Ito *et al.* 1992; Weaver 2002).
108. *Lepidostoma satoi* (Kobayashi, 1968); Shikotan, Kunashir (Ito *et al.* 1992; Weaver 2002).
109. *Lepidostoma stellatum* (Ito, 1984)*; Kunashir (Ito *et al.* 1992; Weaver 2002).
IKIP records: Paramushir*, Makanrushi*, Shiashkotan*, Ketoi*, Simushir*, Urup*, Iturup* (Ito and Minakawa 1995).

19. Family Molannidae Wallengren, 1891

(45) Genus *Molanna* Curtis, 1834*

110. *Molanna moesta* Banks, 1906*; Iturup, Kunashir, Shikotan (Kuwayama 1936; Kuwayama 1967a).
IKIP records: Urup*, Iturup, Kunashir, Zelionyi*, Tanfilyeva* (Arefina 1997g).
111. *Molanna submarginalis* McLachlan, 1872*; Paramushir (Vshivkova *et al.* 1994).
IKIP records: Paramushir.

The genus *Molanna* was also recorded from Shumshu* for the first time (Appendix I).

(46) Genus *Molannodes* McLachlan, 1866*

112. *Molannodes itoae* Fuller and Wiggins, 1987; Kunashir (Vshivkova *et al.* 1994).
113. *Molannodes tinctus* (Zetterstedt, 1840)*/**
IKIP records: Shumshu*, Paramushir* (Arefina *et al.* 1999).

20. Family Leptoceridae Leach, 1815

(47) Genus *Ceraclea* Stephens, 1829*/**

114. *Ceraclea alboguttata* (Hagen, 1860)*/**
IKIP records: Kunashir* (Arefina *et al.* 1999).
115. *Ceraclea valentinae* Arefina, 1997*/**
IKIP records: Zelionyi* (Arefina 1997a).

(48) Genus *Mystacides* Berthold, 1827*

116. *Mystacides azureus* (Linnaeus, 1761)*/**
IKIP records: Iturup*, Kunashir* (Arefina *et al.* 1999).
117. *Mystacides pacificus* Mey, 1991*; Iturup, Kunashir (Vshivkova *et al.* 1994).
IKIP records: Urup*, Iturup, Kunashir, Zelionyi*, Tanfilyeva*.

(49) Genus *Oecetis* McLachlan, 1877*

118. *Oecetis brachyura* Yang and Morse, 1997; Kunashir (*Oecetis* sp.: Vshivkova *et al.* 1994).
M. Uenishi examined the specimens listed as *Oecetis* sp. by Vshivkova *et al.* (1994) and confirmed that they are *O. brachyura*.
119. *Oecetis morii* Tsuda, 1942*/**
IKIP records: Kunashir* (Arefina *et al.* 1999).
120. *Oecetis nigropunctata* Ulmer, 1908*; Paramushir, Kunashir (Kuwayama 1967a; Kuranishi 2000).
IKIP records: Paramushir, Kunashir, Tanfilyeva*.

(50) Genus *Triaenodes* McLachlan, 1865*

121. *Triaenodes pellectus* Ulmer, 1908*/**
IKIP records: Kunashir* (Arefina *et al.* 1999).
122. *Triaenodes unanimis* McLachlan, 1877*; Iturup (Kuwayama 1967a; Vshivkova *et al.* 1997).
IKIP records: Iturup, Kunashir*, Zelionyi*.
123. *Triaenodes* sp.; Iturup, Kunashir (Vshivkova *et al.* 1994).

Distribution patterns

Caddisflies of the Kurils are roughly divided into four groups based on their distribution patterns: (1) a group of species that is distributed toward the north end of the archipelago, (2) a group of species that is distributed toward the south end, (3) a group of species that is distributed toward both ends, and (4) a group of species

distributed throughout the archipelago. Most species (87 species) are distributed toward the south end. The Philopotamidae, Phryganeidae, Limnephilidae and Apataniidae include two or more patterns of distribution. The Molannidae are distributed either toward the north end or south end.

Synonymic note

Glossosoma ussuricum was described as *Mystrophora ussurica* by Martynov (1934) from the southern Ussuri, and is widely distributed in continental Russia (Vshivkova 1986; Arefina and Levanidova 1997). On the other hand, *Glossosoma inops* was described as *M. inops* from Kyoto, Japan by Tsuda (1940), and has been commonly recorded from Japanese islands (Nozaki *et al.* 1994). During this study, we compared specimens collected from the Kurils with those from the southern Ussuri and the Japanese islands, and found that these two species are identical. Thus, we conclude that *G. inops* is a junior subjective synonym of *G. ussuricum* although we could not examine the type specimens of both species (see also footnote).

Discussion

IKIP added considerably to the knowledge of the caddisfly fauna on the Kuril Islands. The expedition recorded about 80% and added about 20% of the currently known species. Caddisflies were recorded from nearly half of the Kuril Islands for the first time. IKIP made it possible to sample caddisflies from the remote and small islands that biologists had not visited.

Species number of each island is affected by several factors, distance from the mainland, island size, age and habitat availability (MacArthur and Wilson 1967). The high species numbers on the major southern islands are likely due to their close distances to the main land (Hokkaido) and their large island sizes. This is also true for Shumshu and Paramushir which are relatively large and close to Kamchatka. The low species numbers of the central islands is likely due to the large distance from the mainland. The species that occur in the central islands must have great dispersal ability to reach the islands. The islands without caddisfly records are probably too small to provide habitats even for those with great dispersal ability.

Although the Habomai Islands are also small, a relatively rich caddisfly fauna is expected for these islands because of their close distance to Hokkaido and lack of volcanic activities (Kryvolutskaya 1973; Pietsch *et al.* 2001). All of the Habomai islands are flat, and numerous swamps on the islands provide suitable habitats for several caddisfly species that are adapted for lentic environments. However, the current known species numbers on the Habomai islands are low, which is due to insufficient sampling days. IKIP allotted only six sampling days for the five islands of the Habomai group, and previously no one had visited to these islands for collecting.

Higher species numbers are also expected for the larger islands. Due to lack of transportation on the islands, sampling caddisflies was mostly limited to the areas near the shore during the expedition. The collectors had to return to the research vessel for safety at the end of the day, which also prevented them from sampling far inland. By staying on the islands, collectors can cover a larger area, and operate insect traps. The light traps and Malaise traps were used a few occasions when the research vessel stayed at the same locations over night, and the results of the traps were remarkable.

The expedition was limited to the period from the end of July through August each year. Although this is the best season to collect adult caddisflies on the islands, it is reasonable to consider that several species that emerge in the other seasons were unrecorded. Their emergence period is expected to be longer than the period of the expedition, particularly, on the southern islands. Thus, the knowledge of the Kuril caddisfly fauna could be improvement. At a minimum, the distributions of the following species are expected to be corrected in future research. *Ecclisomiya kamtshatica* and *Limnephilus sericeus* are expected to occur on Kunashir, because these species were recorded from the other major southern islands and Hokkaido (Nozaki and Tanida 1996; Nozaki *et al.* 2000). Since *Lepidostoma crassicorne* occurs on Urup, Shikotan and Kunashir, this species may also occur on Iturup that lies between Urup and Kunashir. Similarly, *Micrasema hanasensis* and *Agrypnia picta* may occur on Simushir. *Limnephilus alienus* and *L. fuscovittatus* are distributed on the major islands throughout the island chain, therefore, the former species may occur on Paramushir, Matua and Shikotan, and the later species may occur on Shiashkotan.

Synonymic list of *Glossosoma ussuricum* (Martynov, 1934)

Mystrophora ussurica Martynov, 1934, 79–80.

Glossosoma ussuricum: Vshivkova, 1986, 72–74; Arefina & Levanidova, 1997, 38.

Mystrophora inops Tsuda, 1940, 193–194. **New Synonym.**

Glossosoma inops: Nozaki *et al.*, 1994, 299–300.

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Appendix I: Material Examined

In the following list of material examined, the island locality is followed by IKIP number (see Appendix II) and the number of specimens (M = male adult, F = female adult, P = pupa, L = larva) in the lot.

Rhyacophila arefini URUP: UR-95-PO-11 (1M), UR-95-PO-18 (3M), UR-95-PO-36 (2M), UR-95-VAT-11 (1M 2F), UR-95-VAT-15 (2M), UR-95-VAT-23 (2M), UR-96-PO-60 (2M), UR-96-VAT-41 (1M 1F); ITURUP: IT-94-RG-02 (1M), IT-94-RG-11 (1M), IT-94-VAT-33 (1F), IT-94-VAT-34 (3L), IT-94-VAT-36 (1F), IT-94-VAT-37 (1L), IT-94-VAT-45 (1M), IT-94-VAT-49 (2L), IT-94-VAT-51 (1L), IT-97-TIR-05 (1M), IT-98-NM-19 (2M), IT-98-NM-24 (2M), IT-98-VAT-14 (1L), IT-98-VAT-18 (2M), IT-98-VAT-22 (1M), IT-98-VAT-23 (1L), IT-98-VAT-24 (1M), IT-98-VAT-38 (3M); KUNASHIR: KU-94-NM-21 (4 M 4F), KU-94-NM-13 (1M), KU-94-VAT-06 (2L), KU-94-VAT-11 (3M 2F), KU-98-LJW-40 (1M); SHIKOTAN: SH-98-VAT-42 (1M 1F), SH-98-VAT-50 (1L).

Rhyacophila brevicephala ITURUP: IT-98-LJW-31 (1M), IT-98-VAT-32 (1L); KUNASHIR: KU-95-VAT-01 (1P), KU-95-VAT-03 (4P), KU-97-NM-01 (7M), KU-97-VAT-01 (2M), KU-98-LJW-40 (3M), KU-98-VAT-01 (2M 1F), KU-98-VAT-02 (11P); SHIKOTAN: SH-98-VAT-49 (1F).

Rhyacophila hokkaidensis SIMUSHIR: SI-95-PO-39 (8L); URUP: UR-95-PO-10 (1F 2L 6P), UR-95-PO-15 (3L), UR-95-PO-22 (1L), UR-95-PO-34 (1L), UR-95-PO-95 (1M), UR-95-PO-96 (2M), UR-95-PO-105 (4L), UR-95-VAT-08 (2L), UR-95-VAT-09 (1M 1F 5P), UR-95-VAT-10 (3L), UR-95-VAT-13 (2L), UR-95-VAT-15 (3L), UR-95-VAT-18 (3L), UR-95-VAT-23 (3L), UR-95-VAT-66 (1M), UR-96-VAT-42 (3L); ITURUP: IT-94-RG-01 (2L), IT-94-RG-02 (10L), IT-94-RG-03 (8L), IT-94-RG-04 (6M 4F 17L 1P), IT-94-RG-05 (6L), IT-94-RG-06 (1M 15L), IT-94-RG-08 (1L), IT-94-RG-11 (1L), IT-94-RG-14 (1M 1F 49L), IT-94-RG-15 (2L), IT-94-VAT-34 (27L 5P), IT-94-VAT-35 (1F 4L 1P), IT-94-VAT-36 (1M), IT-94-VAT-37 (3L), IT-94-VAT-38 (6L), IT-94-VAT-40 (1M 1F 13L), IT-94-VAT-46 (2L), IT-94-VAT-49 (2L), IT-94-VAT-51 (23L 2P), IT-95-PO-06 (3L), IT-95-PO-07 (7L), IT-95-PO-08 (1L), IT-95-PO-120 (3M 30L), IT-95-VAT-06 (20L 1P), IT-95-VAT-68 (2L), IT-96-VAT-39 (2F), IT-97-VAT-08 (2M 4F), IT-98-LJW-23 (2L), IT-98-LJW-28 (2M 1L), IT-98-LJW-30 (1L), IT-98-LJW-35 (1L), IT-98-NM-16 (1F), IT-98-NM-37 (1L), IT-98-VAT-10 (9L), IT-98-VAT-12 (3L), IT-98-VAT-14 (3L), IT-98-VAT-22 (1M), IT-98-VAT-23 (5L 4P), IT-98-VAT-26 (2F), IT-98-VAT-27 (1L 1P), IT-98-VAT-29 (4L 2P), IT-98-VAT-31 (1M), IT-98-VAT-32 (24L), IT-98-VAT-34 (1M), IT-98-VAT-35 (4L), IT-98-VAT-36 (2L); KUNASHIR: KU-94-NM-04 (1M), KU-94-NM-05 (2L), KU-94-NM-07 (1L), KU-94-NM-10 (5L), KU-94-NM-11 (2L), KU-94-NM-13 (1M), KU-94-NM-16 (1L), KU-94-NM-17 (3L), KU-94-NM-18 (2L), KU-94-VAT-06 (5L), KU-94-VAT-07 (1M 1F), KU-94-VAT-08 (3L), KU-94-VAT-09 (4L), KU-94-VAT-10 (1M), KU-94-VAT-12 (3L), KU-94-VAT-14 (1M), KU-94-VAT-15 (2L), KU-94-VAT-16 (4L 5P), KU-94-VAT-19 (2F 5L), KU-94-VAT-20 (2M), KU-95-PO-02 (2M), KU-95-PO-128 (14M 7F), KU-95-VAT-02 (1M), KU-95-VAT-03 (1L), KU-95-VAT-71 (4F), KU-97-NM-01 (3M), KU-97-TIR-04 (3M), KU-97-VAT-01 (3F), KU-98-LJW-06 (5L), KU-98-LJW-10 (1M), KU-98-LJW-41 (2L), KU-98-VAT-01 (9M 1F), KU-98-VAT-02 (6L 6P), KU-98-VAT-06 (1M 1F 1L), KU-98-VAT-08 (4P), KU-98-TIA-65 (1M), KU-99-KLK-51 (3L), KU-99-VAT-62 (5L), KU-99-VAT-63 (1F 3L); SHIKOTAN: SH-94-RG-01 (6L), SH-94-RG-03 (2L), SH-94-VAT-29 (10L 6P), SH-94-VAT-32 (1L 1P), SH-98-LJW-46 (1M), SH-98-LJW-54 (1M), SH-98-LJW-55 (1L), SH-98-LJW-56 (3L 2P), SH-98-NM-30 (1M), SH-98-NM-33 (1L), SH-98-VAT-47 (1F), SH-98-VAT-50 (1L); ZELIONYI : ZE-94-NM-03 (14L), ZE-94-VAT-25 (1L).

Rhyacophila kawamurae ITURUP: IT-98-NM-06 (1M), IT-98-VAT-18 (2F), IT-98-VAT-22 (1F), IT-98-VAT-23 (2L), IT-98-VAT-38 (1F); KUNASHIR: KU-94-NM-11 (2M), KU-97-TIR-04 (1M), KU-98-LJW-01 (1M), KU-98-VAT-01 (4F).

Rhyacophila mirabilis KETOI: KE-95-PO-63 (2M), KE-95-PO-64 (7P 1P), KE-95-PO-74 (2M), KE-95-PO-75 (7L 6P), KE-95-PO-76 (1M), KE-95-VAT-37 (17M 5F), KE-95-VAT-38 (8L 19P), KE-95-VAT-44 (4M), KE-95-VAT-45 (15L 2P); SIMUSHIR: SI-95-PO-39 (1M 1L), SI-95-PO-43 (1M), SI-95-PO-45 (11M 8F), SI-95-PO-66 (1M), SI-95-PO-69 (2M), SI-95-PO-70 (4M), SI-95-PO-80 (5M), SI-95-PO-81 (3P), SI-95-PO-82 (2M), SI-95-VAT-24 (9M 3F), SI-95-VAT-25 (6L 8P), SI-95-VAT-26 (2M 1F 1P), SI-95-VAT-27 (3L), SI-95-VAT-29 (10L 2P), SI-95-VAT-30 (10M 1F), SI-95-VAT-40 (4M 1F), SI-95-VAT-48 (22M), SI-95-VAT-49 (5L 10P), SI-95-VAT-50 (3M 3F), SI-95-VAT-51 (2L), SI-99-KLK-41 (1L 1P), SI-99-KLK-42 (2M), SI-99-VAT-40 (1M 4L 5P); URUP: UR-95-MO-03 (3M), UR-95-MO-60 (1M), UR-95-PO-11 (1M 4L 6P), UR-95-PO-13 (1P), UR-95-PO-18 (3M 1F), UR-95-PO-19 (3L 3P), UR-95-PO-23 (4M), UR-95-PO-34 (1L 4P), UR-95-PO-89 (1M), UR-95-PO-94 (1M 2P), UR-95-PO-95 (3M 1F), UR-95-PO-96 (1L), UR-95-VAT-10 (2P), UR-95-VAT-11 (2M), UR-95-VAT-15 (2M 14L 8P), UR-95-VAT-23 (4L 9P), UR-95-VAT-53 (2L 5P), UR-95-VAT-66 (1M), UR-96-NM-22 (2M), UR-96-NM-25 (1M), UR-96-PO-62 (1M), UR-96-VAT-41 (5M 8F), UR-96-VAT-42 (4L 1P); ITURUP: IT-94-RG-02 (1M 1F 1L), IT-94-RG-04 (8M 3F 1L), IT-94-RG-09 (1M), IT-94-RG-14 (2F 5L), IT-94-VAT-33 (4M 2F), IT-94-VAT-34 (3L 1P), IT-94-VAT-36 (16M 2F), IT-94-VAT-37 (1L 4P), IT-94-VAT-45 (1M), IT-94-VAT-46 (2P), IT-94-VAT-50 (7M 1F), IT-94-VAT-51 (5L 12P), IT-95-VAT-07 (1F), IT-97-NM-06 (1M), IT-97-NM-20 (2M), IT-97-TIR-06 (1M), IT-97-VAT-06 (6M 1F), IT-97-VAT-08 (3M 3F), IT-98-DJB-69 (2M), IT-98-LJW-11 (31M 5F), IT-98-LJW-13 (1M), IT-98-LJW-15 (14M), IT-98-LJW-22 (1M), IT-98-LJW-27 (3M), IT-98-LJW-32 (7M 1F), IT-98-LJW-33 (3P), IT-98-LJW-34 (1M), IT-98-LJW-36 (5M), IT-98-NM-20 (1M), IT-98-NM-23 (6M 3F), IT-98-NM-24 (7M), IT-98-NM-37 (1P), IT-98-VAT-09 (3M 1F), IT-98-VAT-10 (1L), IT-98-VAT-11 (20M 7F), IT-98-VAT-13 (11M 1F), IT-98-VAT-18 (14M 3F), IT-98-VAT-22 (5M 3F), IT-98-VAT-23 (7P), IT-98-VAT-24 (11M), IT-98-VAT-26 (1M 1F), IT-98-VAT-27 (1P), IT-98-VAT-29 (2P), IT-98-VAT-31 (6M 1F), IT-98-VAT-32 (18L 9P), IT-98-VAT-34 (1M), IT-98-VAT-38 (4M 2F); KUNASHIR: KU-94-NM-05 (1F), KU-94-NM-10 (6M), KU-94-NM-13 (5M), KU-94-NM-21 (2M), KU-94-VAT-06 (5P), KU-94-VAT-07 (4M 10F), KU-94-VAT-11 (3M), KU-94-VAT-16 (1P), KU-94-VAT-17 (1M 1F), KU-94-VAT-20 (6M 1F), KU-95-VAT-02 (1M), KU-97-NM-03 (2M 1F), KU-97-TIR-04 (4M), KU-97-VAT-01 (1M), KU-98-LJW-01 (1M), KU-98-LJW-40 (1M), KU-98-VAT-01 (12M 5F).

Rhyacophila nipponica KUNASHIR: KU-94-NM-21 (2M), KU-95-VAT-03 (2L), KU-99-VAT-63 (1L); SHIKOTAN: SH-94-VAT-28 (1M), SH-98-LJW-56 (2M), SH-98-VAT-49 (3M), SH-98-VAT-50 (7L); ZELIONYI: ZE-94-NM-05 (2M).

Rhyacophila retracta URUP: UR-95-PO-11 (1M), UR-95-PO-13B (1M), UR-95-PO-21 (3M 5F), UR-95-PO-33 (1F), UR-95-PO-36 (1F), UR-95-PO-95 (1F), UR-95-VAT-16 (1F), UR-95-VAT-52 (1F); ITURUP: IT-98-LJW-15 (1M 1F), IT-98-VAT-38 (1M 1F); KUNASHIR: KU-94-NM-10 (1L), KU-94-VAT-06 (1L), KU-98-LJW-40 (1M).

Rhyacophila transquilla KUNASHIR: KU-94-VAT-10 (1M), KU-97-TIR-04 (1M).

Apsilochorema sutshanum ITURUP: IT-98-VAT-13 (1M 1F); KUNASHIR: KU-94-VAT-14 (2L), KU-95-VAT-03 (4L), KU-97-NM-01 (1M 1F), KU-97-NM-03 (3F), KU-97-VAT-02 (3L), KU-97-VAT-03 (1F), KU-98-VAT-01 (1M), KU-98-VAT-02 (8P); SHIKOTAN: SH-94-VAT-29 (1F), SH-98-VAT-50 (1P).

Anagapetus schmidi KETOI: KE-95-VAT-38 (16L), KE-95-VAT-45 (1L); SIMUSHIR: SI-95-VAT-25 (25L), SI-95-VAT-26 (1L), SI-95-VAT-43 (13L), SI-95-VAT-49 (4L), SI-99-VAT-40 (1L); URUP: UR-95-VAT-23 (4L), UR-95-VAT-53 (11L), UR-96-VAT-42 (7L); ITURUP: IT-94-VAT-49 (1L), IT-94-VAT-51 (1L), IT-95-VAT-04 (9L), IT-95-VAT-06 (5L), IT-98-VAT-12 (2L), IT-98-VAT-14 (4L), IT-98-VAT-23 (1L); KUNASHIR: KU-94-VAT-06 (2L), KU-94-VAT-19 (2L), KU-95-VAT-69 (5L), KU-98-VAT-02 (1L); SHIKOTAN: SH-94-VAT-29 (3L), SH-98-VAT-50 (2L).

Glossosoma dulkejti ITURUP: IT-94-RG-04 (2M 3F), IT-98-VAT-018 (1M 3F); KUNASHIR: KU-94-NM-04 (5M 8F), KU-94-VAT-01 (38M 20F), KU-94-VAT-16 (1P), KU-94-VAT-17 (1M); SHIKOTAN: SH-94-RG-01 (1M 2F), SH-94-RG-03 (6M 6F 1P), SH-94-VAT-31 (34M 10F), SH-94-VAT-32 (7P), SH-98-LJW-60 (2M), SH-98-VAT-47 (3M 4F), SH-98-VAT-49 (23M 5F), SH-98-VAT-50 (6L).

Glossosoma intermedium SHUMSHU: SU-99-VAT-23 (5M 5F), SU-00-ATR-11 (1F); PARAMUSHIR: PA-96-VAT-07 (1M), PA-99-KLK-25 (4M 4F), PA-99-VAT-20 (13M 16F).

Glossosoma ussuricum SIMUSHIR: SI-95-PO-66 (4M), SI-95-PO-69 (1M), SI-95-VAT-40 (4M 2F), SI-95-VAT-42 (1M), SI-95-VAT-43 (1P); URUP: UR-95-VAT-53 (5P); ITURUP: IT-94-VAT-34 (2P), IT-94-VAT-49 (1P), IT-94-VAT-51 (2P), IT-95-VAT-06 (1P), IT-98-LJW-25 (1M), IT-98-NM-16 (1M), IT-98-VAT-22 (2M); KUNASHIR: KU-94-VAT-19 (2P), KU-95-PO-128 (1M), KU-95-VAT-69 (1P), KU-97-VAT-03 (1M), KU-98-LJW-40 (1M); SHIKOTAN: SH-94-VAT-29 (15P), SH-98-LJW-56 (1M).

Glossosoma sp. KETOI: KE-95-PO-64 (2L), KE-95-VAT-38 (20L).

Hydroptila sp. ITURUP: IT-98-TIA-31 (1F); POLONSKOGO: PO-98-TIA-64 (1F).

Orthotrichia sp. ZELIONYI: ZE-94-VAT-27 (2L).

Palaeagapetus flexus ITURUP: IT-94-VAT-35 (1M), IT-97-VAT-08 (1M), IT-98-LJW-18 (1L).

Palaeagapetus sp. URUP: UR-95-PO-23 (1F).

Dolophilodes (Dolophilodes) japonicus KUNASHIR: KU-97-NM-03 (1F).

Dolophilodes (Dolophilodes) kunashirensis PARAMUSHIR: PA-99-VAT-20 (5M).

Dolophilodes (Dolophilodes) nomugiensis SHUMSHU: SU-97-NM-42 (1M); KHARIMKOTAN: KH-96-PO-36 (3M); SIMUSHIR: SI-95-PO-66 (1F); URUP: UR-95-VAT-16 (1M); ITURUP: IT-94-RG-06 (1M 1F), IT-94-VAT-39 (10M 5F), IT-95-PO-120 (1M), IT-95-VAT-67 (5M 4F), IT-96-PO-58 (7M 6F), IT-96-PO-59 (1F), IT-96-VAT-39 (2M 8F), IT-97-NM-19 (2F), IT-97-VAT-08 (7M 1F), IT-98-LJW-29 (2F), IT-98-LJW-34 (1F), IT-98-VAT-34 (4M 3F).

Dolophilodes sp. KETOI: KE-95-VAT-38 (7L), KE-95-VAT-38 (7L); SHIASHIKOTAN: SA-96-PO-53 (1L).

Kisaura borealis KUNASHIR: KU-97-NM-01 (29M), KU-97-NM-03 (1M), KU-97-TIR-04 (4M).

Kisaura hattorii ITURUP: IT-98-LJW-11 (4M), IT-98-NM-23 (1M), IT-98-VAT-11 (3M 1F); KUNASHIR: KU-97-NM-01 (6M), KU-97-NM-03 (1M), KU-97-TIR-04 (1M); SHIKOTAN: SH-98-LJW-54 (5M), SH-98-VAT-51-(1M).

Kisaura sp. KUNASHIR: KU-97-NM-01 (1M 6F), KU-97-NM-03 (1M), KU-97-TIR-04 (2M 2F).

Wormaldia sp. KUNASHIR: KU-95-VAT-02 (1F).

Stenopsyche marmorata ITURUP: IT-97-VAT-06 (1F); KUNASHIR: KU-94-NM-10 (1M 1L), KU-94-NM-18 (1M 3L), KU-94-VAT-19 (4L), KU-95-VAT-03 (1L 1P), KU-95-VAT-69 (4L), KU-95-VAT-71 (1M), KU-96-NM-36 (1L), KU-97-NM-01 (3M 1F), KU-97-VAT-03 (1F), KU-98-LJW-04 (3L), KU-98-LJW-41 (10L), KU-98-VAT-01 (1F), KU-98-VAT-02 (1P); SHIKOTAN: SH-98-VAT-50 (1L).

Cheumatopsyche infascia PARAMUSHIR: PA-97-BKU-73 (2M 1F); KUNASHIR: KU-95-VAT-02 (1M), KU-97-BKU-06 (1M), KU-97-NM-01 (151M 308F), KU-97-NM-03 (3M 3F), KU-97-TIR-01 (1M 1F), KU-97-TIR-04 (31M 43F), KU-98-LJW-01 (1M), KU-98-VAT-02 (2M), KU-99-VAT-56 (4M 11F).

Hydropsyche albicephala KUNASHIR: KU-94-NM-16 (1P), KU-97-NM-01 (4M 23F), KU-97-NM-03 (6M 5F), KU-97-TIR-04 (1M), KU-97-VAT-01 (2M 2F), KU-98-LJW-40 (1F), KU-98-VAT-01 (1M).

Hydropsyche orientalis ITURUP: IT-97-NM-20 (1F), IT-99-NM-14 (1F); KUNASHIR: KU-97-NM-01 (15M 50F), KU-97-NM-03 (6F).

Parapsyche shikotsuensis KUNASHIR: KU-97-NM-01 (1M).

Lype excisa ITURUP: IT-98-LJW-13 (1M); KUNASHIR: KU-95-PO-02 (1M), KU-98-LJW-01 (2M 1F).

Ecnomus tenellus ITURUP: IT-98-DJB-34 (1M), IT-98-LJW-16 (20M), IT-98-LJW-19 (1M), IT-98-VAT-15 (1M), IT-99-VAT-50 (77M 8F); KUNASHIR: KU-94-VAT-01 (1M), KU-99-VAT-56 (2M).

Agrypnia acristata ITURUP: IT-96-BKU-86 (2M 2F), IT-96-BKU-87 (6F), IT-96-MO-52 (10F), IT-96-PO-69 (44M 53F), IT-96-PO-75 (1M 2F).

Agrypnia czerskyi ITURUP: IT-94-VAT-44 (1M), IT-96-VAT-48 (7M 10F).

Agrypnia picta SHUMSHU: SU-97-TIR-29 (2M 3F), SU-99-BKU-36 (1M); PARAMUSHIR: PA-96-PO-03 (1F), PA-96-PO-09 (1F), PA-96-KLK-21 (2M 6F), PA-96-KLK-22 (26M 50F), PA-96-KLK-23 (1F), PA-99-VAT-10 (13M 11F); SHIASHIKOTAN: SA-96-PO-50 (5M 3F); RASSHUA: RAS-95-MO-13 (1F), RAS-95-PO-49 (1M 3F), RAS-99-KLK-39 (1F), RAS-99-KLK-40 (1M 1F), PA-99-VAT-30 (2F), PA-99-VAT-32 (2M 3F); ITURUP: IT-96-PO-69 (1M), IT-98-DJB-40 (1M 1F), IT-98-NM-10 (1F), IT-98-VAT-15 (1F), IT-99-NM-15 (1M).

Agrypnia sahlbergi SHUMSHU: SU-97-BKU-50 (2F), SU-97-NM-32 (1M), SU-97-NM-34 (2M 2F), SU-97-NM-35 (8M

2F), SU-97-NM-46 (7M 3F), SU-97-TIR-27 (14M 3F), SU-97-TIR-28 (45M 7F), SU-97-TIR-29 (27M 5F), SU-97-TIR-31 (13M 4F), SU-97-VAT-14 (3M 4F), SU-97-VAT-15 (3M), SU-99-BKU-36 (2F), SU-99-KLK-20 (32M 2F), SU-99-KLK-30 (1F); PARAMUSHIR: PA-96-BKU-15 (3M 1F), PA-96-MO-09 (8M 6F), PA-96-NM-04 (48M 2F), PA-96-NM-07 (28M 1F), PA-96-NM-08 (8M 1F), PA-96-PO-01 (1F), PA-96-PO-03 (1M), PA-96-PO-09 (2M 3F), PA-96-VAT-01 (3M), PA-96-VAT-09 (11M 1F), PA-96-VAT-10 (1M), PA-97-BKU-31 (2F), PA-97-BKU-87 (1F), PA-97-NM-22 (52M 47F), PA-97-NM-52 (1M), PA-97-NM-57 (1M 1F), PA-97-NM-65 (2M), PA-97-NM-72 (1M 2F), PA-97-RLC-15 (1M 1F), PA-97-TIR-15 (5M), PA-97-TIR-19 (2M 33F), PA-97-TIR-48 (1F), PA-97-VAT-09 (5M 15F), PA-97-VAT-10 (1M), PA-99-KLK-21 (2M), PA-99-KLK-22 (23M 3F), PA-99-KLK-23 (1M).

Agrypnia sordida URUP: UR-95-EMS-05 (1M); ITURUP: IT-97-NM-20 (1M 1F), IT-99-DJB-93 (1M), IT-99-NM-14 (3F); KUNASHIR: KU-94-VAT-02 (1M).

Eubasilissa regina KUNASHIR: KU-95-VAT-02 (1M), KU-98-VAT-01 (1F).

Hagenella apicalis KUNASHIR: KU-98-VAT-06 (1M); POLONSKOGO: PO-98-VAT-61 (1M 2F), PO-98-DJB-135 (2F).

Hagenella sibirica PARAMUSHIR: PA-00-DJB-17 (1F).

Oligotricha lapponica PARAMUSHIR: PA-96-RLC-04 (1F), PA-97-DES-43 (1F), PA-97-VAT-10 (1F); ONEKOTAN: ON-99-KLK-04 (2F).

Oligotricha sp. URUP: UR-95-PO-108 (4L), UR-95-PO-109 (4L); SHUMSHU: SU-97-NM-41 (1L).

Brachycentrus americanus KUNASHIR: KU-94-NM-05 (1L 1P), KU-94-NM-10 (3L).

Brachycentrus sp. SHUMSHU: SU-97-NM-56 (38L).

Micrasema hanasensis KETOI: KE-95-PO-64 (1P), KE-95-VAT-37 (1M 1F); URUP: UR-95-PO-21 (1M), UR-95-VAT-16 (1M), UR-95-VAT-23 (1M); ITURUP: IT-98-BKU-60 (1F), IT-98-LJW-15 (1M), IT-98-NM-23 (1M); KUNASHIR: KU-97-NM-03 (1M).

Micrasema sp. SIMUSHIR: SI-95-PO-40 (1M).

Asynarchus sachalinensis URUP: UR-95-VAT-57 (2F); ITURUP: IT-94-RG-08 (16P); SHIKOTAN: SH-98-VAT-42 (1M 1F).

Dicosmoecus jozankeanus URUP: UR-95-MO-05 (1L), UR-95-PO-10 (1L 1P), UR-95-PO-11 (3L 1P), UR-95-PO-34 (1M 2L 23P), UR-95-PO-37 (25P), UR-95-PO-88 (1L), UR-95-PO-95 (1P), UR-95-PO-106 (1F), UR-95-PO-107 (1L 2P), UR-95-PO-110 (1F), UR-95-PO-112 (13M 14F), UR-95-PO-118 (1F), UR-95-VAT-08 (1L), UR-95-VAT-09 (1L), UR-95-VAT-10 (3L), UR-95-VAT-14 (1M), UR-95-VAT-15 (3L), UR-95-VAT-23 (9L), UR-95-VAT-53 (4L), UR-95-VAT-56 (1L), UR-95-VAT-57 (1M), UR-95-VAT-58 (2L), UR-95-VAT-59 (2L), UR-95-VAT-60 (12M 4F), UR-95-VAT-66 (1M), UR-96-VAT-42 (5L 3P); ITURUP: IT-94-RG-02 (2L), IT-94-RG-04 (1L), IT-94-RG-05 (1P), IT-94-RG-08 (6L), IT-94-RG-12 (2P), IT-94-RG-14 (4P), IT-94-RG-15 (1L), IT-94-VAT-34 (1L), IT-94-VAT-37 (1L), IT-94-VAT-42 (3L), IT-94-VAT-46 (1L), IT-94-VAT-47 (1L) IT-94-VAT-49 (1L), IT-94-VAT-51 (1L), IT-94-VAT-53 (3L), IT-98-LJW-23 (1L), IT-98-LJW-28 (1P), IT-98-LJW-33 (1M); KUNASHIR: KU-94-NM-08 (2L), KU-94-NM-10 (11P), KU-94-NM-16 (1P), KU-94-NM-17 (6L), KU-94-VAT-06 (1L), KU-94-VAT-09 (1L), KU-94-VAT-16 (1L), KU-94-VAT-19 (3L), KU-95-VAT-01 (3L), KU-97-VAT-02 (1L), KU-98-LJW-04 (2L), KU-98-LJW-09 (2L), KU-98-LJW-41 (3L), KU-98-VAT-02 (3L), KU-98-VAT-08 (5L); SHIKOTAN: SH-94-RG-01 (2L), SH-94-RG-03 (5L), SH-94-TWP-03 (1L), SH-98-LJW-57 (4L), SH-98-LJW-63 (1L), SH-98-VAT-50 (1L).

Ecclisocosmoecus spinosus URUP: UR-95-PO-10 (1M 1L), UR-95-PO-15 (2L), UR-95-PO-23 (1M), UR-95-PO-24 (1M), UR-95-PO-93 (1F), UR-95-PO-94 (3L), UR-95-PO-105 (18L), UR-95-PO-107 (5L), UR-95-VAT-09 (1L 4P), UR-95-VAT-10 (3L), UR-95-VAT-13 (7L), UR-95-VAT-15 (1L), UR-95-VAT-19 (1M 6L), UR-95-VAT-53 (1L 15P), UR-95-VAT-55 (28L), UR-95-VAT-66 (2M), UR-96-PO-62 (1M), UR-96-VAT-41 (3M), UR-96-VAT-42 (9L 2P), UR-96-VAT-46 (10L); ITURUP: IT-94-RG-04 (17M 6F), IT-94-RG-05 (2L), IT-94-VAT-39 (2M), IT-94-VAT-40 (3M), IT-95-PO-120 (35M 8F 26L 2P), IT-95-PO-121 (1M), IT-95-VAT-67 (21M 3F), IT-95-VAT-68 (27L), IT-96-PO-58 (36M 3F 1L), IT-96-VAT-39 (8M), IT-97-NM-20 (1M 1F), IT-97-NM-84 (1M), IT-97-NM-85 (1M), IT-97-VAT-08 (3M), IT-98-LJW-12 (2L), IT-98-LJW-23 (1L), IT-98-LJW-28 (1L), IT-98-LJW-35 (10L), IT-98-VAT-28 (1M), IT-98-VAT-29 (16L), IT-98-VAT-32 (1L), IT-98-VAT-34 (1M 1F), IT-98-VAT-35 (4L); KUNASHIR: KU-98-LJW-06 (2L); SHIKOTAN: SH-98-LJW-55 (4L), SH-98-NM-33 (21L), SH-98-VAT-53 (29L); TANFILYEVA: TA-98-LJW-66 (2L).

Ecclisomyia kamtshatica SHUMSHU: SU-97-NM-42 (2M), SU-97-VAT-24 (1F), SU-97-VAT-25 (1M); PARAMUSHIR: PA-96-NM-03 (1P), PA-96-PO-07 (1M 1F), PA-96-VAT-08 (1L), PA-97-BKU-73 (1M), PA-97-NM-50 (1M), PA-97-NM-59 (1M), PA-97-VAT-10 (1M), PA-97-VAT-29 (4M 5F), PA-97-VAT-35 (4M), PA-97-VAT-36 (2L 4P), PA-97-VAT-41 (1M 1F), PA-97-VAT-49 (3M 3F); KETOI: KE-95-MO-37 (1M), KE-95-PO-73 (1M 1F), KE-95-PO-74 (9M 9F), KE-95-PO-75 (2P), KE-95-PO-76 (1M 1F), KE-95-VAT-37 (1F), KE-95-VAT-44 (3M 8F), KE-95-VAT-45 (4L 1P), KE-95-VAT-46 (1F); SIMUSHIR: SI-95-PO-70 (1M), SI-95-PO-82 (6M), SI-95-VAT-43 (2L 7P), SI-95-VAT-51 (3L), SI-99-KLK-41 (1P); URUP: UR-95-PO-10 (4M), UR-95-PO-11 (1M 4L), UR-95-PO-18 (2M), UR-95-PO-23 (1M), UR-95-PO-93 (1M), UR-95-PO-100 (1M), UR-95-VAT-11 (1M), UR-95-VAT-15 (1L), UR-95-VAT-23 (1L 4P), UR-95-VAT-58 (4L), UR-96-VAT-42 (1P); ITURUP: IT-94-RG-05 (20P), IT-94-RG-06 (1M 2 F 1P), IT-94-VAT-34 (1L), IT-94-VAT-38 (18P), IT-94-VAT-46 (1L), IT-95-PO-121 (4M 1F), IT-96-NM-19 (3M 1F), IT-96-PO-59 (1M), IT-97-BKU-19 (3M 1F), IT-97-NM-06 (4M 2F), IT-97-NM-13 (1M), IT-97-NM-20 (8M 6F), IT-97-NM-84 (1M), IT-97-VAT-06 (4M 1F), IT-98-LJW-27 (1M), IT-98-LJW-30 (1M), IT-98-VAT-32 (98P).

Grammotaulius inornatus PARAMUSHIR: PA-97-NM-22 (1M).

Grammotaulius signatipennis SHUMSHU: SU-97-VAT-24 (1F); PARAMUSHIR: PA-99-VAT-19 (1F); ONEKOTAN: ON-99-KLK-04 (1P).

Halesus sachalinensis URUP: UR-95-PO-106 (1M), UR-95-VAT-10 (5L), UR-95-VAT-23 (1L), UR-95-VAT-53 (1F 1L); ITURUP: IT-94-RG-04 (1P), IT-94-TWP-02 (1L); KUNASHIR: KU-94-NM-17 (1L), KU-97-VAT-02 (1L); SHIKOTAN: SH-94-RG-03 (1L).

Hydatophylax festivus URUP: UR-96-VAT-46 (2L); ITURUP: IT-94-RG-04 (5L), IT-94-RG-14 (1L), IT-96-VAT-47 (4L),

IT-98-VAT-22 (1M); KUNASHIR: KU-94-NM-01 (6L), KU-94-NM-04 (1L), KU-94-NM-13 (1L), KU-98-LJW-41 (3L), KU-99-KLK-52 (1L); SHIKOTAN: SH-94-RG-01 (5L), SH-94-RG-03 (1L); ZELIONYI: ZE-94-NM-03 (17L).

Hydatophylax variabilis KUNASHIR: KU-94-TWP-07 (1L), KU-98-LJW-41 (6L); SHIKOTAN: SH-98-LJW-50 (1L), SH-98-LJW-57 (2L).

Hydatophylax sp. KETOI: KE-95-PO-73 (1F), KE-95-VAT-38 (1P), KE-95-VAT-44 (1M), KE-95-VAT-45 (1L 1P); SIMUSHIR: SI-95-PO-80 (1F), SI-95-PO-82 (3M 1F), SI-95-VAT-41 (4 L 4P), SI-95-VAT-43 (1L 1P), SI-95-VAT-48 (4M), SI-95-VAT-51 (3L), SI-99-KLK-42 (1M); URUP: UR-95-PO-18 (1M), UR-95-VAT-60 (1M), UR-95-VAT-42 (2L 1P); ITURUP: IT-95-VAT-06 (1L), IT-96-NM-19 (4M 1F), IT-97-NM-84 (1M); KUNASHIR: KU-95-PO-127 (1M); SHIKOTAN: SH-94-RG-01 (1L), SH-98-LJW-50 (1L).

Hydatophylax sp. PARAMUSHIR: PA-96-VAT-08 (11L).

Lenarchus fuscostramineus URUP: UR-95-PO-112 (1F); ITURUP: IT-98-DJB-71 (1F); SHIKOTAN: SH-98-LJW-46 (1F), SH-98-LJW-61 (7L); TANFILYEVA: TA-98-TIA-57 (1M).

Limnephilus alienus SHUMSHU: SU-99-VAT-25 (1L); ONEKOTAN: ON-96-VAT-14 (2L 3P); SHIASHKOTAN: SA-96-VAT-28 (1L); RASSHUA: RAS-95-PO-47 (1M 1F), RAS-95-VAT-31 (5L); URUP: UR-95-BKU-73 (1M 1F), UR-95-PO-102 (1P), UR-95-PO-106 (1M 1F), UR-95-PO-110 (3M 2F), UR-95-PO-111 (1F), UR-95-PO-112 (1F), UR-95-PO-113 (1M 2F), UR-95-PO-116 (2P), UR-95-VAT-08 (3L), UR-95-VAT-14 (9L), UR-95-VAT-54 (1L), UR-95-VAT-61 (1M 12F), UR-95-VAT-63 (3P), UR-95-VAT-65 (1M), UR-96-PO-67 (3P), UR-96-VAT-43 (5L 4P), UR-96-VAT-44 (4M 4F), UR-96-VAT-45 (3M 6F); ITURUP: IT-94-RG-07 (4M 3F), IT-94-RG-09 (1M 1P), IT-96-NM-29 (2P), IT-96-PO-69 (1M), IT-96-PO-75 (2M 1F), IT-96-VAT-49 (2L), IT-98-DJB-41 (1F), IT-98-LJW-19 (1M), IT-98-VAT-21 (1M), IT-99-KLK-44 (1F), IT-99-KLK-45 (1F), IT-99-NM-14 (2M 3F); KUNASHIR: KU-98-DJB-140 (1M), KU-99-VAT-57 (1F).

Limnephilus elegans PARAMUSHIR: PA-97-VAT-09 (1F), PA-97-VAT-10 (1F), PA-00-ATR-015 (1F), PA-00-DJB-016 (1M).

Limnephilus femoralis SHUMSHU: SU-97-NM-34 (1M 1F), SU-97-NM-37 (1F), SU-97-TIR-28 (1F), SU-97-VAT-24 (2M 1F), SU-99-KLK-20 (10M 11F), SU-99-VAT-16 (2M 7F); PARAMUSHIR: PA-96-MO-01 (1M), PA-96-VAT-04 (1M), PA-97-NM-52 (1F), PA-97-VAT-10 (3F), PA-99-KLK-21 (2F), PA-99-KLK-22 (2M 5F), PA-99-VAT-19 (2F), PA-99-VAT-20 (1F), PA-00-ATR-16 (2F), PA-00-DJB-16 (2M), PA-00-DJB-17 (1M 1F).

Limnephilus femoratus ITURUP: IT-96-VAT-48 (2M), IT-96-VAT-54 (1M 1F).

Limnephilus fenestratus SHUMSHU: SU-97-VAT-24 (2M 1F); PARAMUSHIR: PA-97-NM-65 (1M 6F), PA-97-NM-72 (2F), PA-97-RLC-60 (2M 1F), PA-97-VAT-48 (1F).

Limnephilus fuscovittatus SHUMSHU: SU-97-NM-46 (2M 4F), SU-99-DJB-40A (1F); ATLASOVA: AL-97-NM-53 (1F), AL-99-VAT-05 (1M); PARAMUSHIR: PA-96-NM-04 (1M 1F), PA-96-NM-07 (1F), PA-99-VAT-19 (1F); PA-00-ATR-13 (1F), PA-00-ATR-15 (2F); ONEKOTAN: ON-99-VAT-02 (30M 22F); KHARIMKOTAN: KH-00-ATR-30 (1M); MATUA: MA-96-NM-17 (1M), MA-99-VAT-19 (1F); RASSHUA: RAS-95-PO-47 (1F), RAS-95-PO-49 (1M 1F); KETOI: KE-95-PO-61 (1M), KE-95-PO-63 (1M), KE-95-PO-74 (1M 2F), KE-95-VAT-37 (1M), KE-95-VAT-44 (4F); SIMUSHIR: SI-95-PO-45 (1M 1F), SI-95-PO-82 (1M), SI-95-VAT-48 (4M); URUP: UR-95-PO-31 (1M 1F), UR-95-PO-106 (2M 2F), UR-95-PO-110 (1M), UR-95-PO-112 (1M 1F), UR-95-PO-113 (2F), UR-95-VAT-60 (2M), UR-96-BKU-80 (1F); ITURUP: IT-94-RG-13 (1L), IT-96-PO-69 (10M 3F), IT-96-VAT-48 (3M), IT-98-DJB-71 (1F), IT-98-NM-16A (2M); KUNASHIR: KU-94-VAT-56 (1M), KU-98-VAT-06 (1M 1F); SHIKOTAN: SH-98-DJB-93 (1F), SH-98-LJW-46 (1F), SH-98-LJW-61 (7L), SH-98-NM-35 (1M); TANFILYEVA: TA-98-TIA-57 (1M).

Limnephilus incisus PARAMUSHIR: PA-96-MO-06 (1F), PA-97-NM-74 (2M 3F), PA-97-VAT-44 (4M 9F), PA-97-VAT-48 (1F).

Limnephilus major SHUMSHU: SU-99-KLK-26 (3M 1F), SU-99-KLK-27 (25M 16F).

Limnephilus nigriceps PARAMUSHIR: PA-97-NM-74 (2M).

Limnephilus nipponicus KETOI: KE-95-PO-61 (2F), KE-95-VAT-39 (1M); SIMUSHIR: SI-99-VAT-34 (2M 2F); URUP: UR-95-PO-31 (1F), UR-95-PO-106 (1F), UR-95-PO-112 (2M), UR-95-PO-118 (1M), UR-95-VAT-10 (1M), UR-95-VAT-22 (1F), UR-95-VAT-60 (2M), UR-96-NM-26 (1F), UR-96-PO-66 (2M), RU-96-VAT-45 (1M), UR-00-DJB-81 (1M 1F); ITURUP: IT-94-RG-09 (1M), IT-96-PO-69 (6M 2F), IT-96-PO-75 (2F), IT-96-VAT-48 (4M), IT-96-VAT-50 (2M), IT-97-NM-12 (1M), IT-97-NM-21 (1M 2F), IT-98-BKU-26 (1F), IT-98-LJW-37 (1F), IT-98-NM-13 (1F), IT-98-VAT-15A (1F), IT-98-VAT-37 (3M 9F), IT-99-KLK-45 (1M), IT-99-NM-13 (1F), IT-99-VAT-54 (1M 2F); KUNASHIR: KU-95-PO-123 (1F), KU-98-VAT-06 (3M 1F); SHIKOTAN: SH-98-BKU-91 (2F), SH-98-LJW-46 (1M 1F).

Limnephilus orientalis URUP: UR-96-PO-66 (1F), UR-96-VAT-41 (1F), UR-00-DJB-81 (2F); ITURUP: IT-96-NM-19 (2M), IT-97-BKU-19 (1F), IT-97-NM-20 (1M 4F), IT-97-VAT-06 (1F), IT-99-NM-14 (1F); KUNASHIR: KU-95-PO-128 (1F).

Limnephilus ornatulus KUNASHIR: KU-97-VAT-05 (1F), KU-99-VAT-56 (1M).

Limnephilus picturatus SHUMSHU: SU-97-MO-12A (4M 9F), SU-97-VAT-20 (2F), SU-97-VAT-21 (1M), SU-97-VAT-23 (1M), SU-97-VAT-24 (1F), SU-99-BKU-36 (1M), SU-99-KLK-27 (6M 12F), SU-99-KLK-28 (17M 4F), SU-99-VAT-25 (1F); PARAMUSHIR: PA-97-VAT-10 (1M 1F).

Limnephilus quadratus KUNASHIR: KU-99-VAT-56 (5M 2F), KU-99-VAT-57 (1M); TANFILYEVA: TA-98-TIA-57 (5M 1F); IURII: IU-98-TIA-59 (1M).

Limnephilus rhombicus ITURUP: IT-97-VAT-06 (1F).

Limnephilus sericeus SHUMSHU: SU-97-BKU-51 (1M), SU-97-MO-12A (19F), SU-97-NM-34 (3M 2F), SU-97-NM-39 (2M 1F), SU-97-NM-49 (2F), SU-97-RLC-30 (1F), SU-97-TIR-29 (2F), SU-97-TIR-30 (1M), SU-97-VAT-14 (1F), SU-97-VAT-21 (1M), SU-97-VAT-22 (2F), SU-97-VAT-23 (2M 5F), SU-97-VAT-24 (8M 8F), SU-99-BKU-35

(1M 2F), SU-99-KLK-26 (1M), SU-99-KLK-27 (11M 8F), SU-99-VAT-25 (5M 1F), SU-00-DJB-12 (1F); PARAMUSHIR: PA-96-NM-08 (1M), PA-96-VAT-03 (1F), PA-96-VAT-11 (2F), PA-97-BKU-33 (1M 1F), PA-97-MO-25A (1M 1F), PA-97-MO-26A (1F), PA-97-NM-62 (1F), PA-97-NM-74 (1F), PA-97-RLC-60 (1M), PA-97-TIR-36 (1M), PA-97-VAT-39 (2M 1F), PA-97-VAT-44 (27M 21F), PA-97-VAT-45 (2F), PA-97-VAT-46 (1M), PA-99-VAT-19 (1M), PA-00-ATR-13 (3M 2F), PA-00-ATR-15 (1M 1F), PA-00-ATR-16 (1M 1F), PA-00-DJB-16 (3M 1F); MAKANRUSHI: MK-97-BKU-94 (1M 1F), MK-97-VAT-55 (1F); ONEKOTAN: ON-96-PO-14 (1P), ON-96-PO-15 (1M 1F), ON-96-PO-16 (1M 1F); KHARIMKOTAN: KH-96-PO-32 (1M), KH-96-PO-34 (3M 7F), KH-96-PO-39 (1M), KH-00-DJB-30 (1M), KH-00-DJB-31 (1F); SHIASHKOTAN: SA-96-PO-48 (1M), SA-96-VAT-31 (1F), SA-96-VAT-32 (12P); MATUA: MA-96-PO-55 (2M 5F), MA-96-VAT-34 (11M 1F), MA-96-VAT-37 (1M), MA-99-KLK-36 (46M 34F), MA-99-KLK-38 (2M 2F), MA-99-VAT-29 (1M); RASSHUA: RAS-95-MO-13 (1M 1F), RAS-95-PO-47 (1M 3F), RAS-95-PO- 49 (45M 30F), RAS-95-VAT-33 (1M 2F), RAS-95-VAT-36 (7M 14F), RAS-99-KLK-39 (1F), RAS-99-KLK-40 (10M 5F), RAS-99-VAT-30 (9M 11F), RAS-99-VAT-32 (8M 4F); KETOI: KE-95-MO-23 (1M 2F), KE-95-PO-61 (10M 10F), KE-95-PO-63 (1M 3F), KE-95-PO-77 (3P), KE-95-VAT-37 (3M 8F), KE-95-VAT-39 (1M 4F); SIMUSHIR: SI-99-VAT-34 (1F), SI-00-ATR-73 (1M); URUP: UR-95-MO-08 (2M 1F), UR-95-MO-72 (1F), UR-95-PO-31 (1M 1F), UR-95-PO-96 (1M), UR-95-PO-106 (4M 2F), UR-95-PO-112 (2M), UR-95-PO-113 (29M 12F), UR-95-PO-115 (1M 3F), UR-95-PO-117 (2M 2F), UR-95-VAT-22 (4M 1F), UR-95-VAT-57 (1M), UR-95-VAT-60 (1M), UR-95-VAT-65 (2F), UR-96-VAT-41 (1M), UR-00-DJB-81 (5M 4F); ITURUP: IT-94-RG-11 (1M), IT-96-PO-75 (1F), IT-98-NM-05 (1M); SHIKOTAN: SH-98-VAT-45 (5M 2F).

Limnephilus sparsus ATLASOVA: AL-97-NM-54 (1M 5F), AL-97-VAT-30 (1M 3F), AL-97-VAT-33 (1M 1F), AL-99-KLK-07 (1M); SHUMSHU: SU-97-BKU-44 (1F), SU-97-BKU-51 (2F), SU-97-MO-12A (1F), SU-97-NM-34 (1M 7F), SU-97-NM-35 (1F), SU-97-NM-37 (1M 1F), SU-97-NM-39 (3F), SU-97-NM-42 (6F), SU-97-RLC-30 (1F), SU-97-TIR-27 (1F), SU-97-TIR-30 (1F), SU-97-TIR-31 (1M 4F), SU-97-TIR-32 (1F), SU-97-TWP-21 (1M 1F), SU-97-VAT-13 (1F), SU-97-VAT-14 (9F), SU-97-VAT-15 (1F), SU-97-VAT-16 (2M 1F), SU-97-VAT-17 (1P), SU-97-VAT-18 (1M 1F), SU-97-VAT-20 (2M 3F), SU-97-VAT-21 (3M 9F), SU-97-VAT-22 (3F), SU-97-VAT-23 (3F), SU-97-VAT-24 (1F), SU-99-KLK-28 (2F), SU-99-VAT-23 (1M 1F), SU-00-ATR-11 (1M 4F); PARAMUSHIR: PA-96-BKU-03 (1M), PA-96-NM-04 (2M 1F), PA-96-NM-07 (1F), PA-96-NM-08 (9F), PA-96-PO-07 (1F), PA-96-VAT-06 (3M 2F), PA-96-VAT-07 (3M), PA-96-VAT-09 (1M 2F), PA-96-VAT-10 (1F), PA-96-VAT-11 (4M 8F), PA-97-BKU-33 (1F), PA-97-BKU-70 (1F), PA-97-BKU-77 (1F), PA-97-MO-06A (2F), PA-97-MO-25A (1F), PA-97-MO-34 (1F), PA-97-NM-52 (1F), PA-97-NM-62 (1M), PA-97-NM-72 (1F), PA-97-NM-74 (2F), PA-97-TIR-17 (1F), PA-97-TIR-37 (1F), PA-97-TIR-45 (1M), PA-97-VAT-09 (4F), PA-97-VAT-10 (3F), PA-97-VAT-35 (1F), PA-97-VAT-37 (2F), PA-97-VAT-39 (1F), PA-97-VAT-46 (1M 1F), PA-97-VAT-48 (1M 1F), PA-97-VAT-49 (1M), PA-99-BKU-32 (1F), PA-99-VAT-10 (1M), PA-99-VAT-20 (3M), PA-00-ATR-13 (3M 4F), PA-00-DJB-16 (1M 3F), PA-00-DJB-17 (2M); MAKANRUSHI: MK-97-BKU-94 (1F); ONEKOTAN: ON-96-PO-13 (1F), ON-96-PO-21 (2M 1F), ON-96-PO-23 (6M), ON-96-PO-25 (2M), ON-96-PO-30 (1M), ON-96-PO-43 (1F), ON-96-VAT-15 (5M 6F), ON-96-VAT-20 (1M), ON-96-VAT-23 (1F), ON-99-DJB-07 (1M); KHARIMKOTAN: KH-96-BKU-40 (1F), KH-96-PO-36 (1M 1F), KH-96-PO-38 (1M), KH-96-PO-41 (1F), KH-96-VAT-22 (2M 3F); SHIASHKOTAN: SA-96-NM-11 (1F), SA-96-NM-14 (1M 1F), SA-96-VAT-29 (1M 3F), SA-99-KLK-33 (1F), SA-00-ATR-39 (1F), SA-00-ATR-42 (1M), SA-00-DJB-33 (1M 4F), SA-00-DJB-36 (1F); MATUA: MA-96-NM-16 (1F), MA-96-VAT-34 (5M 5F), MA-99-KLK-36 (1M 6F), MA-99-KLK-37 (3M 3F), MA-99-KLK-38 (1M 1F), MA-99-VAT-29 (1M 1F); RASSHUA: RAS-95-PO-47 (1M), RAS-95-PO-49 (3M), RAS-95-PO-52 (10M 3F), RAS-95-VAT-36 (3M 3F), RAS-99-KLK-39 (3M 7F), RAS-99-KLK-40 (5M 11F), RAS-99-VAT-30 (2M 4F), RAS-99-VAT-32 (2M 3F); KETOI: KE-95-PO-61 (1F), KE-95-PO-63 (1M 1F), KE-95-PO-65 (1F), KE-95-PO-73 (2F); SIMUSHIR: SI-95-PO-82 (2F), SI-95-VAT-26 (1F), SI-95-VAT-50 (1M), SI-99-VAT-40 (1F); URUP: UR-95-PO-11 (2F), UR-95-PO-14 (1F), UR-95-PO-18 (1M), UR-95-VAT-10 (1M), UR-95-VAT-57 (1F), UR-95-VAT-61 (1F), UR-00-DJB-81 (1M); ITURUP: IT-96-PO-69 (15M 12F), IT-96-PO-75 (1F), IT-96-VAT-48 (4M 4F), IT-97-BKU-14 (1M), IT-97-NM-06 (1F), IT-98-LJW-15 (1F), IT-98-NM-20 (1M), IT-99-DJB-97 (1F), IT-99-DJB-99 (1F); KUNASHIR: KU-99-KLK-49 (1F), KU-99-KLK-50 (1F); SHIKOTAN: SH-98-DJB-93 (1F), SH-98-DJB-99 (1F), SH-98-LJW-62 (1F); ZELIONYI: ZE-98-LJW-70 (1M 1F); TANFILYEVA: TA-98-TIA-57 (1F).

Limnephilus stigma SHUMSHU: SU-97-RLC-30 (1M), SU-99-KLK-27 (8M 5F); PARAMUSHIR: PA-96-MO-06 (1F), PA-96-NM-08 (1F), PA-96-VAT-11 (1F), PA-97-MO-06A (2M), PA-97-NM-72 (1F), PA-97-VAT-44 (1M 4F); ONEKOTAN: ON-96-RLC-26 (1M 1F); KHARIMKOTAN: KH-96-PO-34 (5M 6F), KH-96-PO-41 (2M); ITURUP: IT-94-RG-15 (1M).

Limnephilus subcentralis ITURUP: IT-99-VAT-54 (1M).

Nemotaulius miyakei ITURUP: IT-99-VAT-50 (1F); KUNASHIR: KU-98-VAT-06 (1M), KU-99-NM-18 (1M 1F).

Nothopsyche sp. KUNASHIR: KU-94-NM-18 (1L), KU-98-LJW-41 (1L).

Onocosmoecus unicolor ATLASOVA: AL-97-VAT-30 (1M), AL-99-KLK-08 (11L); SHUMSHU: SU-97-NM-32 (1F), SU-97-NM-39 (2M), SU-97-NM-42 (1M 2F), SU-97-TIR-32 (1M), SU-97-VAT-20 (1M), SU-97-VAT-21 (1M), SU-97-VAT-22 (1M), SU-97-VAT-25 (2M); PARAMUSHIR: PA-96-NM-02 (1M), PA-96-NM-03 (2P), PA-96-PO-07 (1M), PA-96-VAT-03 (1F), PA-96-VAT-04 (1M 1F), PA-97-VAT-29 (1M), PA-97-VAT-35 (1M), PA-97-VAT-36 (2P), PA-97-VAT-42 (3M 1F), PA-97-VAT-49 (4M); MAKANRUSHI: MK-97-NM-77 (2M), MK-97-VAT-51 (4M 1F), MK-97-VAT-52 (8P); ONEKOTAN: ON-96-MO-11 (1L), ON-96-VAT-15 (2M), ON-96-VAT-16 (3P), ON-96-VAT-18 (3L 10P), ON-96-VAT-23 (4M), ON-96-VAT-24 (2L 7P); KHARIMKOTAN: KH-96-PO-36 (5M), KH-96-PO-37 (2L), KH-96-VAT-21 (1L); EKARMA: EK-99-KLK-31 (1L); SHIASHKOTAN: SA-96-NM-13 (1M), SA-96-PO-46 (1M 1F), SA-96-PO-47 (1L), SA-96-VAT-28 (1L), SA-96-VAT-29 (2M 1F), SA-96-VAT-30 (4L), SA-99-KLK-32 (1L), SA-99-KLK-33 (1M); RASSHUA: RAS-95-PO-52 (5M 1F), RAS-95-PO-55 (1M); KETOI: KE-95-PO-62 (6L).

Allomyia coronae ITURUP: IT-94-VAT-39 (2L), IT-98-VAT-35 (3L); SHIKOTAN: SH-98-VAT-50 (1L).

Allomyia delicatula SIMUSHIR: SI-95-PO-70 (1F), SI-95-VAT-25 (6L), SI-95-VAT-41 (3L).

Apatania parvula RASSHUA: RAS-95-PO-47 (2M), RAS-95-PO-49 (2M), RAS-95-PO-51 (1F), RAS-95-PO-52 (2M 4F), RAS-95-PO-57 (7M), RAS-95-VAT-31 (1F), RAS-95-VAT-32 (5L 20P); KETOI: KE-95-PO-63 (1F), KE-95-PO-73 (12M 6F), KE-95-PO-74 (13M 1F), KE-95-PO-76 (2F), KE-95-PO-79 (2M 1F), KE-95-VAT-37 (1M 1F), KE-95-VAT-38 (4L 2P), KE-95-VAT-44 (12M 4F), KE-95-VAT-45 (8L 4P), KE-95-VAT-47 (5M 1F); SIMUSHIR: SI-95-BKU-32B (4M 4F), SI-95-MO-10 (4M 4F 1P), SI-95-PO-40 (1M 2F), SI-95-PO-41 (1P), SI-95-PO-42 (30M 24F), SI-95-PO-43 (45M 18F), SI-95-PO-44 (2P), SI-95-PO-46 (4P), SI-95-PO-66 (4M 2F), SI-95-PO-68 (1M), SI-95-PO-69 (2M), SI-95-PO-70 (1M 1F), SI-95-PO-80 (3M 5F), SI-95-PO-82 (6M), SI-95-VAT-24 (4M 10F), SI-95-VAT-25 (20P), SI-95-VAT-26 (15M 6F), SI-95-VAT-29 (1M 1F), SI-95-VAT-30 (22M 5F), SI-95-VAT-40 (3M 1F), SI-95-VAT-41 (3L), SI-95-VAT-42 (1F), SI-95-VAT-43 (2L), SI-95-VAT-48 (3M), SI-95-VAT-49 (7L), SI-95-VAT-50 (1M), SI-99-DJB-69 (1F), SI-99-DJB-71 (1M), SI-99-KLK-42 (3M 2F), SI-99-NM-08 (1F), SI-99-VAT-40 (4M 1F 1P); URUP: UR-95-MO-08 (1F), UR-95-MO-61 (2M), UR-95-MO-67 (2M), UR-95-PO-10 (1M 4P), UR-95-PO-11 (3M), UR-95-PO-14 (7M 4F), UR-95-PO-15 (6P), UR-95-PO-21 (1M), UR-95-PO-23 (5M 6F), UR-95-PO-25 (7M 9F), UR-95-PO-31 (7M 3F), UR-95-PO-93 (1F), UR-95-PO-96 (24M 2F), UR-95-PO-99 (3M), UR-95-PO-100 (1F), UR-95-PO-104 (6M 5F), UR-95-PO-106 (6M 3F), UR-95-PO- 107 (2P), UR-95-PO-118 (12M 1F),UR-95-VAT-08 (6P), UR-95-VAT-11 (3M 1F), UR-95-VAT-13 (6M 1L 10P), UR-95-VAT-18 (2M), UR-95-VAT-20 (1M), UR-95-VAT-22 (13M 2F), UR-95-VAT-52 (2M 3F), UR-95-VAT-53 (2P), UR-95-VAT-57 (10M 4F), UR-95-VAT-58 (1L), UR-95-VAT-60 (1M), UR-95-VAT-66 (12M 3F), UR-95-VR-32 (1M), UR-00-ATR-85 (1F), UR-00-ATR-86 (2M), UR-00-DJB-81 (14M); ITURUP: IT-94-RG-06 (8M 4F), IT-94-VAT-36 (1F), IT-94-VAT-40 (2F 1P), IT-94-VAT-45 (1M), IT-95-PO-06 (1F), IT-95-PO-119 (3M 2F), IT-95-VAT-05 (15M 3F), IT-95-VAT-06 (1M 5L 2P), IT-96-PO-59 (1M), IT-96-VAT-39 (1M 1F), IT-97-VAT-08 (1M), IT-98-LJW-18 (5M 1F), IT-98-LJW-24 (2M), IT-98-LJW-34 (2M 1F), IT-98-LJW-36 (3M 1F), IT-98-NM-19 (10M 9F), IT-98-DJB-63 (2M), IT-98-VAT-16 (1M 1F), IT-98-VAT-24 (9M 4F), IT-98-VAT-26 (3M), IT-98-VAT-28 (1M 1F), IT-98-VAT-34 (2M), IT-99-VAT-46 (4M 1P); KUNASHIR: KU-94-VAT-04 (1M), KU-95-PO-127 (38M 21F), KU-95-VAT-69 (3L); SHIKOTAN: SH-98-VAT-42 (12M 8F); ANUCHINA: AN-98-TIA-55 (2F).

Apatania zonella ATLASOVA: AL-97-NM-54 (4F), AL-97-VAT-33 (1M 5F), AL-99-KLK-07 (1F); SHUMSHU: SU-97-BKU-60 (2F), SU-97-MO-17 (5F), SU-97-NM-30 (1F), SU-97-NM-32 (12F), SU-97-NM-39 (90F), SU-97-NM-42 (12F), SU-97-NM-44 (4F), SU-97-NM-46 (3F), SU-97-TIR-32 (10F), SU-97-TIR-33 (6F), SU-97-VAT-13 (3F), SU-97-VAT-16 (16F), SU-97-VAT-17 (3L 7P), SU-97-VAT-18 (10F), SU-97-VAT-20 (18F), SU-97-VAT-21 (1M 34F), SU-97-VAT-24 (7F), SU-97-VAT-25 (11F), SU-97-VAT-27 (7F), SU-99-DJB-27 (1F), SU-99-KLK-28 (3M 360F), SU-99-KLK-29 (2P), SU-99-KLK-30 (8F), SU-99-VAT-23 (1M 29F), SU-00-ATR-07 (2F), SU-00-ATR-08 (2F), SU-00-ATR-11 (6F), SU-00-DJB-10 (1M 3F), SU-00-DJB-10A (1F); PARAMUSHIR: PA-96-MO-01 (1F), PA-96-MO-03 (2F), PA-96-NM-02 (7F), PA-96-NM-04 (8F), PA-96-PO-01 (1M 12F), PA-96-PO-05 (1M 3F), PA-96-PO-07 (16F), PA-96-VAT-01 (1F), PA-96-VAT-02 (2L), PA-96-VAT-03 (8F), PA-96-VAT-04 (36F), PA-96-VAT-05 (6L 2P), PA-96-VAT-06 (16F), PA-96-VAT-07 (8F), PA-96-VAT-08 (4P), PA-96-VAT-10 (27F), PA-97-BKU-33 (1F), PA-97-BKU-72 (1F), PA-97-MO-25A (3F), PA-97-MO-26A (2F), PA-97-MO-29 (1M 1F), PA-97-MO-33A (3F), PA-97-NM-50 (2F), PA-97-NM-57 (2F), PA-97-NM-59 (1F), PA-97-NM-62 (7F), PA-97-NM-73 (3F), PA-97-RLC-63 (5F), PA-97-TIR-17 (1M 7F), PA-97-TIR-45 (11F), PA-97-VAT-09 (20F), PA-97-VAT-10 (3F), PA-97-VAT-29 (8F), PA-97-VAT-35 (7F), PA-97-VAT-36 (1L), PA-97-VAT-37 (1F), PA-97-VAT-39 (3F), PA-97-VAT-41 (9F), PA-97-VAT-42 (8F), PA-97-VAT-46 (103F), PA-97-VAT-48 (1F), PA-97-VAT-49 (20F), PA-99-KLK-23 (1F), PA-99-KLK-25 (3F), PA-99-VAT-20 (7F), PA-00-ATR-15 (10F); MAKANRUSHI: MK-97-BKU-97 (2F), MK-97-BKU-103 (1F), MK-97-MO-35A (15F), MK-97-MO-37A (1F), MK-97-NM-77 (8F), MK-97-TIR-49 (50F), MK-97-VAT-51 (26), MK-97-VAT-52 (35L), MK-97-VAT-53 (30F), MK-97-VAT-55 (4F); ONEKOTAN: ON-96-BKU-16 (5F), ON-96-MO-11 (30F), ON-96-PO-18 (5P), ON-96-PO-19 (24F), ON-96-PO-20 (3L 16P), ON-96-PO-21 (20F), ON-96-PO-22 (2F 1P), ON-96-PO-23 (34F), ON-96-PO-24 (5F 5L), ON-96-PO-25 (42F), ON-96-PO-26 (1F), ON-96-PO-27 (5P), ON-96-PO-43 (1F), ON-96-RLC-17 (1F), ON-96-VAT-12 (29P), ON-96-VAT-15 (78F), ON-96-VAT-16 (12L 18P), ON-96-VAT-17 (1F), ON-96-VAT-18 (5L), ON-96-VAT-19 (7L), ON-96-VAT-23 (7L), ON-96-VAT-24 (8L 3P), ON-99-BKU-04 (1F), ON-99-BKU-05 (2F), ON-99-BKU-07 (1F), ON-99-KLK-05 (1M 34F), ON-99-KLK-06 (1F), ON-99-VAT-02 (29F), ON-00-ATR-18 (2F), ON-00-ATR-19 (1F), ON-00-DJB-21C (6F); KARIMKOTAN: KH-96-BKU-36 (1M 24F), KH-96-BKU-40 (3F), KH-96-PO-36 (5M 93F), KH-96-PO-38 (35F), KH-96-VAT-21 (21L 10P), KH-96-VAT-22 (155F), KH-00-ATR-30 (6F); SHIASHKOTAN: SA-96-NM-02 (5F), SA-96-PO-46 (22F), SA-96-PO-47 (4F), SA-96-VAT-28 (8L), SA-96-VAT-29 (13F), SA-99-KLK-33 (1F), SA-99-NM-02 (5F), SA-99-VAT-26 (13F); MATUA: MA-96-NM-16 (13F), MA-96-NM-17 (13F), MA-96-PO-55 (13F), MA-96-VAT-34 (19F), MA-96-VAT-37 (12F), MA-99-KLK-36 (3F), MA-99-KLK-37 (1M 11F), MA-99-KLK-38 (5F), MA-99-VAT-29 (21F); RASSHUA: RAS-95-VAT-36 (1F); ITURUP: IT-97-NM-85 (3M 1F).

Apatania sp. EKARMA: EK-99-KLK-31 (17L).

Goera japonica URUP: UR-95-PO-09 (1L 1P); ITURUP: IT-94-RG-13 (3L), IT-94-VAT-41 (1L 3P), IT-94-VAT-43 (3L), IT-94-VAT-49 (3L), IT-95-PO-06 (1F), IT-95-VAT-04 (1M 11L), IT-95-VAT-06 (1L), IT-96-PO-69 (1M), IT-97-TIR-05 (1F), IT-98-LJW-20 (3F), IT-98-LJW-21 (2F), IT-98-LJW-22 (1M 1F), IT-98-NM-10 (1M), IT-98-NM-11 (1M), IT-98-NM-13 (2M 2F), IT-98-NM-15 (1F), IT-98-NM-16 (1F), IT-98-DJB-48 (1M), IT-98-VAT-15 (3M 2F), IT-98-VAT-21 (11M 5F), IT-98-VAT-33 (4M 2F), IT-98-VAT-46 (1F 1P); KUNASHIR: KU-94-VAT-54 (1L 2P), KU-95-PO-03 (3L), KU-95-PO-127 (1M), KU-95-VAT-01 (1L), KU-97-NM-01 (2M 16F), KU-97-NM-03 (1M 1F), KU-97-TIR-04 (2M), KU-98-LJW-01 (1M), KU-98-LJW-40 (1M), KU-98-VAT-01 (1M 1F); SHIKOTAN: SH-98-LJW-56 (1M), SH-98-VAT-49 (1M).

Neophylax japonicus KUNASHIR: KU-94-NM-08 (1L), KU-97-VAT-02 (1L).

Neophylax ussuriensis URUP: UR-95-MO-05 (12P), UR-95-MO-68 (1F), UR-95-PO-11 (1M 3L), UR-95-PO-12 (2F), UR-95-PO-13 (5P), UR-95-PO-37 (2P), UR-95-PO-106 (7M 5F), UR-95-PO-107 (2P), UR-95-PO-112 (5M 5F), UR-95-PO-118 (2M), UR-95-VT-08 (3P), UR-95-VT-10 (1F), UR-95-VT-20 (1P), UR-95-VT-23 (10P), UR-95-VT-52 (1F), UR-95-VT-53 (3P), UR-95-VT-57 (7M 9F), UR-95-VT-58 (1L 6P), UR-95-VT-60 (5M 2F), UR-95-VT-66 (3M 1F), UR-96-VT-41 (1P), UR-96-VT-42 (2P); ITURUP: IT-94-RG-11 (4P), IT-94-RG-14 (8P), IT-94-VT-34 (1L 2P), IT-94-VT-38 (1L 5P), IT-94-VT-51 (4P), IT-96-NM-19 (1M), IT-98-VT-14 (7L 1P), IT-98-VT-27 (1L 1P), IT-98-VT-30 (1M 1F), IT-98-VT-32 (5L 1P), IT-98-VT-36 (8L 1P); KUNASHIR: KU-94-NM-10 (1L), KU-94-NM-13 (2P), KU-94-VT-09 (1L), KU-94-VT-10a (15L), KU-94-VT-12 (6L, 2P), KU-94-VT-19 (2L 1P), KU-95-VT-01 (1L), KU-95-VT-69 (1L 1P), KU-97-VAT-02 (3L), KU-99-KLK-50 (1F); SHIKOTAN: SH-94-VT-29 (1P), SH-94-VT-32 (5L 3P), SH-98-LJW-54 1F), SH-98-VT-49 (1M 2F), SH-98-VT-50 (1P).

Lepidostoma complicatum ITURUP: IT-94-VAT-06 (1M), IT-98-VAT-31 (1M); KUNASHIR: KU-94-NM-04 (2M), KU-94-NM-11 (1F), KU-94-NM-16 (1M), KU-94-VAT-07 (1M 1F), KU-94-VAT-10 (1M), KU-94-VAT-11 (1M), KU-94-VAT-20 (2F), KU-95-PO-127 (9M 2F), KU-95-PO-128 (1M), KU-95-VAT-02 (17M 1F), KU-96-NM-43 (2F), KU-97-NM-01 (8M 6F), KU-97-TIR-01 (1M), KU-97-TIR-04 (8M), KU-97-VAT-03 (2M), KU-98-LJW-03 (1L), KU-98-LJW-40 (2M 4F), KU-98-VAT-01 (19M 2F), KU-98-TIA-65 (10M 8F), KU-99-DJB-105 (2M), KU-99-KLK-50 (4M); SHIKOTAN: SH-98-LJW-46 (1F), SH-98-LJW-54 (3M 2F), SH-98-VAT-49 (1M).

Lepidostoma crassicorne URUP: UR-96-NM-24 (1M); SHIKOTAN: SH-98-VAT-42 (2M), SH-98-VAT-47 (1M).

Lepidostoma hiurai ITURUP: IT-98-LJW-16 (3M 3F), IT-98-LJW-18 (7M 1F), IT-98-LJW-19 (1F); KUNASHIR: KU-94-NM-04 (3M), KU-94-VAT-04 (6F), KU-95-PO-127 (6M 6F), KU-98-LJW-40 (1M), KU-98-TIA-65 (9F), KU-99-VAT-56 (8M 2F), KU-99-VAT-57 (1M); SHIKOTAN: SH-94-VAT-31 (1M), SH-98-VAT-42 (2M 2F); ZELIONYI: ZE-94-NM-03 (1M); TANFILYEVA: TA-98-TIA-58 (7L).

Lepidostoma stellatum PARAMUSHIR: PA-97-VAT-29 (3M 3F), PA-97-VAT-35 (1M 1F); MAKANRUSHI: MK-97-NM-73 (1F); SHIASHKOTAN: SA-99-VAT-26 (5M 2F); KETOI: KE-95-PO-63 (1M 2F), KE-95-PO-73 (8M 8F), KE-95-PO-74 (2M), KE-95-PO-79 (2M 1F), KE-95-VAT-37 (2M 3F), KE-95-VAT-47 (1F); SIMUSHIR: SI-95-MO-10 (1F), SI-95-PO-40 (2M), SI-95-PO-42 (8M 6F), SI-95-PO-43 (12M 14F), SI-95-PO-66 (1M), SI-95-PO-80 (1F), SI-95-PO-82 (1M 1F), SI-95-VAT-24 (2M), SI-95-VAT-26 (7M 3F), SI-99-VAT-40 (2M 1F); URUP: UR-95-PO-11 (1M), UR-95-VAT-11 (10M 1F), UR-95-VAT-16 (1M), UR-95-VAT-18 (1F); ITURUP: IT-94-RG-06 (8M 1F), IT-95-PO-119 (1M 2F), IT-97-NM-06 (1F), IT-97-VAT-08 (17M 7F), IT-98-LJW-27 (1M 2F), IT-98-LJW-34 (1M), IT-98-NM-24 (1M), IT-98-VAT-11 (1M), IT-98-VAT-16 (1M 1F), IT-98-VAT-28 (2M).

Molanna moesta URUP: UR-95-PO-102 (2L), UR-95-PO-113 (19M 2F), UR-95-PO-114 (2L), UR-95-VAT-54 (1M), UR-95-VAT-58 (2L); ITURUP: IT-94-RG-07 (23M 21F), IT-94-RG-11 (1M 1F), IT-94-VAT-41 (5M 1F), IT-94-VAT-47 (1F), IT-96-MO-52 (1F), IT-98-DJB-32 (1M), IT-98-DJB-34 (1F), IT-98-DJB-42 (1M), IT-98-LJW-16 (16M 3F), IT-98-LJW-19 (4M 2F), IT-98-LJW-21 (1M), IT-98-NM-06 (18M 5F), IT-98-NM-10 (2M 2F), IT-98-NM-13 (1M 1F), IT-98-NM-14 (1F), IT-98-NM-15 (3F), IT-98-NM-16 (1F), IT-98-VAT-15 (11M 3F), IT-98-VAT-17 (14M 1F), IT-98-VAT-21 (4M), IT-98-VAT-33 (2M), IT-99-KLK-43 (3M 2F), IT-99-VAT-46 (10M 6F), IT-99-VAT-50 (4M); KUNASHIR: KU-94-NM-01 (83M 13F 20L 2P), KU-94-NM-04 (1M), KU-94-NM-05 (1M), KU-94-NM-21 (13M 10L), KU-94-VAT-01 (54M 7F), KU-94-VAT-14 (1M), KU-94-VAT-55 (12M 2F), KU-95-PO-123 (45M 10F), KU-95-PO-127 (15M 4F), KU-96-PO-76 (13M), KU-98-LJW-74 (1M 1F), KU-98-LJW-75 (1F), KU-99-NM-18 (11L), KU-99-VAT-56 (44M 3F), KU-99-VAT-57 (1M); ZELIONYI: ZE-94-NM-02 (3M 2F), ZE-94-RLC-04 (2M 1F), ZE-94-VAT-24 (2M 1F), ZE-98-LJW-70 (1M 1F); TANFILYEVA: TA-98-TIA-57 (8M 4F).

Molanna submarginalis PARAMUSHIR: PA-99-KLK-22 (12M 9F), PA-99-VAT-19 (12M 6F).

Molanna sp. SHUMSHU: SU-97-NM-47 (5 cases).

Molannodes tinctus SHUMSHU: SU-97-VAT-24 (5M 5F); PARAMUSHIR: PA-96-NM-08 (6M), PA-96-NM-09 (1L).

Ceraclea alboguttata KUNASHIR: KU-95-PO-127 (1F).

Ceraclea valentinae ZELIONYI: ZE-94-VAT-27 (1M).

Mystacides azureus ITURUP: IT-98-VAT-21 (1M); KUNASHIR: KU-98-BKU-73 (1M), KU-98-DJB-79 (1F).

Mystacides pacificus URUP: UR-95-EMS-05 (1F), UR-95-PO-113 (2M 1F), UR-95-VAT-14 (1M), UR-95-VAT-65 (4M 1F); ITURUP: IT-94-RG-07 (27M 11F), IT-94-VAT-41 (21M 31F), IT-94-VAT-45 (1M), IT-94-VAT-47 (1M), IT-96-BKU-87 (7F), IT-96-NM-29 (43M 16F), IT-96-PO-69 (3F), IT-96-VAT-48 (1M), IT-96-VAT-50 (27M), IT-98-NM-16A (1M), IT-98-VAT-15 (17M 5F), IT-98-VAT-17 (36M 1F), IT-98-VAT-21 (14M 2F), IT-99-VAT-46 (20M 20F), IT-99-VAT-52 (2M 1F); KUNASHIR: KU-94-NM-01 (1M), KU-94-NM-04 (2M 2F), KU-94-NM-05 (1M), KU-94-NM-21 (37M 2F), KU-94-VAT-01 (1L), KU-94-VAT-02 (8M 8F), KU-94-VAT-03 (1L), KU-94-VAT-04 (11M 6F), KU-94-VAT-55 (29M 3F), KU-95-PO-127 (3M 1F), KU-98-BKU-73 (1F), KU-99-VAT-56 (1M 1F); ZELIONYI: ZE-94-NM-02 (2M), ZE-94-NM-05 (1F), ZE-94-RLC-04 (2M), ZE-94-VAT-21 (6M 3F), ZE-94-VAT-24 (19M 6F), ZE-94-VAT-27 (40); TANFILYEVA: TA-98-TIA-57 (1M 1F).

Oecetis morii KUNASHIR: KU-96-PO-76 (1M).

Oecetis nigropunctata PARAMUSHIR: PA-97-NM-74 (3M 3F), PA-97-VAT-29 (3M 5F); KUNASHIR: KU-94-VAT-01 (1M 1F), KU-95-PO-123 (7M 2F), KU-95-PO-127 (1M), KU-95-VR-38 (1F), KU-96-PO-76 (4M), KU-99-VAT-56 (1M); TANFILYEVA: TA-98-TIA-57 (1M).

Triaenodes pellectus KUNASHIR: KU-94-NM-43 (1M), KU-97-NM-01 (2M 5F), KU-97-NM-03 (2M), KU-97-TIR-04 (2M 1F).

Triaenodes unanimis ITURUP: IT-98-VAT-17 (2M 2F), IT-98-LJW-19 (1M), IT-98-NM-10 (27M 37F); KUNASHIR: KU-98-DJB-140 (2M 2F); ZELIONYI: ZE-94-VAT-24 (1M), ZE-94-VAT-27 (1M), ZE-98-LJW-70 (1M).

Appendix II: IKIP Field Numbers and Field Data

Each IKIP field number consists of four parts: an abbreviation for the particular island, the year the collection was made, the initials of the representative collectors and the station number; for example, KU-94-NM-01 indicates that the specimens in that particular lot were collected on Kunashir in 1994 by N. Minakawa and R. I. Gara.

ATLASOVA

AL-97-NM-53: Lake fed by Zaperty Creek, near abandoned settlement, Alaidskaya Bay; 50°49.90' N, 155°39.96' E; Aug 12, 1997; N. Minakawa.

AL-97-NM-54, 55: Zaperty Creek, near abandoned settlement, Alaidskaya Bay; 50°50.83' N, 155°39.45' E; Aug 12, 1997; N. Minakawa.

AL-97-VAT-30: Zaperty Creek near abandoned settlement , Alaidskaya Bay; Aug 12, 1997; V. A. Teslenko.

AL-97-VAT-33: Stream near Zaperty Creek and abandoned settlement, Alaidskaya Bay; 50°50.69' N, 155°39.63' E; Aug 12, 1997; V. A. Teslenko.

AL-99-KLK-07, 08: Stream near Zaperty Creek and abandoned settlement, Alaidskaya Bay; 50°50.43' N, 155°39.68' E; Jul 25, 1999; N. Minakawa, K. L. Kurowski.

AL-99-VAT-05: Lake near abandoned settlement , Alaidskaya Bay; Jul 25, 1999; V. A. Teslenko.

SHUMSHU

SU-97-BKU-44: Top of coastal slope, first stream north of Koshkina River, about 2 km south of Pochtareva Cape; 50°49.32' N, 156°29.76' E; Aug 8, 1997; B.K. Urbain.

SU-97-BKU-50: Environs of Bolshoye Lake, along road running parallel with coastline and Bolshoye Marshland, eastern side of Cape Chibuynyi; 50°46.43' N, 156°15.34' E; Aug 9, 1997; B. K. Urbain.

SU-97-BKU-51: Environs of Bolshoye Lake, eastern side of Cape Chibuynyi; 50°46.20' N, 156°14.44' E; Aug 9, 1997; B. K. Urbain.

SU-97-BKU-60: Slope of stream valley between Cape Yudina and Luzhnanka River, Babushkina Bay; 50°39.74' N, 156°24.51' E; Aug 10, 1997; B. K. Urbain.

SU-97-MO-12A: Bolshoye Lake, eastern side of Cape Chibuynyi; 50°45.48' N, 156°15.92' E; Aug 9, 1997; M. Ohara.

SU-97-MO-17: Luzhnanka River, Babushkina Bay; 50°39.46' N, 156°25.00' E; Aug 10, 1997; M. Ohara.

SU-97-NM-30: Small pond about 0.8 km from coastline, environs of first stream north of Koshkina River, about 2 km south of Pochtareva Cape; 50°49.13' N, 156°28.93' E; Aug 8, 1997; N. Minakawa.

SU-97-NM-32, 35: Small pond about 1 km from coastline, environs of first stream north of Koshkina River, about 2 km south of Pochtareva Cape; 50°49.21' N, 156°28.70' E; Aug 8, 1997; N. Minakawa.

SU-97-NM-34: Small stream about 0.4 km from coastline, first stream from north of Koshkina River, about 2 km south of Pochtareva Cape; 50°49.17' N, 156°29.43' E; Aug 8, 1997; N. Minakawa.

SU-97-NM-37: Small stream about 1.3 km from coastline, first stream from north of Koshkina River, about 2 km south of Pochtareva Cape; 50°49.22' N, 156°28.53' E; Aug 8, 1997; N. Minakawa.

SU-97-NM-39: Meadow about 1.6 km from coastline, environs of first stream from north of Koshkina River, about 2 km south of Pochtareva Cape; 50°50.06' N, 156°29.17' E; Aug 8, 1997; N. Minakawa.

SU-97-NM-41: About 3.2 km upriver along floodplain inland from eastern side of Cape Chibuynyi, environs of Bolshoye Lake; 50°45.72' N, 156°17.84' E; Aug 9, 1997; N. Minakawa.

SU-97-NM-42: Headwater stream between Cape Yudina and Luzhnanka River, about 1.5 km inland from Babushkina Bay; 50°40.20' N, 156°23.98' E; Aug 10, 1997; N. Minakawa.

SU-97-NM-44: Stream between Cape Yudina and Luzhnanka River inland from Babushkina Bay; 50°39.78' N, 156°24.45' E; Aug 10, 1997; N. Minakawa.

SU-97-NM-46, 47: Lake about 1 km inland from Babushkina Bay, between Cape Yudina and Luzhnanka River; 50°40.03' N, 156°24.13' E; Aug 10, 1997; N. Minakawa.

SU-97-NM-49: Small ponds between Cape Yudina and Luzhnanka River, about 1.6 km inland from Babushkina Bay; 50°40.16' N, 156°23.80' E; Aug 10, 1997; N. Minakawa.

SU-97-NM-56: Stream about 3 km inland from eastern side of Cape Chibuynyi, environs of Bolshoye Lake; 50°45.70' N, 156°17.64' E; Aug 9, 1997; N. Minakawa.

SU-97-RLC-30: 3 km northeast of Bolshoye Lake at far edge of flat marshy area, beginning of slope up to hills, eastern side of Cape Chibuynyi; 50°46.66' N, 156°17.00' E; Aug 9, 1997; R.L. Crawford.

SU-97-TIR-27: A series of pools about 500 m upriver about 2 km south of Pochtareva Cape, environs of first river north of Koshkina River; Aug 8, 1997; T.I. Ritchie.

SU-97-TIR-28: Small lake about 2 km upriver, first river north of Koshkina River, about 2 km south of Pochtareva Cape; 50°49.20' N, 156°28.79' E; Aug 8, 1997; T.I. Ritchie.

SU-97-TIR-29: Small pond in river valley near Bolshoye Lake, eastern side of Cape Chibuynyi; 50°45.88' N, 156°15.94' E; Aug 9, 1997; T.I. Ritchie.

SU-97-TIR-30: Small ponds upriver from Bolshoye Lake at start of foothills inland from eastern side of Cape Chibuynyi; 50°45.85' N, 156°16.55' E; Aug 9, 1997; T.I. Ritchie.

SU-97-TIR-31: Small ponds upriver from Bolshoye Lake at start of foothills inland from eastern side of Cape Chibuynyi; 50°45.55' N, 156°17.36' E; Aug 9, 1997; T.I. Ritchie.

SU-97-TIR-32: Small ponds upriver from Bolshoye Lake at start of foothills inland from eastern side of Cape Chibuynyi; 50°45.70' N, 156°17.64' E; Aug 9, 1997; T.I. Ritchie, N. Minakawa.

SU-97-TIR-33: Luzhnanka River about 2 km Babushkina Bay; 50°39.84' N, 156°22.15' E; Aug 10, 1997; T.I. Ritchie.

SU-97-TWP-21: Slope above ponds in environs of first river north of Koshkina River, about 2 km south of Pochtareva Cape; 50°49.14' N, 156°29.34' E; Aug 8, 1997; T.W. Pietsch.

SU-97-VAT-13: Stream north of Koshkina River, about 2 km south of Pochtareva Cape; 50°49.48' N, 156°29.48' E; Aug 7, 1997; V. A. Teslenko.

SU-97-VAT-14: Bog about 2 km south of Pochtareva Cape, environs of first river north of Koshkina River; 50°49.17' N, 156°29.43' E; Aug 8, 1997; V. A. Teslenko.

SU-97-VAT-15: Bog about 2 km south of Pochtareva Cape, environs of first river north of Koshkina River; 50°48.44' N, 156°29.46' E; Aug 8, 1997; V. A. Teslenko.

SU-97-VAT-16, 17: First stream north of Koshkina River, about 2 km south of Pochtareva Cape, near bunker; 50°49.30' N, 156°30.16' E; Aug 8, 1997; V. A. Teslenko.

SU-97-VAT-18: First stream north of Koshkina River, about 2 km south of Pochtareva Cape; 50°49.48' N, 156°29.48' E; Aug 8, 1997; V. A. Teslenko.

SU-97-VAT-20: Bolshoye Lake, eastern side of Cape Chibuynyi; Aug 9, 1997; V. A. Teslenko.

SU-97-VAT-21: Stream about 2 km from mouth, eastern side of Cape Chibuynyi, environs of Bolshoye Lake; Aug 9, 1997; V. A. Teslenko.

SU-97-VAT-22: Bog by road between lake and Vasenya River, inland from eastern side of Cape Chibuynyi, environs of Bolshoye Lake; Aug 9, 1997; V. A. Teslenko.

SU-97-VAT-23: Tributary of Vasenya River inland from eastern side of Cape Chibuynyi, environs of Bolshoye Lake; Aug 9, 1997; V. A. Teslenko.

SU-97-VAT-24: Ponds near Luzhnanka River, Babushkina Bay; Aug 10, 1997; V. A. Teslenko.

SU-97-VAT-25: Ponds 2 km from tributary of Luzhnanka River, Babushkina Bay; Aug 10, 1997; V. A. Teslenko.

SU-97-VAT-27: Stream 300 m from mouth north of cape in Babushkina Bay, environs of Luzhnanka River; Aug 10, 1997; V. A. Teslenko.

SU-99-BKU-35: Coastal meadow, eastern side of Cape Chibuynyi, environs of Bolshoye Lake; 50°46.32' N, 156°15.46' E; Jul 31, 1999; B. K. Urbain.

SU-99-BKU-36: Stretch of road that is parallel with coastline and adjacent to Bolshoye Lake, eastern side of Cape Chibuynyi; 50°46.32' N, 156°15.46' E; Jul 31, 1999; B. K. Urbain.

SU-99-DJB-27: Inland from Baykoua Village, Jul 29, 1999; D. J. Bennett.

SU-99-DJB-40A: Bluff over pond, environs of Bolshoye Lake; 50°45.88' N, 156°14.46' E; Jul 31, 1999; D. J. Bennett.

SU-99-KLK-20: Swamps and lakes, about 6 km inland from Baykoua Village; 50°41.07' N, 156°15.58' E; Jul 29, 1999; N. Minakawa, K. L. Kurowski.

SU-99-KLK-26, 27: Swamps, inland from east of Cape Chibuynyi, environs of Bolshoye Lake and Bolshoye River; 50°46.68' N, 156°16.66' E; Jul 31, 1999; N. Minakawa, K. L. Kurowski.

SU-99-KLK-28: Stream, inland from east of Cape Chibuynyi, environs of Bolshoye Lake and Bolshoye River; 50°46.47' N, 156°16.92' E; Jul 31, 1999; N. Minakawa, K. L. Kurowski.

SU-99-KLK-29, 30: Stream, inland from east of Cape Chibuynyi, environs of Bolshoye Lake and Bolshoye River; 50°45.71' N, 156°17.07' E; Jul 31, 1999; N. Minakawa, K. L. Kurowski.

SU-99-VAT-16: Small lake 8 km southeast from Baykoua Village; 50°42.29' N, 156°12.43' E; Jul 29, 1999; V. A. Teslenko.

SU-99-VAT-23: Vesennyaya River, about 1.5 km from mouth, Bolshoye Bight; 50°44.62' N, 156°15.30' E; Jul 31, 1999; V. A. Teslenko.

SU-99-VAT-25: Western part of Bolshoye Lake; 50°45.32' N, 156°15.05' E; Jul 31, 1999; V. A. Teslenko.

SU-00-ATR-07: South of Baykovo Bay towards Bol'shoye Lake, upstream from valley in a small ravine with many mine shafts; 50°42.97' N, 156°12.29' E; July 24, 2000; T. R. Anderson.

SU-00-ATR-08: South of Baykovo Bay towards Bol'shoye Lake, above ravine with mine shafts on top of ridge; 50°42.97' N, 156°12.29' E; July 24, 2000; T. R. Anderson.

SU-00-ATR-11: In ravine heading south and west towards Baykovo Bay (inland from mine shafts); 50°42.97' N, 156°12.29' E; Jul 24, 2000; T. R. Anderson.

SU-00-DJB-10, 10A: Inland from Baykovo Bay, upstream from valley, near stream bank between valley walls; 50°42.97' N, 156°12.29' E; Jul 24, 2000; D. J. Bennett.

SU-00-DJB-12: Inland from Baykovo Bay, on terrace, inland from stream valley; 50°42.97' N, 156°12.29' E; Jul 24, 2000; D. J. Bennett.

PARAMUSHIR

PA-96-BKU-13: Coastal grassland, near Russian military watch tower, western base of Vasil'Yeva Peninsula; 50°02.87' N, 155°23.46' E; Aug 3, 1996; B. K. Urbain.

PA-96-BKU-15: Western shore of Pernatoye Lake, inland from western base of Vasilyeva Peninsula; 50°02.96' N, 155°22.92' E; Aug 3, 1996; B. K. Urbain.

PA-96-MO-01: Utesnyi River; 50°37.73' N, 156°08.21' E; Aug 1, 1996; M. Ohara.

PA-96-MO-03: Utesnyi River, 200 m from mouth; 50°37.65' N, 156°08.13' E; Aug 1, 1996; M. Ohara.

PA-96-MO-06: Pond on Vasilyeva Peninsula; 50°01.41' N, 155°23.92' E; Aug 3, 1996; M. Ohara.

PA-96-MO-09: Near Pernatoye Lake, Vasilyeva Bay; 50°02.37' N, 155°23.34' E; Aug 3, 1996; M. Ohara.

PA-96-NM-02, 03: Bolsheva River, Vasilyeva Bay; 50°02.59' N, 155°22.54' E; Aug 3, 1996; N. Minakawa.

PA-96-NM-04: Southwest shore of Pernatoye Lake, Vasilyeva Bay; 50°02.50' N, 155°23.20' E; Aug 3, 1996; N. Minakawa.

PA-96-NM-07: Small pond about 100 m south of Pernatoya Lake, Vasilyeva Bay; 50°02.37' N, 155°23.34' E; Aug 3, 1996; N. Minakawa.

PA-96-NM-08, 09: Small pond on Vasilyev Peninsula; 50°02.30' N, 155°23.61' E; Aug 3, 1996; N. Minakawa.

PA-96-PO-01, 02: Small pond 200 m north of Utyosnaya River, about 1 km inland from sea; 50°37.85' N, 156°07.46' E; Aug 1, 1996; P. Oberg, N. Minakawa.

PA-96-PO-03: Small pond 300 m north of Utyosnaya River, about 1 km inland from sea; 50°37.87' N, 156°07.32' E; Aug 1, 1996; P. Oberg, N. Minakawa.

PA-96-PO-05: Large pond 100 m north of Utyosnaya River, about 1 km inland from sea; 50°37.83' N, 156°07.37' E; Aug 1, 1996; N. Minakawa.

PA-96-PO-07: Utyosnaya River, 1.5 km inland from sea; 50°37.72' N, 156°07.29' E; Aug 1, 1996; P. Oberg, N. Minakawa.

PA-96-PO-09: Large pond, 300m east of Pernatoye Lake on Vasiljeva Peninsula; 50°02.68' N, 155°24.04' E; Aug 3, 1996; P. Oberg.

PA-96-RLC-04: Small pond in valley of Utyosnaya River; 50°37.78' N, 156°07.45' E; Aug 1, 1996; R.L. Crawford.

PA-96-VAT-01: Small pond by Utyosnaya River, 300 - 500 m from mouth; Aug 1, 1996; V. A. Teslenko.

PA-96-VAT-02, 03: Small stream on Utyosnaya Slope, about 1 km from sea; Aug 1, 1996; V. A. Teslenko.

PA-96-VAT-04, 05: Utyosnaya River, about 1.2 km from mouth; 50°37.87' N, 156°07.32' E; Aug 1, 1996; V. A. Teslenko.

PA-96-VAT-06: Small tributary of Bolshaya River, 500 m from mouth, Vasilyeva Bay; Aug 3, 1996; V. A. Teslenko.

PA-96-VAT-07, 08: Small tributary of Bolshaya River, 600 m from mouth, Vasilyeva Bay; Aug 3, 1996; V. A. Teslenko.

PA-96-VAT-09: Pernatoye Lake, Vasilyeva Bay; 50°02.37' N, 155°23.34' E; Aug 3, 1996; V. A. Teslenko.

PA-96-VAT-10: Small stream about 300 m west from Pernatoye Lake, Vasilyeva Bay; 50°02.37' N, 155°23.34' E; Aug 3, 1996; V. A. Teslenko.

PA-96-VAT-11: Small pond on Vasilyeva Peninsula; 50°02.30' N, 155°23.61' E; Aug 3, 1996; V. A. Teslenko.

PA-97-BKU-31, 33: South of lake fed by Savushkina River, near Putyatino settlement, between coastline and road; 50°44.19' N, 156°08.82' E; Aug 4, 1997; B. K. Urbain.

PA-97-BKU-70: Near Shelekhoya River and Shelekhoya settlement, on coastal plateau inland from Shelekhoya Bay; 50°22.31' N, 155°36.05' E; Aug 13, 1997; B. K. Urbain.

PA-97-BKU-72, 73: Near Shelekhoya River and Shelekhoya settlement, along coastal slope at steep exposed area, near stream, with protruding wet rocks, inland from Shelekhoya Bay; 50°22.26' N, 155°36.17' E; Aug 13, 1997; B. K. Urbain.

PA-97-BKU-77: Near Krasheninnikova River, along coastal terrace, inland from Krasheninnikova Bay; 50°16.87' N, 155°20.43' E; Aug 14, 1997; B. K. Urbain.

PA-97-BKU-87: Near small lake next to Lake Pernatoye, around abandoned buildings, inland from western base of Vasil'Yeva Peninsula; 50°02.82' N, 155°24.04' E; Aug 16, 1997; B. K. Urbain.

PA-97-DES-43: Coastal meadow, western base of Vasil'Yeva Peninsula; 50°01.09' N, 155°23.71' E; Aug 16, 1997; D. E. Stevenson.

PA-97-MO-06A: Grassland near center of town of Severo-Kurilsk; 50°40.35' N, 156°08.47' E; Aug 4, 1997; M. Ohara.

PA-97-MO-25A: Near Shelekhoya River and Shelekhoya settlement, Shelekhoya Bay; 50°22.50' N, 155°35.50' E; Aug 13, 1997; M. Ohara.

PA-97-MO-26A: Near Krasheninnikova River, Krasheninnikova Bay; 50°16.62' N, 155°20.72' E; Aug 14, 1997; M. Ohara.

PA-97-MO-29: Grassland, western base of Vasil'Yeva Peninsula; 50°03.18' N, 155°25.24' E; Aug 16, 1997; M. Ohara

PA-97-MO-33A: Grassland, inland from eastern Tukharaka Bay; 50°11.06' N, 155°39.15' E; Aug 17, 1997; M. Ohara.

PA-97-MO-34: Grassland, inland from eastern Tukharaka Bay; 50°11.06' N, 155°38.64' E; Aug 17, 1997; M. Ohara.

PA-97-NM-22: Lake fed by Savushkina River, near Putyatino settlement on shore; 50°44.33' N, 156°08.71' E; Aug 4, 1997; N. Minakawa.

PA-97-NM-50: Utyosnaya River, Utyosnaya Bay; 50°37.81' N, 156°06.93' E; Aug 11, 1997; N. Minakawa.

PA-97-NM-52: Ponds in valley of Utyosnaya River, Utyosnaya Bay; 50°37.82' N, 156°07.43' E; Aug 11, 1997; N. Minakawa.

PA-97-NM-57: Stream south of Shelekhoya River and near Shelekhoya settlement, Shelekhoya Bay; 50°22.19' N, 155°36.15' E; Aug 13, 1997; N. Minakawa.

PA-97-NM-59: Stream south of Shelekhoya River and near Shelekhoya settlement, Shelekhoya Bay; 50°22.08' N, 155°36.47' E; Aug 13, 1997; N. Minakawa.

PA-97-NM-62: Stream near Krasheninnikova River, Krasheninnikova Bay; 50°16.06' N, 155°19.90' E; Aug 14, 1997; N. Minakawa.

PA-97-NM-65: Pond near Krasheninnikova River, inland from Krasheninnikova Bay; 50°15.81' N, 155°20.04' E; Aug 14, 1997; N. Minakawa.

PA-97-NM-72: Pond 200-300 m inland from western base of Vasilyeva Peninsula; 50°01.40' N, 155°24.03' E; Aug 16, 1997; N. Minakawa.

PA-97-NM-73: Stream that flows into eastern Tukharaka Bay; 50°10.88' N, 155°38.89' E; Aug 17, 1997; N. Minakawa.

PA-97-NM-74: Lake about 300 m inland from eastern Tukharaka Bay; 50°11.28' N, 155°38.06' E; Aug 17, 1997; N. Minakawa.

PA-97-RLC-15: Lake fed by Savushkina River, near Putyatino settlement on coast; 50°44.08' N, 156°08.10' E; Aug 4, 1997; R. L. Crawford.

PA-97-RLC-60: Near tributary feeding Bolshaya River from east, inland from western base of Vasil'Yeva Peninsula; 50°03.20' N, 155°21.52' E; Aug 16, 1997; R. L. Crawford.

PA-97-RLC-63: Flat valley bottom immediately north and slightly upslope of Pernatoye Lake, near meandering stream, inland from western base of Vasil'Yeva Peninsula; 50°02.86' N, 155°22.64' E; Aug 16, 1997; R. L. Crawford.

PA-97-TIR-15, 17: Lake fed by Savushkina River, near Putyatino settlement on coast, around bridge; 50°43.92' N, 156°08.24' E; Aug 4, 1997; T. I. Ritchie.

PA-97-TIR-19: Lake fed by Savushkina River, near Putyatino settlement on coast, edge of lake; 50°44.24' N, 156°08.83' E; Aug 4, 1997; T. I. Ritchie.

PA-97-TIR-36: Bog south of Lagernoye plateau in environ of Cape Ozernyi; 50°35.97' N, 156°09.66' E; Aug 11, 1997; T. I. Ritchie.

PA-97-TIR-37: About 1 km from mouth of Severyanka River, south of Cape Ozernyi; 50°35.31' N, 156°08.72' E; Aug 11, 1997; T. I. Ritchie.

PA-97-TIR-45: Tributary of Krasheninnikova River about 200 m inland from Krasheninnikova Bay; 50°16.88' N, 155°20.93' E; Aug 14, 1997; T. I. Ritchie.

PA-97-TIR-48: Small pond western base of Vasil'Yeva Peninsula; 50°03.07' N, 155°24.66' E; Aug 16, 1997; T. I. Ritchie.

PA-97-VAT-09, 10: Lake fed by Savushkina River, near Putyatino settlement on shore; 50°43.92' N, 156°08.24' E; Aug 4, 1997; V. A. Teslenko.

PA-97-VAT-29: Tributary of Utyosnaya River about 1 km from mouth, Utyosnaya Bay; Aug 11, 1997; V. A. Teslenko.

PA-97-VAT-35, 36: Stream with waterfall , Shelekhoya River and Shelekhoya settlement, Shelekhoya Bay; Aug 13, 1997; V. A. Teslenko.

PA-97-VAT-37: Tributary of Krasheninnikova River, Krasheninnikova Bay; 50°16.91' N, 155°21.47' E; Aug 14, 1997; V. A. Teslenko.

PA-97-VAT-39: Small stream between Krasheninnikova River and Alenushkina River, Krasheninnikova Bay; Aug 14, 1997; V. A. Teslenko.

PA-97-VAT-41: Mouth of Krasheninnikova River, Krasheninnikova Bay; 50°16.55' N, 155°20.37' E; Aug 14, 1997; V. A. Teslenko.

PA-97-VAT-42: Forelnyi Stream, 800 m from mouth, east of Cape Kapustnyi; Aug 15, 1997; V. A. Teslenko.

PA-97-VAT-44: Small pond near light house, east of Cape Kapustnyi; Aug 15, 1997; V. A. Teslenko.

PA-97-VAT-45: Lake about 1 km north of light house, east of Cape Kapustnyi; Aug 15, 1997; V. A. Teslenko.

PA-97-VAT-46: About 1 km from mouth of Shikshanka River, western base of Vasil'Yeva Peninsula; Aug 16, 1997; V. A. Teslenko.

PA-97-VAT-48: Pond (drying), western base of Vasil'Yeva Peninsula; Aug 16, 1997; V. A. Teslenko.

PA-97-VAT-49: Small stream near Baklanyi Rocks, eastern Tukharaka Bay; Aug 17, 1997; V. A. Teslenko.

PA-99-BKU-32: Near two lakes northeast of Medvezhiya River, inland from Rifovaya Bay; 50°29.75' N, 156°05.73' E; Jul 30, 1999; B. K. Urbain.

PA-99-KLK-21, 22: Swamps inland from Rifovaya Bay; 50°29.57' N, 156°05.58' E; Jul 30, 1999; N. Minakawa, K. L. Kurowski.

PA-99-KLK-23: Ponds near Medvezhiya River inland from Rifovaya Bay; 50°29.62' N, 156°04.92' E; Jul 30, 1999; N. Minakawa, K. L. Kurowski.

PA-99-KLK-25: Stream near Medvezhiya River inland from Rifovaya Bay; 50°29.62' N, 156°06.64' E; Jul 30, 1999; N. Minakawa, K. L. Kurowski.

PA-99-VAT-10: Meadow near Severo-Kurilsk; Jul 26, 1999; A. Lelej.

PA-99-VAT-19: Small lake northeast of Melkoye Lake, Pujsharija Bight, Rifovaya Bay; 50°29.57' N, 156°05.43' E; Jul 30, 1999; V. A. Teslenko.

PA-99-VAT-20: Stream near Rofovyi Cape, Pujshariya Bight, Rifovaya Bay; 50°29.66' N, 156°06.70' E; Jul 30, 1999; V. A. Teslenko.

PA-00-ATR-13: Inland from eastern side of Vasil'yeva Bay; 50°01.62' N, 155°23.82' E; Jul 25, 00; T. R. Anderson.

PA-00-ATR-15, 16: Inland from eastern side of Vasil'yeva Bay, from the southwest side of Lake Pernatoye around to north side of the lake; 50°02.83' N, 155°22.84' E; Jul 25, 00; T. R. Anderson.

PA-00-DJB-16, 17: Inland from eastern side of Vasil'yeva Bay; 50°01.62' N, 155°23.82' E; Jul 25, 2000; D. J. Bennett.

MAKANRUSHI

MK-97-BKU-94: Northwestern edge of big coastal marshland, at base of foothills, inland from Aakat Bay; 49°44.29' N, 154°25.09' E; Aug 18, 1997; B. K. Urbain.

MK-97-BKU-97: Northwestern edge of big coastal marshland, at base of foothills, inland from Aakat Bay; 49°44.28' N, 154°25.20' E; Aug 18, 1997; B. K. Urbain.

MK-97-BKU-103: Southeastern facing steep slope, inland from Aakat Bay; 49°44.51' N, 154°24.99' E; Aug 18, 1997; B. K. Urbain.

MK-97-MO-35A: Grassland, inland from Aakat Bay; 49°44.21' N, 154°25.19' E; Aug 18, 1997; M. Ohara.

MK-97-MO-37A: Grassland, inland from Aakat Bay; 49°44.34' N, 154°25.71' E; Aug 18, 1997; M. Ohara.

MK-97-NM-77: Stream near Pit'yevoy River about 2 km inland from Aakat Bay; 49°44.63' N, 154°25.74' E; Aug 18, 1997; N. Minakawa.

MK-97-TIR-49: Small stream, base of foothills that flows into Aakat Bay; 49°44.27' N, 154°25.24' E; Aug 18, 1997; T. I. Ritchie.

MK-97-VAT-51, 52: Godnyi Creek about 1.5 km above from waterfall, inland from Aakat Bay; Aug 18, 1997; V. A. Teslenko.

MK-97-VAT-53: Godnyi Creek about 1.0 km above from waterfall, inland from Aakat Bay; Aug 18, 1997; V. A. Teslenko.

MK-97-VAT-55: Small pond near Aakat Bay, north of Aakat Bight; Aug 18, 1997; V. A. Teslenko.

ONEKOTAN

ON-96-BKU-16: South slope of a river valley inland from Nemo Bay; 49°36.68' N, 154°48.97' E; Aug 4, 1996; B. K. Urbain.

ON-96-MO-11: Coastal margin of Nemo Bay; 49°36.62' N, 154°49.40' E; Aug 4, 1996; M. Yabe.

ON-96-PO-13, 14: Pond (sink holes) on plateau about 2 km from Nemo Bay; 49°36.30' N, 154°50.33' E; Aug 4, 1996; P. Oberg, N. Minakawa.

ON-96-PO-15, 16: 2 small ponds on the plateau about 2.5 km from Nemo Bay; 49°36.31' N, 154°50.39' E; Aug 4, 1996; P. Oberg, N. Minakawa.

ON-96-PO-18: A series of ponds (sink holes) in drainage area, about 4.2 km inland from Nemo Bay, headwaters for the stream that flows into Nemo Bay; 49°35.66' N, 154°51.55' E; Aug 4, 1996; P. Oberg, N. Minakawa.

ON-96-PO-19, 20: Stream that flows into Nemo Bay, about 100 m from mouth of the stream, north of Lake Chyornoye; 49°36.61' N, 154°49.51' E; Aug 4, 1996; P. Oberg, N. Minakawa.

ON-96-PO-21, 22: Stream, about 1 km south of Cape Subbotina; 49°23.84' N, 154°38.67' E; Aug 5, 1996; P. Oberg, N. Minakawa.

ON-96-PO-23, 24: Waterfall, about 1 km south of Cape Subbotina; 49°24.33' N, 154°38.88' E; Aug 5, 1996; P. Oberg.

ON-96-PO-25: Stream 1 km south of Cape Subbotina; 49°24.06' N, 154°38.65' E; Aug 5, 1996; P. Oberg, N. Minakawa.

ON-96-PO-26, 27: Stream just north of Resvyi River, that flows into Mussel Bay, between Mussle Point and Lisiy Point, about 500 m inland from the bay; 49°23.56' N, 154°49.08' E; Aug 7, 1996; N. Minakawa.

ON-96-PO-30: Ponds on plateau north of Resvyi River, about 4 km inland from Lisiy Point; 49°23.89' N, 154°48.69' E; Aug 7, 1996; N. Minakawa.

ON-96-PO-43: Trudnyi River, about 2 km from mouth, southern Onekotan; 49°16.76' N, 154°45.02' E; Aug 9, 1996; P. Oberg, N. Minakawa.

ON-96-VAT-12: Stream that flows into Nemo Bay, 300 m from the mouth; Aug 4, 1996; V. A. Teslenko.

ON-96-VAT-14: Small pond on the right side of the stream that flows into Nemo Bay, about 300 m from the bay; Aug 4, 1996; V. A. Teslenko.

ON-96-VAT-15: Waterfall about 2 km to the south of Subbotina Cape; Aug 5, 1996; V. A. Teslenko.

ON-96-VAT-16: Stream about 2 km to the south of Subbotina Cape; 49°23.84' N, 154°38.67' E; Aug 5, 1996; V. A. Teslenko.

ON-96-VAT-17, 18: Stream north of Resvyi River, Mussel Bay; 49°23.56' N, 154°49.08' E; Aug 7, 1996; V. A. Teslenko.

ON-96-VAT-19, 20: Small pond on the trail to Lisiy Cape, from Mussel Bay; Aug 7, 1996; V. A. Teslenko.

ON-96-VAT-23, 24: Trudnyi River, south part of Onekotan; 49°16.49' N, 154°45.04' E; Aug 9, 1996; V. A. Teslenko.

ON-96-RLC-17: Stabilized dune meadow inland near river, Nemo Bay; 49°36.83' N, 154°49.11' E; Aug 4, 1996; R. L. Crawford.

ON-96-RLC-26: Rezvyi River, in river valley bottom near abandoned army base; 49°23.76' N, 154°48.54' E; Aug 7, 1996; R. L. Crawford.

ON-99-BKU-04: Northern slopes (via narrow foot-trail) which lead up to Lake Chernoye, Nemo Bay; 49°36.51' N, 154°49.85' E; Jul 23, 1999; B. K. Urbain.

ON-99-BKU-05, 07: Northern slopes (via narrow foot-trail) which lead up to Lake Chernoye, Nemo Bay; 49°36.56' N, 154°49.70' E; Jul 23, 1999; B. K. Urbain.

ON-99-DJB-07: Plateau between Lake Chernoye and stream that flows into Nemo Bay; 49°36.18' N, 154°49.67' E; Jul 24, 1999; D. J. Bennett.

ON-99-KLK-04: Pond on plateau, inland from Nemo Bay; 49°36.10' N, 154°49.71' E; Jul 24, 1999; N. Minakawa, K. L. Kurowski.

ON-99-KLK-05: Chernoye Lake, inland of Nemo Bay; 49°35.50' N, 154°48.87' E; Jul 24, 1999; N. Minakawa, K. L. Kurowski.

ON-99-KLK-06: 2 ponds on the plateau, inland from Nemo Bay; 49°36.04' N, 154°49.78' E; Jul 24, 1999; N. Minakawa, K. L. Kurowski.

ON-99-VAT-02: Northwest part of Lake Chernoye Lake, Nemo Bay; 49°35.50' N, 154°48.87' E; Jul 24, 1999; V. A. Teslenko.

ON-00-ATR-18: Inland of Nemo Bay, south hillside of river valley; 49°36.61' N, 154°49.21' E; July 27, 2000; T. R. Anderson.

ON-00-ATR-19: Inland and a little south of Nemo Bay, atop ridge on flat terrace overlooking bay; 49°36.57' N, 154°49.24' E; July 27, 2000; T. R. Anderson.

ON-00-DJB-21C: Inland from Nemo Bay, near river mouth just inland from beach extending up slopes to terrace margin over valley; 49°36.62' N, 154°49.21' E; July 27, 2000; D. J. Bennett.

ON-00-DJB-22C: Inland and south of Nemo Bay, between west end of Lake Chernoye and coast; 49°36.62' N, 154°49.21' E; July 27, 2000; D. J. Bennett.

KHARIMKOTAN

KH-96-BKU-36: Mouth of coastal stream in Severgina Bay; 49°09.79' N, 154°29.25' E; Aug 8, 1996; B. K. Urbain.

KH-96-BKU-40: Atop first coastal plateau inland from Severgina Bay; 49°09.65' N, 154°29.27' E; Aug 8, 1996; B. K. Urbain.

KH-96-PO-32: Lake about 2km inland from Severgina Bay, between bay and Lake Lazurnoye; 49°09.49' N, 154°28.24' E; Aug 8, 1996; P. Oberg, N. Minakawa.

KH-96-PO-34: Pond amongst ridges about 3 km inland from Severgina Bay, between bay and Lake Lazurnoye; 49°09.35' N, 154°27.98' E; Aug 8, 1996; P. Oberg, N. Minakawa.

KH-96-PO-36, 37: Stream that flows into Severgina Bay; 49°09.79' N, 154°29.25' E; Aug 8, 1996; N. Minakawa.

KH-96-PO-38: Stream that flows into Severgina Bay; 49°09.55' N, 154°29.54' E; Aug 8, 1996; P. Oberg.

KH-96-PO-39: Stream that flows into northern end of Severgina Bay, north of former settlement in the bay; 49°09.65' N, 154°30.19' E; Aug 8, 1996; P. Oberg.

KH-96-PO-41: Pond 200 m inland from Severgina Bay, and north of former settlement in the bay; 49°09.66' N, 154°30.08' E; Aug 8, 1996; P. Oberg, A. Lopez.

KH-96-VAT-21, 22: Stream that flows into Severgina Bay; 49°09.63' N, 154°29.23' E; Aug 8, 1996; V. A. Teslenko.

KH-00-ATR-30: Near lakeshore of Lake Lazurnoye; 49°08.75' N, 154°27.64' E; Jul 28, 2000; T. R. Anderson.

KH-00-DJB-30: Northwestern part of island, environs surrounding Lake Lazurnoye, on hillside, upslope from coastal lake towards volcano; 49°08.93' N, 154°28.09' E; Jul 28, 2000; D. J. Bennett.

KH-00-DJB-31: Northwestern part of island, environs surrounding Lake Lazurnoye, valley on north side of volcano leading into coastal lake- transect; Jul 28, 2000; D. J. Bennett.

EKARMA

EK-99-KLK-31: Small coastal stream by shore, west of Cape Lyutyi; Aug 1, 1999; K. L. Kurowski.

SHIASHKOTAN

SA-96-NM-11: Pond (sink holes) on the plateau about 1.5 km inland Zakatnaya Bay; 48°46.45' N, 154°01.18' E; Aug 12, 1996; N. Minakawa.

SA-96-NM-13: Stream on the north slope of Mt. Kuntominter Zakatnaya Bay; 48°46.40' N, 154°01.13' E; Aug 12, 1996; N. Minakawa.

SA-96-NM-14: Stream on the north slope of Mt. Kuntominter Zakatnaya Bay; 48°46.59' N, 154°02.41' E; Aug 12, 1996; N. Minakawa.

SA-96-PO-46, 47: Small waterfall that flows into Zakatnaya Bay; 48°46.96' N, 154°02.66' E; Aug 11, 1996; P. Oberg, N. Minakawa.

SA-96-PO-48: Small ponds (sink holes) on the plateau inland from Zakatnaya Bay; 48°46.80' N, 154°02.07' E; Aug 11, 1996; P. Oberg, N. Minakawa.

SA-96-PO-50, 51: 3 large ponds on the plateau about 1 km inland from Zakatnaya Bay; 48°46.69' N, 154°01.99' E; Aug 11, 1996; P. Oberg.

SA-96-PO-53: Stream section about 1.5 km upstream from waterfall, Zakatnaya Bay; 48°46.46' N, 154°02.62' E; Aug 12, 1996; P. Oberg.

SA-96-VAT-28, 29, 30: Stream section above waterfall, Zakatnaya Bay, about 3 km east of Grotovyi Cape; Aug 11, 1996; V. A. Teslenko.

SA-96-VAT-31, 32: Small pond by trail to waterfall, west side of Grotovyi cape, Zakatnaya Bay; Aug 12, 1996; V. A. Teslenko.

SA-99-KLK-32, 33: Stream above coastal waterfall north of Cape Obvalinyi; 48°46.27' N, 154°03.95' E; Aug 2, 1999; N. Minakawa, K. L. Kurowski.

SA-99-NM-02: Stream above coastal waterfall north of Cape Obvalinyi; 48°45.94' N, 154°03.92' E; Aug 2, 1999; N. Minakawa.

SA-99-VAT-26: Coastal stream north of Cape Obvalinyi; 48°46.31' N, 154°04.06' E; Aug 2, 1999; V. A. Teslenko.

SA-00-ATR-39: Inland from southern part of Zakatnaya Bay, west of landing site, plateau above beach bounded by mountains to the south and cliffs to the north; 48°46.83' N, 154°01.85' E; Jul 29, 2000; T. R. Anderson.

SA-00-ATR-42: Inland from southern part of Zakatnaya Bay, plateau west of Zakatnay Bay, on the edge of a small ravine; 48°46.77' N, 154°01.99' E; Jul 29. 2000; T. R. Anderson.

SA-00-DJB-33: Inland from southern part of Zakatnaya Bay, on terrace west of the landing site; 48°46.83' N, 154°01.85' E; Jul 29, 2000; D. J. Bennett.

SA-00-DJB-36: Inland from southern part of Zakatnaya Bay, on terrace above landing site, to the west; 48°46.80' N, 154°01.95' E; Jul 29, 2000; D. J. Bennett.

MATUA

MA-96-NM-16: Small coastal stream that flows into Yamato Bay; 48°03.17' N, 153°15.53' E; Aug 15, 1996; N. Minakawa.

MA-96-NM-17: Small coastal stream that flows into Yamato Bay; 48°03.19' N, 153°15.49' E; Aug 15, 1996; N. Minakawa.

MA-96-PO-55: Pond about 500 m inland from Ainu Bay; 48°03.39' N, 153°14.38' E; Aug 14, 1996; P. Oberg.

MA-96-VAT-34: Small pond about 0.5 km from Ainu Bay; 48°03.39' N, 153°14.38' E; Aug 14, 1996; V. A. Teslenko.

MA-96-VAT-37: Small stream that flows into the small cove between Klyuv Cape and Orlova Cape; 48°03.46' N, 153°15.85' E; Aug 15, 1996; V. A. Teslenko.

MA-99-KLK-36, 37: Swamps near Ainu Bay; 48°02.85' N, 153°13.68' E; Aug 3, 1999; N. Minakawa, K. L. Kurowski.

MA-99-KLK-38: Swamps near Ainu Bay; 48°02.60' N, 153°13.87' E; Aug 3, 1999; N. Minakawa, K. L. Kurowski.

MA-99-VAT-29: Small pond near Ainu Bay; 48°02.64' N, 153°13.88' E; Aug 3, 1999; V. A. Teslenko.

RASSHUA

RAS-95-MO-13: Tikhoye Lake and Beloye Lake; 47°43.35' N, 152°59.34' E; Aug 12, 1995; M. Ohara.

RAS-95-PO-47: Tikhoye Lake; 47°43.30' N, 152°59.52' E; Aug 12, 1995; N. Minakawa.

RAS-95-PO-49: Small ponds near Tikhoye Lake; 47°43.32' N, 152°59.78' E; Aug 12, 1995; N. Minakawa, P. Oberg.

RAS-95-PO-51, 52: Inland from southwest section of island near the "arches", environs of small stream; 47°43.18' N, 152°59.25' E; Aug 12, 1995; N. Minakawa, P. Oberg.

RAS-95-PO-55: Stream that flows into Pacific Ocean; 47°43.05' N, 153°00.67' E; Aug 13, 1995; N. Minakawa, P. Oberg.

RAS-95-PO-57: Near mouth of stream that flows into Pacific Ocean; 47°42.70' N, 153°01.74' E; Aug 13, 1995; P. Oberg, N. Minakawa.

RAS-95-VAT-31: Tikhoye Lake; 47°43.34' N, 152°59.80' E; Aug 12, 1995; E.M. Sayenko.

RAS-95-VAT-32, 33: Stream that flows into Tikhoye Lake; 47°43.05' N, 153°00.67' E; Aug 13, 1995; V. A. Teslenko.

RAS-95-VAT-36: Bog adjacent to stream that flows into Tikhoye Lake; 47°43.05' N, 153°00.67' E; Aug 13, 1995; V. A. Teslenko.

RAS-99-KLK-39, 40: Tikhoye Lake and Beloye Lake, 2 km north of Malen'kaya Bay; 47°43.36' N, 152°59.56' E; Aug 4, 1999; N. Minakawa, K. L. Kurowski.
RAS-99-VAT-30: Beloye Lake; 47°43.36' N, 152°59.28' E; Aug 4, 1999; V. A. Teslenko.
RAS-99-VAT-32: Tichoye Lake; 47°43.40' N, 152°59.70' E; Aug 4, 1999; V. A. Teslenko.

KETOI

KE-95-MO-23: Coastal margin, east of Cape Storozheva; 47°22.60' N, 152°27.76' E; Aug 15, 1995; M. Ohara.
KE-95-KE-95-MO-23: Coastal margin, east of Cape Storozheva; 47°22.60' N, 152°27.76' E; Aug 15, 1995; M. Ohara.
KE-95-MO-37: Coastal margin in the environs of Stochnyi River; 47°17.93' N, 152°30.00' E; Aug 19, 1995; M. Ohara.
KE-95-PO-61, 62: Swamp, west of Kaskad Waterfall, east of Cape Storozheva; 47°22.54' N, 152°27.47' E; Aug 15, 1995; N. Minakawa, P. Oberg.
KE-95-PO-63, 64: Small stream about 2 km west of Kaskad Waterfall, east of Cape Storozheva; 47°22.48' N, 152°27.53' E; Aug 15, 1995; N. Minakawa, P. Oberg.
KE-95-PO-65: Waterfall about 2 km west from Kaskad Waterfall, east of Cape Storozheva; 47°22.53' N, 152°27.88' E; Aug 15, 1995; P. Oberg.
KE-95-PO-73: Stream near Stochnyi River; 47°17.93' N, 152°30.00' E; Aug 19, 1995; N. Minakawa.
KE-95-PO-74, 75: Stochnyi River; 47°18.11' N, 152°29.85' E; Aug 19, 1995; N. Minakawa, P. Oberg.
KE-95-PO-76: Puddles in environs of Stochnyi River, about 200 m from mouth; 47°18.11' N, 152°29.85' E; Aug 19, 1995; N. Minakawa, P. Oberg.
KE-95-PO-77: Puddles in environs of Stochnyi River, top of coastal plateau; 47°18.08' N, 152°30.21' E; Aug 19, 1995; N. Minakawa.
KE-95-PO-79: Stream near Stochnyi River; 47°17.89' N, 152°30.69' E; Aug 19, 1995; P. Oberg.
KE-95-VAT-37, 38: Waterfall about 2 km west from Kaskad Waterfall, east of Cape Storozheva; 47°22.48' N, 152°27.53' E; Aug 15, 1995; V. A. Teslenko.
KE-95-VAT-39: Swamp, west of Kaskad Waterfall, east of Cape Storozheva; 47°22.54' N, 152°27.47' E; Aug 15, 1995; V. A. Teslenko.
KE-95-VAT-44, 45: Stochnyi River; 47°17.93' N, 152°30.00' E; Aug 19, 1995; V. A. Teslenko.
KE-95-VAT-46: Puddles in environs of Stochnyi River, about 1 km upriver from mouth; 47°18.11' N, 152°29.85' E; Aug 19, 1995; V. A. Teslenko.
KE-95-VAT-47: Stochnyi River; 47°18.03' N, 152°29.96' E; Aug 19, 1995; V. A. Teslenko.

SIMUSHIR

SI-95-BKU-32B: Coastal margin, Kitoboyknaya Bay; 46°51.15' N, 151°47.83' E; Aug 10, 1995; B. K. Urbain.
SI-95-MO-10: Coastal margin, Kitoboyknaya Bay; 46°51.12' N, 151°47.75' E; Aug 10, 1995; M. Ohara.
SI-95-PO-39: Small coastal waterfall and stream that flows into Kitoboyknaya Bay; 46°51.24' N, 151°47.83' E; Aug 10, 1995; N. Minakawa, P. Oberg.
SI-95-PO-40, 41: Small coastal waterfall and stream that flows into Kitoboyknaya Bay; 46°51.10' N, 151°47.73' E; Aug 10, 1995; P. Oberg.
SI-95-PO-42: Small coastal stream that flows into Kitoboyknaya Bay; 46°51.25' N, 151°48.14' E; Aug 10, 1995; N. Minakawa, P. Oberg.
SI-95-PO-43: Small coastal waterfall and stream that flows into Kitoboyknaya Bay; 46°51.40' N, 151°48.37' E; Aug 10, 1995; N. Minakawa, P. Oberg.
SI-95-PO-44: Small coastal stream that flows into Kitoboyknaya Bay; 46°51.25' N, 151°48.14' E; Aug 10, 1995; P. Oberg.
SI-95-PO-45, 46: Stream near Kostochko Meteorological station, Kitoboyknaya Bay; 46°51' N, 151°47' E; Aug 11, 1995; N. Minakawa, P. Oberg.
SI-95-PO-66: Stream that flows into Malaya Bay; 47°05.38' N, 152°08.15' E; Aug 18, 1995; N. Minakawa, P. Oberg.
SI-95-PO-68: Stream about 200 m upstream from mouth, Malaya Bay; 47°05.24' N, 152°08.20' E; Aug 18, 1995; P. Oberg.
SI-95-PO-69: Stream about 600 m upstream from mouth, Malaya Bay; 47°05.16' N, 152°08.32' E; Aug 18, 1995; P. Oberg.
SI-95-PO-70: Stream that flows into Malaya Bay; 47°05.60' N, 152°08.29' E; Aug 18, 1995; N. Minakawa.
SI-95-PO-80, 81: River that flows into Srednaya Bay; 46°59.01' N, 152°01.30' E; Aug 22, 1995; N. Minakawa, P. Oberg.
SI-95-PO-82: Stream that flows into Srednaya Bay; 46°58.69' N, 152°00.77' E; Aug 22, 1995; N. Minakawa, P. Oberg.
SI-95-VAT-24, 25: Waterfall in Kitoboyknaya Bay; 46°51.24' N, 151°47.83' E; Aug 10, 1995; V. A. Kostenko.
SI-95-VAT-26, 27: Waterfall in Kitoboyknaya Bay; 46°51.24' N, 151°47.83' E; Aug 10, 1995; V. A. Teslenko.
SI-95-VAT-29, 30: Stream near Kostochko Meteorological station, Kitoboyknaya Bay; 46°51' N, 151°47' E; Aug 11, 1995; V. A. Teslenko.
SI-95-VAT-40: Stream that flows into Malaya Bay; 47°05.38' N, 152°08.15' E; Aug 18, 1995; V. A. Teslenko.
SI-95-VAT-41: Small stream about 2 km inland from Malaya Bay; 47°05.38' N, 152°08.15' E; Aug 18, 1995; V. A. Teslenko.
SI-95-VAT-42, 43: Small stream that flows into Malaya Bay; 47°05.60' N, 152°08.22' E; Aug 18, 1995; V. A. Teslenko.
SI-95-VAT-48, 49: Small stream near old house, Srednaya Bay; 46°58.94' N, 152°01.39' E; Aug 22, 1995; V. A. Teslenko.
SI-95-VAT-50, 51: Stream about 2 km west of Cape Cheornyi, Srednaya Bay; Aug 22, 1995; V. A. Teslenko.
SI-99-DJB-69: Inland of Dushnaya Bay, about 1 km south of Cape Neprochka; 47°04.46' N, 152°11.60' E; Aug 9, 1999; D. J. Bennett.
SI-99-DJB-71: Plain near bluffs overlooking coast of Dushnaya Bay; 47°04.49' N, 152°11.52' E; Aug 9, 1999; D. J. Bennett.
SI-99-KLK-41, 42: Stream that flows from Oleniy Range into Dushnaya Bay; 47°04.24' N, 152°11.00' E; Aug 9, 1999; N. Minakawa, K. L. Kurowski.
SI-99-NM-08: Ponds and swamps by road, inland from Broutona Bay, Sredniy Isthmus; 47°06.08' N, 152°14.24' E; Aug 8,

1999; N. Minakawa.

SI-99-VAT-34: Broutona Bay, Peresheek Sredniy, small swamps on the left side of the road from Broutona Bay to Paletz Cape; about 2.5 km from the southeastern part of the bay; 47°06.29' N, 152°13.85' E; Aug 8, 1999; V. A. Teslenko.

SI-99-VAT-40: River that flows from Oleniy Range into Dushnaya Bay; 47°04.22' N, 152°11.08' E; Aug 9, 1999; V. A. Teslenko.

SI-00-ATR-73: North end of island, inland from northeast part of Broutona Bay, near roadside in disturbed flat area backed by hillside with sasa and birch trees; 47°07.82' N, 152°16.40' E; Aug 2, 2000; T. R. Anderson.

URUP

UR-95-BKU-73A: Environs of Vstrechnyi River, Negodnaya Bay; 45°57.74' N, 150°10.54' E; Aug 29, 1995; B. K. Urbain.

UR-95-EMS-05: Small marshland north of Tokotan Lake, Otkrytyi Bay; 45°51.20' N, 149°47.30' E; Aug 4, 1995; V. V. Bogatov, E. M. Sayenko.

UR-95-MO-03, 05: Stream near Shabalina River, Otkrytyi Bay; 45°51.04' N, 149°46.12' E; Aug 4, 1995; M. Ohara.

UR-95-MO-08: Straya River, Novo-Kurilskaya Bay; 46°12.84' N, 150°18.69' E; Aug 8, 1995; M. Ohara.

UR-95-MO-60, 61: Rybnaya River, Smuglyi Bay; 46°01.02' N, 149°58.42' E; Aug 25, 1995; M. Ohara.

UR-95-MO-67: Lopukhovaya River, Barkhatny Bay; 45°48.26' N, 149°54.59' E; Aug 28, 1995; M. Ohara.

UR-95-MO-68: Pond in environs of Lopukhovaya River, Barkhatny Bay; 45°47.79' N, 149°54.01' E; Aug 28, 1995; M. Ohara.

UR-95-MO-72: Bog in environs of Vstrechnyi River, Negodnaya Bay; 45°57.47' N, 150°10.41' E; Aug 29, 1995; M. Ohara.

UR-95-PO-09: Tokotan Lake, Otkrytyi Bay; 45°51.49' N, 149°46.67' E; Aug 4, 1995; N. Minakawa, P. Oberg.

UR-95-PO-10: Stream about 2 km southwest from Tokotan Lake, Otkrytyi Bay; 45°51.37' N, 149°46.66' E; Aug 4, 1995; N. Minakawa, P. Oberg.

UR-95-PO-11, 12, 13: Stream about 3 km southwest from Tokotan Lake, Otkrytyi Bay; 45°51.04' N, 149°46.12' E; Aug 4, 1995; N. Minakawa, P. Oberg.

UR-95-PO-14, 15: Stream that flows into Otkrytyi Bay; 45°52.22' N, 149°47.79' E; Aug 5, 1995; N. Minakawa.

UR-95-PO-18, 19: Vesyolaya River, Natalie Bay; 46°05.18' N, 150°08.44' E; Aug 6, 1995; N. Minakawa, P. Oberg.

UR-95-PO-21, 22: Coastal waterfall and stream in Natalie Bay; 46°05.35' N, 150°06.95' E; Aug 6, 1995; N. Minakawa, P. Oberg.

UR-95-PO-23, 24: Coastal stream about 3 km south of Vesyolaya River, Natalie Bay; 46°05' N, 150°06' E; Aug 6, 1995; N. Minakawa.

UR-95-PO-25: Obzhitaya River, Natalie Bay; 46°05.52' N, 150°10.07' E; Aug 7, 1995; N. Minakawa, P. Oberg.

UR-95-PO-31: Straya River, Novo-Kurilskaya Bay; 46°12.41' N, 150°19.05' E; Aug 8, 1995; N. Minakawa, P. Oberg.

UR-95-PO-33, 34, 36, 37: Straya River, Novo-Kurilskaya Bay; 46°12.35' N, 150°18.81' E; Aug 8, 1995; N. Minakawa, P. Oberg.

UR-95-PO-88: Marsh in environs of Rybnaya River, Smuglyi Bay; 46°01.46' N, 149°59.02' E; Aug 24, 1995; N. Minakawa, P. Oberg.

UR-95-PO-89: Side pools in environs of Rybnaya River, Smuglyi Bay; 46°01.46' N, 149°59.02' E; Aug 24, 1995; N. Minakawa, P. Oberg.

UR-95-PO-93, 94: Tributary of Rybnaya River, Smuglyi Bay; 46°01.06' N, 149°59.64' E; Aug 24, 1995; N. Minakawa.

UR-95-PO-95, 96: Tributary of Rybnaya River, Smuglyi Bay; 46°01.02' N, 149°58.42' E; Aug 24, 1995; N. Minakawa.

UR-95-PO-99: Stream that flows into Katayeva Bay; 45°34.82' N, 149°26.25' E; Aug 26, 1995; P. Oberg.

UR-95-PO-100: Stream that flows into Katayeva Bay; 45°34.73' N, 149°26.21' E; Aug 26, 1995; P. Oberg.

UR-95-PO-102: Lake, about 3 km inland from Katayeva Bay; 45°36.25' N, 149°29.24' E; Aug 26, 1995; N. Minakawa.

UR-95-PO-104, 105: Stream that flows into Katayeva Bay; 45°34.82' N, 149°26.25' E; Aug 26, 1995; N. Minakawa.

UR-95-PO-106, 107: Tributary of Lopukhovaya River, Barkhatny Bay; 45°47.85' N, 149°54.07' E; Aug 28, 1995; N. Minakawa, P. Oberg.

UR-95-PO-108: Near ponds in environs of Lopukhovaya River, Barkhatny Bay; 45°47.78' N, 149°54.04' E; Aug 28, 1995; P. Oberg.

UR-95-PO-109, 110, 111: Near ponds in environs of Lopukhovaya River, Barkhatny Bay; 45°47.79' N, 149°54.01' E; Aug 28, 1995; P. Oberg, N. Minakawa.

UR-95-PO-112: Tributary of Lopukhovaya River, Barkhatny Bay; 45°47.85' N, 149°54.07' E; Aug 28, 1995; N. Minakawa.

UR-95-PO-113, 114: Lake in environs of Vstrechnyi River, Negodnaya Bay; 45°57.85' N, 150°10.80' E; Aug 29, 1995; P. Oberg, D.E. Hoekstra.

UR-95-PO-115: Vstrechnyi River, Negodnaya Bay; 45°57.60' N, 150°10.43' E; Aug 29, 1995; P. Oberg, D.E. Hoekstra.

UR-95-PO-116, 117: Near ponds in environs of Vstrechnyi River, Negodnaya Bay; 45°57.76' N, 150°10.82' E; Aug 29, 1995; P. Oberg, N. Minakawa.

UR-95-PO-118: Mouth of stream in Negodnaya Bay; 45°56.64' N, 150°10.56' E; Aug 29, 1995; P. Oberg, N. Minakawa.

UR-95-VR-32: Near shore of Katayeva Bay; 45°34.89' N, 149°26.24' E; Aug 26, 1995; V. Roth.

UR-95-VAT-08: Tokotan Lake, Otkrytyi Bay; 45°51.49' N, 149°47.67' E; Aug 4, 1995; V. A. Teslenko.

UR-95-VAT-09: Stream about 2 km southwest from Tokotan Lake, Otkrytyi Bay; 45°51.37' N, 149°46.66' E; Aug 4, 1995; V. A. Teslenko.

UR-95-VAT-10, 11: Stream about 3 km southwest from Tokotan Lak, Otkrytyi Bay; 45°51.04' N, 149°46.12' E; Aug 4, 1995; V. A. Teslenko.

UR-95-VAT-13: Coastal waterfall in Otkrytyi Bay; 45°51.22' N, 149°47.79' E; Aug 5, 1995; V. A. Teslenko.

UR-95-VAT-14: Lake southwest of Tokotan Lake, Otkrytyi Bay; 45°51.03' N, 149°47.71' E; Aug 5, 1995; E.M. Sayenko.

UR-95-VAT-15: Vesolaya River about 2 km from mouth, Natalie Bay; 46°05.19' N, 150°08.43' E; Aug 6, 1995; V. A.

Teslenko.

UR-95-VAT-16: Waterfall about 4 km east of Vesolaya River, Natalie Bay; 46°05.35' N, 150°06.95' E; Aug 6, 1995; V. A. Teslenko.

UR-95-VAT-18, 19: 4 small streams along coast within 4 km east from Vesolaya River, Natalie Bay; 46°05.35' N, 150°06.95' E; Aug 6, 1995; V. A. Teslenko.

UR-95-VAT-20: Obzhitaya River about 2 km from mouth, Natalie Bay; 46°05.85' N, 150°09.91' E; Aug 7, 1995; V. A. Teslenko.

UR-95-VAT-22: Small tributary within bog near mouth of Straya River, Novo-Kurilskaya Bay; 46°12.41' N, 150°19.05' E; Aug 8, 1995; V. A. Teslenko.

UR-95-VAT-23: Straya River, Novo-Kurilskaya Bay; 46°12.35' N, 150°18.81' E; Aug 8, 1995; V. A. Teslenko.

UR-95-VAT-52, 53: Rybnaya River, about 2.5 km from mouth, Smuglyi Bay; 46°01.46' N, 149°59.02' E; Aug 24, 1995; V. A. Teslenko.

UR-95-VAT-54, 55: Lake near Osma River about 3 km inland from Katayeva Bay; 45°36.28' N, 149°29.20' E; Aug 26, 1995; V. A. Teslenko.

UR-95-VAT-56: Lake near PVO Station about 3 km Inland from Katayeva Bay; 45°36.28' N, 149°29.20' E; Aug 26, 1995; V. A. Teslenko.

UR-95-VAT-57, 58: Lopukhovaya River about 4.5 km from mouth, Barkhatny Bay; 45°48.55' N, 149°53.55' E; Aug 28, 1995; V. A. Teslenko.

UR-95-VAT-59: Lopukhovaya River about 4.5 km from mouth, Barkhatny Bay; 45°48.55' N, 149°53.55' E; Aug 28, 1995; A. Balanov.

UR-95-VAT-60, 61: Southern tributary of Lopukhovaya River, Barkhatny Bay; 45°47.78' N, 149°54.04' E; Aug 28, 1995; V. A. Teslenko, N. Minakawa, P. Oberg.

UR-95-VAT-63: Small Lake north of Vstrechnyi River, Negodnaya Bay; 45°57.55' N, 150°10.33' E; Aug 29, 1995; V. A. Teslenko.

UR-95-VAT-65: Lake about 1 km northeast of Vstrechnyi River, Negodnaya Bay; 45°57.84' N, 150°10.63' E; Aug 29, 1995; V. V. Bogatov, E. M. Sayenko.

UR-95-VAT-66: Stream near the 'YOSHI MARU' shipwreck, Negodnaya Bay; 45°56.60' N, 150°10.44' E; Aug 29, 1995; V. A. Teslenko., N. Minakawa, P. Oberg.

UR-96-BKU-80: Environs of Kama River mouth, Tetyaeva Bay; 45°38.85' N, 149°27.97' E; Aug 21, 1996; B. K. Urbain.

UR-96-NM-22: Ukromnaya River about 1.5 km from mouth, Ukromnaya Bay; 45°35.57' N, 149°31.28' E; Aug 20, 1996; N. Minakawa.

UR-96-NM-24: Tributary of Ukromnaya River, Ukromnaya Bay; 45°35.56' N, 149°31.26' E; Aug 20, 1996; N. Minakawa.

UR-96-NM-25: Waterfall at west side of Chrenoburka Bay; 45°35.23' N, 149°32.56' E; Aug 20, 1996; N. Minakawa.

UR-96-NM-26: Tributary of Kama River, about 1 km from mouth, Tetyayeva Bay; 45°38.43' N, 149°28.20' E; Aug 21, 1996; N. Minakawa.

UR-96-PO-60: Stream that flows into Ukromnaya Bay, about halfway between Ukromnaya River and Kuzinoty Point; 45°34.90' N, 149°31.85' E; Aug 20, 1996; P. Oberg.

UR-96-PO-62: Stream that flows into Ukamnaya Bay, between Ukromnaya River and Kuzinoty Point, just north of stream in UR-96-PO-60; 45°34.95' N, 149°32.04' E; Aug 20, 1996; P. Oberg.

UR-96-PO-66, 67: Ponds in wetland in environs (300 m south of) of Kama River, about 3 km inland from Tetyaeva Bay; 45°38.62' N, 149°28.72' E; Aug 21, 1996; P. Oberg, N. Minakawa.

UR-96-VAT-41, 42: Ukromnaya River, main river and tributary 2.5 km from river mouth, Ukromnaya Bay; 45°35.21' N, 149°32.14' E; Aug 20, 1996; V. A. Teslenko.

UR-96-VAT-43: Lake about 100 m inland from Bajdorocknaya Bay; Aug 20, 1996; V. A. Teslenko.

UR-96-VAT-44, 45: Small lakes in environs of Kama River, 3 km from mouth, Tetyaeva Bay; 45°38.58' N, 149°28.75' E; Aug 21, 1996; V. A. Teslenko.

UR-96-VAT-46: Tributary of Kama River,that flows from the hill near lake on the left side, Tetyaeva Bay; 45°38.43' N, 149°28.20' E; Aug 21, 1996; V. A. Teslenko.

UR-00-ATR-85, 86: Inland from Aleutka Bay, lowland near river surrounded by small hills; 45°56.10' N, 150°09.70' E; Aug 7, 2000; T. R. Anderson.

UR-00-DJB-81: Inland of Aleutka Bay, river valley about1/3 mile inland from coast, broad plain adjacent to river; 45°56.18' N, 150°09.39' E; Aug 7, 2000; D. J. Bennett.

ITURUP

IT-94-RG-01: Lake Natasha, Dobroye Nachalo Bay; 44°46'06"N, 147°11'18"E; Aug 12, 1994; R. I. Gara, N. Minakawa.

IT-94-RG-02: Yasnyi Creek, about 700 m upstream from mouth, Dobroye Nachalo Bay; Aug 13, 1994; R. I. Gara, N. Minakawa.

IT-94-RG-03: Peschanyi Creek (near Yasnyi Creek), about 60 m upstream from mouth, Dobroye Nachalo Bay; 44°68.4 N, 147°18.8 E; Aug 13, 1994; R. I. Gara, N. Minakawa.

IT-94-RG-04: Godbaza River, about 1km from mouth, Dobroye Nachalo Bay; Aug 14, 1994; R. I. Gara, N. Minakawa.IT-94-RG-05: Stream that flows into Konservnaya Bay, near Zapravochyi Waterfall; 45°19.92' N, 147°59.91'; Aug 16, 1994; R. I. Gara, N. Minakawa.

IT-94-RG-06: Zapravochyi Waterfall, Konservnaya Bay; 45°19.81' N, 147°59.83' E; Aug 16, 1994; R. I. Gara, N. Minakawa.

IT-94-RG-07: Lake Lebedinoye near Kurilsk; Aug 17, 1994; R. I. Gara, N. Minakawa.

IT-94-RG-08: Kitovaya River near Kurilsk; 45°15'30" N, 147°52'06" E; Aug 17, 1994; R. I. Gara, N. Minakawa.

IT-94-RG-09: Reidovoye Lake near Reidovo; 45°16.00' N, 148°01.30' E; Aug 18, 1994; R. I. Gara, N. Minakawa.

IT-94-RG-11: Porozhistaya River, Tornaya Bay in Prostor Sound; Aug 19, 1994; R. I. Gara, N. Minakawa.
IT-94-RG-12: Lake Sopochnoye, Tornaya Bay in Prostor Sound; Aug 19, 1994; N. Minakawa, R. I. Gara.
IT-94-RG-13: Slavnaya River, about 1 km upriver from mouth, Slavnaya Bay in Prostor Sound; Aug 20, 1994; N. Minakawa, R. I. Gara.
IT-94-RG-14: Kumushka River by Aktivnyi settlement, Slavnaya Bay in Prostor Sound; 45°28.90' N, 148°39.07' E; Aug 21, 1994; N. Minakawa, R. I. Gara.
IT-94-RG-15: Pioner River, about 200 m from mouth, Kuibyshevskii Bay, 45°04'30" N, 147°38'00" E; Aug 22, 1994; N. Minakawa, R. I. Gara.
IT-94-TWP-02: Tichaya River, between 20-300 m from mouth, Dobroye Nachalo Bay; 44°43'18" N, 147°11'36" E; Aug 13, 1994; T. W. Pietsch, W. A. Palsson, B. K. Urbain, J.A. Lopez.
IT-94-VAT-33, 34: Yasnyi Creek, about 1.5 km from mouth, Dobroye Nachalo Bay; Aug 13, 1994; V. A. Teslenko.
IT-94-VAT-35: Godbaza River, at 50 and 200 m from mouth, Dobroye Nachalo Bay; Aug 14, 1994; V. A. Teslenko.
IT-94-VAT-36, 37: Godbaza River, about 800 m from mouth, Dobroye Nachalo Bay; Aug 14, 1994; V. A. Teslenko.
IT-94-VAT-38: Stream that feeds into Konservnaya Bay, near Zapravochyi Waterfall, eastern Chirip Peninsula; 45°19.92' N, 147°59.91'; Aug 16, 1994; V. A. Teslenko.
IT-94-VAT-39: Springs near, Zapravochyi Waterfall, Konservnaya Bay; 45°20.01' N, 147°59.91' E; Aug 16, 1994; V. A. Teslenko.
IT-94-VAT-40: Zapravochyi Waterfall, Konservnaya Bay; 45°20.01' N, 147°59.91' E; Aug 16, 1994; V. A. Teslenko.
IT-94-VAT-41: Lake Lebedinoye near Kurilsk; Aug 17, 1994; V. A. Teslenko.
IT-94-VAT-42: Kitovaya River, between 1.5 and 2 km from mouth; Aug 17, 1994; V. A. Teslenko.
IT-94-VAT-43, 44: Reidovoye Lake near Reidovo; Aug 18, 1994; V. A. Teslenko.
IT-94-VAT-45, 46: Porozhistaya River, Tornaya Bay in Prostor Sound; Aug 19, 1994; V. A. Teslenko.
IT-94-VAT-47: Lake Sopochnoye, Tornaya Bay in Prostor Sound; Aug 19, 1994; V. A. Teslenko.
IT-94-VAT-49: Slavnaya River, about 2 km from mouth, Slavnaya Bay in Prostor Sound; Aug 20, 1994; V. A. Teslenko.
IT-94-VAT-50, 51: Kumushka River by Aktivnyi settlement, Slavnaya Bay in Prostor Sound; 45°28.90' N, 148°39.07' E; Aug 21, 1994; V. A. Teslenko.
IT-94-VAT-53: Pioner River, Kuibyshevskii Bay; Aug 22, 1994; V.V. Bogatov.
IT-95-PO-06: First stream from north of Nezhnyi River, near Kitovyi Village; 45°17.63' N, 147°52.55' E; Aug 3, 1995; N. Minakawa, P. Oberg.
IT-95-PO-07: Stream, north of Kitovyi Village, environs of Nezhnyi River; 45°16.71' N, 147°52.29' E; Aug 3, 1995; N. Minakawa, P. Oberg.
IT-95-PO-08: Stream, north of Kitovyi Village, environs of Nezhnyi River; 45°16.71' N, 147°52.30' E; Aug 3, 1995; N. Minakawa, P. Oberg.
IT-95-PO-119, 120: Zapravochyi Waterfall, Konservnaya Bay; 45°20.01' N, 147°59.91' E; Aug 31, 1995; P. Oberg, N. Minakawa, D.E. Hoekstra.
IT-95-PO-121: Stream that feeds into Konservnaya Bay, near Zapravochyi Waterfall; 45°19.92' N, 147°59.91'; Aug 31, 1995; N. Minakawa.
IT-95-VAT-04: First stream that flows into Nezhnyi River, about 4 km north of Kitovyi Village, environs of Nezhnaya Hill; 45°17.63' N, 147°52.55' E; Aug 3, 1995; V. A. Teslenko.
IT-95-VAT-05, 06, 07: Nezhnyi River about 4 km north of Kitovyi Village; 45°16.71' N, 147°52.29' E; Aug 3, 1995; V. A. Teslenko.
IT-95-VAT-67, 68: Zapravochyi Waterfall, Konservnaya Bay; 45°20.01' N, 147°59.91' E; Aug 31, 1995; V. A. Teslenko.
IT-96-BKU-86: Inland coastal margin of Dobroye Nachalo Bay, along foot trail; 44°45.93' N, 147°10.91' E; Aug 22, 1996; B. K. Urbain.
IT-96-BKU-87: On ship, Akademic Oparin, anchored in Dobroye Nachalo Bay; 44°45.42' N, 147°10.67' E; Aug 22, 1996; B. K. Urbain.
IT-96-MO-52: On ship, Akademic Oparin, anchored in Dobroye Nachalo Bay; 44°44.61' N, 147°10.50' E; Aug 22, 1996; M. Ohara.
IT-96-NM-19: Stream that flows into Konservnaya Bay, near Zapravochyi Waterfall; 45°19.94' N, 147°59.76' E; Aug 18, 1996; N. Minakawa.
IT-96-NM-29: Dobroye Lake, Dobroye Nachalo Bay; 44°44.23' N, 147°13.13' E; Aug 23, 1996; N. Minakawa.
IT-96-PO-58: Stream that feeds into Konservnaya Bay, near Zapravochyi Waterfall; 45°19.79' N, 147°59.75' E; Aug 19, 1996; P. Oberg, N. Minakawa.
IT-96-PO-59: Stream that feeds into Konservnaya Bay, near Zapravochyi Waterfall; 45°19.94' N, 147°59.76' E; Aug 19, 1996; N. Minakawa.
IT-96-PO-69, 75: Lake Natasha, about 1 km Dobroye Nachalo Bay; 44°46.21' N, 147°11.40' E; Aug 22, 1996; P. Oberg, N. Minakawa.
IT-96-VAT-47: Lake Natasha, Dobroye Nachalo Bay; 44°46.21' N, 147°11.40' E; Aug 22, 1996; V. A. Teslenko.
IT-96-VAT-48: Lake Natasha, Dobroye Nachalo Bay; 44°46.27' N, 147°11.40' E; Aug 22, 1996; V. A. Teslenko.
IT-96-VAT-49: Dobroye Lake, Dobroye Nachalo Bay; 44°44.23' N, 147°13.13' E; Aug 23, 1996; V. A. Teslenko.
IT-96-VAT-50: Dobroye Lake, Dobroye Nachalo Bay; 44°44.23' N, 147°13.13' E; Aug 23, 1996; V. A. Teslenko.
IT-97-BKU-14: Stream about 4 km east of Kitovyi, along side road (off main road) that leads down to abandoned fish hatchery along Podoshevka River; 45°15.90' N, 147°55.90' E; Jul 29, 1997; B. K. Urbain.
IT-97-BKU-19: Coastal margin of Konservnaya Bay; 45°20.04' N, 147°59.84' E; Jul 30, 1997; B. K. Urbain.
IT-97-NM-06: Podoshevka River about 4 km east of Kitovyi, along side road (off main road) that leads down to abandoned fish hatchery; 45°15.87' N, 147°55.71' E; Jul 29, 1997; N. Minakawa.

IT-97-NM-12: Podoshevka River about 4 km east of Kitovyi, along side road (off main road) that leads down to abandoned fish hatchery; 45°15.87' N, 147°55.89' E; Jul 29, 1997; N. Minakawa.
IT-97-NM-13: Stream that flows into Konservnaya Bay; 45°20.04' N, 147°59.80' E; Jul 30, 1997; N. Minakawa.
IT-97-NM-19: Zapravochyi Waterfall, Konservnaya Bay; 45°19.84' N, 147°59.73' E; Jul 30, 1997; N. Minakawa.
IT-97-NM-20: Stream that flows into Konservnaya Bay; 45°20.04' N, 147°59.80' E; Jul 31, 1997; N. Minakawa.
IT-97-NM-21: On ship, Professor Bogorov, anchored in Konservnaya Bay, near Zapravochyi Waterfall; 45°19.81' N, 147°59.83' E; Jul 31, 1997; N. Minakawa.
IT-97-NM-84: Stream that flows into Konservnaya Bay, near Zapravochyi Waterfall; 45°20.04' N, 147°59.80' E; Aug 22, 1997; N. Minakawa.
IT-97-NM-85: Zapravochyi Waterfall, Konservnaya Bay; 45°19.85' N, 147°59.68' E; Aug 22, 1997; N. Minakawa.
IT-97-TIR-05, 06: Podoshevka River, about 4 km east of Kitovyi by road, near abandoned fish hatchery, 0.5 km upriver from road bridge; 45°15.82' N, 147°55.69' E; Jul 29, 1997; T. I. Ritchie.
IT-97-VAT-06: Podoshevka River about 4 km east of Kitovyi by road, near abandoned fish hatchery, about 1-1.5 km upstream from hatchery; 45°15.87' N, 147°55.71' E; Jul 29, 1997; V. A. Teslenko.
IT-97-VAT-08: Near Zapravochnyi Waterfall, coastal margin of Konservnaya Bay; Jul 30, 1997; V. A. Teslenko.
IT-98-BKU-26: North shore of Lake Sredney, northern end of Kasatka Bay; 44°58.83' N, 147°44.14' E; Jul 31, 1998; B. K. Urbain.
IT-98-BKU-60: Stream at northern end of sandy coastline, Medvezhya Bay; 45°27.50' N, 148°49.96' E; Aug 5, 1998; B. K. Urbain.
IT-98-DJB-32, 34: Near Lake Sredney, northern end of Kasatka Bay; 44°58.53' N, 147°44.38' E; Jul 31, 1998; D. J. Bennett.
IT-98-DJB-40, 41, 42: Near Kasatka Lake, northeastern part of Kasatka Bay; 45°00.45' N, 147°43.68' E; Aug 1, 1998; D. J. Bennett.
IT-98-DJB-48: Coastal margin, Sernozavoskaya Bay; 44°58.10' N, 147°53.71' E; Aug 2, 1998; D. J. Bennett.
IT-98-DJB-63: Near mouth of Medyezh'ya River, Medyezhya Bay; 45°26.70' N, 148°49.68' E; Aug 5, 1998; D. J. Bennett.
IT-98-DJB-69: Coastal stream that flows into Medvezhya Bay; 45°25.56' N, 148°49.87' E; Aug 5, 1998; D. J. Bennett.
IT-98-DJB-71: Bog, Slavnaya Bay; 45°29.47' N, 148°37.13' E; Aug 6, 1998; D. J. Bennett.
IT-98-LJW-11, 12: Coastal stream near Cape Trikhpaly and Usach River; 44°28.65' N, 146°59.92' E; Jul 29, 1998; L. J. Weis, N. Minakawa.
IT-98-LJW-13: Usach River, near Cape Trikhpaly; 44°28.84' N, 147°00.11' E; Jul 29, 1998; L. J. Weis, N. Minakawa.
IT-98-LJW-15: Khvoinaya River near Burevestnik Village; 44°55.87' N, 147°36.33' E; Jul 30, 1998; L. J. Weis, N. Minakawa.
IT-98-LJW-16: Sredney Lake, eastern Kasatka Bay; 44°58.89' N, 147°44.08' E; Jul 31, 1998; L. J. Weis.
IT-98-LJW-18: Stream that flows into eastern Kasatka Bay; 45°00.10' N, 147°43.71' E; Aug 1, 1998; L. J. Weis.
IT-98-LJW-19: Marsh, eastern Kasatka Bay; 45°00.67' N, 147°43.35' E; Aug 1, 1998; L. J. Weis.
IT-98-LJW-20: Blagodamyo Lake, east side of Kasatka Bay; 45°01.06' N, 147°43.29' E; Aug 1, 1998; L. J. Weis.
IT-98-LJW-21: Stream that flows into northeastern Kasatka Bay; 45°01.06' N, 147°43.29' E; Aug 1, 1998; L. J. Weis.
IT-98-LJW-22: Stream that flows into Sernozavoskaya Bay; 44°58.06' N, 147°53.77' E; Aug 2, 1998; L. J. Weis.
IT-98-LJW-23: Stream that flows into Sernozavoskaya Bay; 44°58.16' N, 147°53.75' E; Aug 2, 1998; L. J. Weis.
IT-98-LJW-24: Stream that flows into Zorkaya Bay; 45°16.47' N, 148°30.19' E; Aug 4, 1998; L. J. Weis.
IT-98-LJW-25: Stream that flows into Zorkaya Bay; 45°16.82' N, 148°30.42' E; Aug 4, 1998; L. J. Weis.
IT-98-LJW-27, 28: Medvezhya River, Medvezhya Bay; 45°25.96' N, 148°49.63' E; Aug 5, 1998; L. J. Weis.
IT-98-LJW-29, 30: Medvezhya River, Medvezhya Bay; 45°26.19' N, 148°49.64' E; Aug 5, 1998; L. J. Weis.
IT-98-LJW-31: Medvezhya River, Medvezhya Bay; 45°25.56' N, 148°49.87' E; Aug 5, 1998; L. J. Weis.
IT-98-LJW-32, 33: Kumushka River by Aktivnyi settlement / hatchery station, Slavnaya Bay; 45°28.90' N, 148°39.07' E; Aug 6, 1998; L. J. Weis.
IT-98-LJW-34, 35: Stream that feeds into Konservnaya Bay, near Zapravochyi Waterfall; 45°19.68' N, 147°59.89' E; Aug 7, 1998; L. J. Weis.
IT-98-LJW-36: Springs near, Zapravochyi Waterfall, Konservnaya Bay; 45°19.77' N, 147°59.74' E; Aug 7, 1998; L. J. Weis.
IT-98-LJW-37: Lesozavodskoye Lake, Dobroye Nachalo Bay; 44°46.07' N, 147°11.20' E; Aug 10, 1998; L. J. Weis.
IT-98-NM-05: Tire truck puddles, northern end of Kasatka Bay; 44°58.77' N, 147°44.20' E; Jul 31, 1998; N. Minakawa.
IT-98-NM-06: Sredney Lake, eastern Kasatka Bay; 44°58.40' N, 147°44.59' E; Jul 31, 1998; N. Minakawa.
IT-98-NM-10: Kasatka Lake, northeastern Kasatka Bay; 45°00.72' N, 147°43.30' E; Aug 1, 1998; N. Minakawa.
IT-98-NM-11: Blagodamyo Lake, northeastern Kasatka Bay; 45°01.36' N, 147°43.43' E; Aug 1, 1998; N. Minakawa.
IT-98-NM-13: Blagodamyo Lake, northeastern Kasatka Bay; 45°01.78' N, 147°43.56' E; Aug 1, 1998; N. Minakawa.
IT-98-NM-14: Blagodamyo Lake, northeastern Kasatka Bay; 45°02.15' N, 147°43.81' E; Aug 1, 1998; N. Minakawa.
IT-98-NM-15: Stream between Sredney Lake and Blagodamyo Lake, northeastern Kasatka Bay; 45°01.06' N, 147°43.29' E; Aug 1, 1998; N. Minakawa.
IT-98-NM-16: Stream that flows into Sernozavoskaya Bay; 44°58.05' N, 147°53.86' E; Aug 2, 1998; N. Minakawa.
IT-98-NM-19: Zorky River, Zorkaya Bay; 45°16.38' N, 148°30.12' E; Aug 4, 1998; N. Minakawa.
IT-98-NM-20: Lugovoy River, Zorkaya Bay; 45°16.93' N, 148°30.42' E; Aug 4, 1998; N. Minakawa.
IT-98-NM-23, 37: Stream that flows into Medyezhya Bay, north of Medyezhya River; 45°27.88' N, 148°50.30' E; Aug 5, 1998; N. Minakawa.
IT-98-NM-24: Stream that flows into Dozorny Bay; 44°32.63' N, 146°56.93' E; Aug 10, 1998; N. Minakawa.
IT-98-TIA-31: Unnamed stream inland from Medvezh'ya Bay; 45°25.53' N; 148°49.76' E; Aug 8, 1998; T. I. Arefina.
IT-98-VAT-09, 10: Stream with waterfall 1.5 km north from Usach River, near cape Triokhpaly; 44°28.14' N, 1; 46°59.70' E; Jul 29, 1998; V. A. Teslenko.

IT-98-VAT-11, 12: Khvoinaya River about 1 km from the bridge; 44°55.89' N, 147°36.01' E; Jul 30, 1998; V. A. Teslenko.
IT-98-VAT-13: Ponds near Kasatka River mouth, northern end of Kasatka Bay; 44°58.42' N, 147°44.55' E; Jul 31, 1998; V. A. Teslenko.
IT-98-VAT-14: Tichiy Creek that flows into Sredney Lake, northern end of Kasatka Bay; 44°58.39' N, 147°44.59' E; Jul 31, 1998; V. A. Teslenko.
IT-98-VAT-15: Northeast part of Sredney Lake, northern end of Kasatka Bay; 44°58.40' N, 147°44.59' E; Jul 31, 1998; V. A. Teslenko.
IT-98-VAT-16, 17: Blagodamoyo River, about 1 km from mouth, near Yoryachie Kluchi settlement, northeastern Kasatka Bay; 45°02.49' N, 147°45.58' E; Aug 1, 1998; V. A. Teslenko.
IT-98-VAT-18: Southeastern part of Blagodamoyo Lake, northeastern Kasatka Bay; Aug 1, 1998; V. A. Teslenko.
IT-98-VAT-21: Otkoshaya River, about 1 km from mouth, between Cape Kanonerka and Cape Yevgeniya; 45°10.00' N, 148°12.76' E; Aug 3, 1998; V. A. Teslenko.
IT-98-VAT-22, 23: Zorky River, 2 km from mouth, environs of Sentyabrskiy, Zorkaya Bay; 45°16.29' N, 148°28.90' E; Aug 4, 1998; V. A. Teslenko.
IT-98-VAT-24: Lugovoy River, below the waterfall, environs of Sentyabrskiy, Zorkaya Bay; l; Aug 4, 1998; V. A. Teslenko.
IT-98-VAT-26, 27: Stream west side of Medyezhya Bay; 45°25.53' N, 148°49.76' E; Aug 5, 1998; V. A. Teslenko.
IT-98-VAT-28: Small stream between the stream on the west of Medyezhya Bay and Medyezh'ya River; Aug 5, 1998; S. Y. Storozhenko.
IT-98-VAT-29, 30: Kumushka River by Aktivnyi settlement / hatchery station, Slavnaya Bay; 45°28.90' N, 148°39.07' E; Aug 6, 1998; V. A. Teslenko.
IT-98-VAT-31, 32: Zapravochyi Waterfall, Konservnaya Bay, 45°19.85' N, 147°59.68' E; Aug 7, 1998; V. A. Teslenko.
IT-98-VAT-33, 34, 35: Small waterfall next to Zapravochyi Waterfall, Konservnaya Bay; 45°19.77' N, 147°59.74' E; Aug 7, 1998; V. A. Teslenko.
IT-98-VAT-36: Lake Natasha, Dobroye Nachalo Bay, environs of Lesozavodskiy; 44°46.21' N, 147°11.40' E; Aug 10, 1998; V. A. Teslenko.
IT-98-VAT-37, 38: Stryi Creek, Dozorny Bay; 44°32.57' N, 1; 46°57.09' E; Aug 10, 1998; V. A. Teslenko.
IT-99-DJB-93: Coastal margin, northern end of Dobroye Nachalo Bay, near military building; 44°46.01' N, 147°11.58' E; Aug 14, 1999; D. J. Bennett.
IT-99-DJB-97: Inland from beach along road up to Tichaya River (1.41 km from beach, northern end of Dobroye Nachalo Bay; 44°43.38' N, 147°12.77' E; Aug 15, 1999; D. J. Bennett.
IT-99-DJB-99: Inland from beach, along start of road to Lake, Dobroye Nachalo Bay; 44°43.82' N, 147°11.90' E; Aug 15, 1999; D. J. Bennett.
IT-99-KLK-43: Kuybyshevskiy Lake, Kuybyshevskiy Bay; 45°04.21' N, 147°39.09' E; Aug 13, 1999; N. Minakawa, K. L. Kurowski.
IT-99-KLK-44, 45: Kuybyshevskiy Lake, Kuybyshevskiy Bay; 45°04.51' N, 147°41.98' E; Aug 13, 1999; N. Minakawa, K. L. Kurowski.
IT-99-NM-13, 14: Southeastern side of Lake Natasha, northern end of Dobroye Nachalo Bay, near Lesozavodskoy; 44°46.21' N, 147°11.40' E; Aug 14, 1999; N. Minakawa.
IT-99-NM-15: Southwestern side of Dobrye Lake, Dobroye Nachalo Bay; 44°44.24' N, 147°13.44' E; Aug 15, 1999; N. Minakawa.
IT-99-VAT-46: Northwestern part of Kuybyshevskiy Lake, Kuybyshevskiy Bay; 45°04.34' N, 147°39.03' E; Aug 13, 1999; V. A. Teslenko.
IT-99-VAT-50: Eastern side of Lesozavodskoye Lake, Dobroye Nachalo Bay; 44°46.43' N, 147°12.84' E; Aug 14, 1999; V. A. Teslenko.
IT-99-VAT-52: Southwestern side of Dobroye Lake, near Tichaya River flows from the Lake, Dobroye Nachalo Bay; 44°44.24' N, 147°13.44' E; Aug 15, 1999; V. A. Teslenko.
IT-99-VAT-54: Bolshoye Stream, near the bridge over the stream, about 2 km from the mouth, Dobroye Nachalo Bay; 44°43.69' N, 147°14.34' E; Aug 15, 1999; V. A. Teslenko.

KUNASHIR

KU-94-NM-01: Northern and eastern shore of Lake Aliger; 44°02'48" N, 145°44'24" E; Jul 31, 1994; N. Minakawa, R. I. Gara.
KU-94-NM-04: Lower stream section between Lake Bezymaynnoye and Lake Lagunnoye; 44°03'06" N, 145°45'48" E; Jul 31, 1994; N. Minakawa, R. I. Gara.
KU-94-NM-05: About 150 m from mouth of Ilyushina River; 44°09'18" N, 145°56'30" N; Aug 1, 1994; N. Minakawa, R. I. Gara.
KU-94-NM-07: About 300 m from mouth of Ilyushina River; 44°09'30" N, 145°56'12" E; Aug 1, 1994; N. Minakawa, R. I. Gara.
KU-94-NM-08: About 350 m from mouth of Ilyushina River; 44°09'30" N, 145°56'12" E; Aug 1, 1994; N. Minakawa, R. I. Gara.
KU-94-NM-10: About 450 m from mouth of Ilyushina River; 44°09'42" N, 145°56'00" E; Aug 1, 1994; N. Minakawa, R. I. Gara.
KU-94-NM-11, 13: Tributary of River Rikorda, northern bifurcation, just off east side of road; 43°51' N, 145°33' E; Aug 2, 1994; N. Minakawa, R. I. Gara.
KU-94-NM-16: Stream section above geothermal pools, 14 km west of Yuzhno-Kurilsk; 44°00'48" N, 145°41'06" E; Aug 3, 1994; N. Minakawa, R. I. Gara.

KU-94-NM-17: Prozrachnyi River, near broken coastal road bridge, 44°05'42" N, 145°53'18" E; Aug 3, 1994; N. Minakawa, R. I. Gara.

KU-94-NM-18: Lesnaya River, at roadside entrance for Kislyi Hot Springs, near junction with Kislyi river; 44°01.4' N, 145°44.1' E; Aug 4, 1994; N. Minakawa, R. I. Gara.

KU-94-NM-21: Western and southern shore of Lake Krugloye; 44°22'24" N, 146°25'12" E; Aug 23, 1994; N. Minakawa, R. I. Gara.

KU-94-TWP-07: Ilyushina River, about 350 m from mouth, in isolated, shallow, south branch; 44°09'30" N, 145°56'12" E; Jan 8, 1994; T.-W. Pietsch, W. A. Palsson, B. K. Urbain, J. A. Lopez.

KU-94-VAT-01, 02: Western shore of Lake Aliger; 44°02'48" N, 145°44'24" E; Jul 31, 1994; V. A. Teslenko.

KU-94-VAT-03: Northern shore of Lake Aliger; 44°02'48" N, 145°44'24" E; Jul 31, 1994; V. A. Teslenko.

KU-94-VAT-04: Eastern shore of Lake Aliger; 44°02'48" N, 145°44'24" E; Jul 31, 1994; V. A. Teslenko.

KU-94-VAT-06, 07, 08: Ilyushina River, near mouth; 44°09'18" N, 145°56'30" N; Aug 1, 1994; V. A. Teslenko.

KU-94-VAT-09, 10, 11, 12: Tributary of River Rikorda, northern bifurcation, near main road; 43°51' N, 145°33' E; Aug 2, 1994; V. A. Teslenko.

KU-94-VAT-14, 15: Stream adjacent to geothermal pools, 14 km west of Yuzhno-Kurilsk; 44°00.48' N, 145°41.06' E; Aug 3, 1994; V. A. Teslenko.

KU-94-VAT-16, 17: Prozrachnyi River, about 1 km from mouth; 44°05'42" N, 145°53'18" E; Aug 3, 1994; V. A. Teslenko.

KU-94-VAT-19, 20: Lesnaya River, about 1km upriver from junction with Kislyi River; at roadside entrance for Kislyi Hot Springs; 44°01.4 N, 145°44.8 E; Aug 4, 1994; V. A. Teslenko.

KU-94-VAT-55: Western and southern shore of Lake Krugloye; 44°22'24" N, 146°25'12" E; Aug 23, 1994; V. A. Teslenko.

KU-94-VAT-56: Stream that flows into western part of Lake Krugloye; 44°22.30' N, 146°24.90' E Aug 23, 1994; V. A. Teslenko.

KU-95-PO-02, 03: Stream adjacent to geothermal pools, 14 km west of Yuzhno-Kurilsk; 44°00.47' N, 145°40.98' E; Aug 2, 1995; N. Minakawa, P. Oberg.

KU-95-PO-123: Lake Aliger; 44°02.83' N, 145°44.47' E; Sep 1, 1995; P. Oberg.

KU-95-PO-127: Stream that flows into Lake Lagunnoye; 44°03.06' N, 145°45.48' E; Sep 1, 1995; N. Minakawa.

KU-95-PO-128: Lesnaya River; about 200 m upriver from Lesnaya-Kislyi River merge point; 44°00.10' N, 145°46.00' E; Sep 2, 1995; N. Minakawa, P. Oberg, D. E. Hoekstra.

KU-95-VR-38: Aliger Lake; 44°03.13N, 145°44.68E; Sep 1, 1995; V. Roth.

KU-95-VAT-01, 02, 03: Stream adjacent to geothermal pools, 14 km west of Yuzhno-Kurilsk; 44°00.47' N, 145°40.98' E; Aug 2, 1995; V. A. Teslenko.

KU-95-VAT-69: Lesnaya River, near junction with Kislaya River; 44°00.72' N, 145°46.28' E; Sep 1, 1995; V. A. Teslenko.

KU-95-VAT-71: Lesnaya River, near junction with Kislaya River; 44°00.10' N, 145°46.00' E; Sep 1, 1995; V. A. Teslenko.

KU-96-NM-36, 43: Stream adjacent to geothermal pools, 14 km west of Yuzhno-Kurilsk; 44°00.25' N, 145°40.34' E; Aug 25, 1996; N. Minakawa, P. Oberg.

KU-96-PO-76: Aliger Lake; 44°02.59' N, 145°44.18' E; Aug 26, 1996; P. Oberg, N. Minakawa.

KU-97-BKU-06: Environs of geothermal pools, 17 km west of Yuzhno-Kurilsk, along side trail (not main trail up to road) that leads off from the northwest; 44°00.47' N, 145°41.00' E; Jul 27, 1997; B. K. Urbain.

KU-97-NM-01, 03: 70 m upstream from geothermal pools, 14 km west of Yuzhno-Kurilsk; 44°00.34' N, 145°40.99' E; Jul 27, 1997; N. Minakawa.

KU-97-TIR-01: 0-100 m upstream from geothermal pools, 14 km west of Yuzhno-Kurilsk; 44°00.47' N, 145°40.94' E; Jul 27, 1997; T. I. Ritchie.

KU-97-TIR-04: 0-200 m upstream from geothermal pools, 14 km west of Yuzhno-Kurilsk; 44°00.34' N, 145°40.99' E; Jul 27, 1997; T. I. Ritchie.

KU-97-VAT-01, 02, 03: Lesnaya River, about 1 km upstream from its junction with Kislyi River; 44°00.52' N, 145°45.45' E; Jul 27, 1997; V. A. Teslenko.

KU-97-VAT-05: About 1 km inland from shore of Yuzhno-Kurilsk; 44°01.52' N, 145°50.23' E; Jul 27, 1997; A.S. Lelej.

KU-98-BKU-73: Just off road near Lake Aliger; 44°03.17' N, 145°45.00' E; Aug 11, 1998; B. Urbain.

KU-98-DJB-79: Lake Aliger; 44°02.88' N, 145°44.48' E; Aug 11, 1998; D. Bennett.

KU-98-DJB-140: Along road leading to Lake Serebryanoye, about 3 km northwest of Yuzhno-Kurilsk; 44°03.15' N, 145°49.14' E; Aug 22, 1998; D. J. Bennett.

KU-98-TIA-65: Tributary of Kislyi River; Aug 22, 1998; T. I. Arefina.

KU-98-LJW-01: Upstream from geothermal pools, 14 km west of Yuzhno-Kurilsk; 44°00.41' N, 145°40.96' E; Jul 26, 1998; L. J. Weis, N. Minakawa.

KU-98-LJW-02, 04: Downstream from geothermal pools, 14 km west of Yuzhno-Kurilsk; 44°00.41' N, 145°40.96' E; Jul 26, 1998; L. J. Weis, N. Minakawa.

KU-98-LJW-06: Stream that flows into Dlinnoye Lake, Lovtsova Peninsula, northern part of Kruglovsky Isthmus; 44°24.74' N, 146°25.62' E; Jul 28, 1998; L. J. Weis, N. Minakawa.

KU-98-LJW-09, 10: Stream that flows into Dlinnoye Lake, Lovtsova Peninsula, northern Kruglovsky Isthmus; 44°24.02' N, 148°25.33' E; Jul 28, 1998; L. J. Weis, N. Minakawa.

KU-98-LJW-40, 41: Lesnaya River and Kislyi River near Kislyi Hot Springs; 44°00.87' N, 145°46.02' E; Aug 11, 1998; L. J. Weis.

KU-98-LJW-74: Lake Serebryanoye, about 3km northwest of Yuzhno-Kurilsk; 44°03.21' N, 145°48.92' E; Aug 22, 1998; L. J. Weis, N. Minakawa.

KU-98-LJW-75: Lake Serebryanoye, about 3km northwest of Yuzhno-Kurilsk; 44°03.09' N, 145°48.95' E; Aug 22, 1998; L. J. Weis, N. Minakawa.

KU-98-VAT-01, 02: Stream adjacent to geothermal pools, 14 km west of Yuzhno-Kurilsk; 44°00.56' N, 145°40.91' E; Jul 26, 1998; V. A. Teslenko.

KU-98-VAT-06: Stream that flows into western part of Dlinnoye Lake, Lovstova Peninsula, northern Kruglovsky Isthmus; 44°24.74' N, 146°25.62' E; Jul 28, 1998; V. A. Teslenko.

KU-99-DJB-105: Environs of geothermal pools, 14 km west of Yuzhno-Kurilsk, base of trail in hot springs clearing and surrounding area; 44°00.39' N, 145°41.01' E; Aug 17, 1999; D. J. Bennett.

KU-99-KLK-49: Swamp near shore of Alekhina Bay; 43°55.14' N, 145°32.34' E; Aug 19, 1999; N. Minakawa, K. L. Kurowski.

KU-99-KLK-50, 51: Alekhina River, about 1 km from the mouth, Alekhina Bay; 43°55.19' N, 145°32.47' E; Aug 19, 1999; N. Minakawa, K. L. Kurowski.

KU-99-KLK-52: Side pool of Alekhina River, about 0.7 km from the mouth, Alekhina Bay; 43°55.19' N, 145°32.47' E; Aug 19, 1999; N. Minakawa, K. L. Kurowski.

KU-99-NM-18: Stream that flows into Peshcnoye Lake; 43°55.02' N, 145°37.83' E; Aug 17, 1999; N. Minakawa.

KU-99-VAT-56: Eastern side of Peschanoye Lake; 43°55.15' N, 145°37.91' E; Aug 15, 1999; V. A. Teslenko.

KU-99-VAT-57: Small stream that flows from Peschanoye Lake; 43°55.15' N, 145°37.91' E; Aug 15, 1999; V. A. Teslenko.

KU-99-VAT-62: Alekhina River, about 0.8 km from the mouth, Alekhina Bay: 43°55' N, 145°32' E; Aug 19, 1999; V. A. Teslenko.

KU-99-VAT-63: Alekhina River, about 1 km from the mouth, Alekhina Bay: 43°55.06' N, 145°32.38' E; Aug 19, 1999; V. A. Teslenko.

SHIKOTAN

SH-94-RG-01: Tributary about 3.5 km from mouth of Svobodnaya River, Otradnaya Bay; Aug 8, 1994; N. Minakawa, R. I. Gara.

SH-94-RG-03: Coastal stream that empties into Posodebari Inlet of Delfin Bay, between 0-75 m upstream from mouth; Aug 11, 1994; R. I. Gara, N. Minakawa.

SH-94-TWP-03: Svobodnaya River, near river mouth in Otradnaya Bay, between 0-200 m upriver from Ostrovnoye Milk Farm; 43°51'06" N, 146°48'36" E; Aug 8, 1994; T.W. Pietsch, W.A. Palsson, B. K. Urbain, J.A. Lopez.

SH-94-VAT-28, 29: Svobodnaya River, about 5 km from mouth, at confluence of two streams, Otradnaya Bay; Aug 8, 1994; V. A. Teslenko.

SH-94-VAT-31, 32: Coastal stream that flows into Posodebari Inlet of Delfin Bay, between 0-75 m upstream from mouth; Aug 11, 1994; V. A. Teslenko.

SH-98-BKU-91: Meadow, inland from small, unnamed inlet about 2/3 way in, on the south side of Delfin Bay; 43°45.03' N, 146°37.36' E; Aug 15, 1998; B. Urbain.

SH-98-DJB-93: Inland from Dimitrova Bay, ridges, hillsides, and valleys within 1 km from shore; 43°47.69' N, 146°49.64' E; Aug 13, 1998; D. Bennett.

SH-98-DJB-99: Inland from small inlet about 2/3 way in, on the south side of Delfin Bay, upland from stream valley; 43°44.96' N, 146°37.75' E; Aug 15, 1998; D. Bennett.

SH-98-LJW-46: Stream that flows into Otradnaya Bay; 43°50.44' N,146°48.89' E; Aug 12, 1998; L. J. Weis.

SH-98-LJW-50: Stream that flows into Tserkovnaya Bay; 43°44.55' N, 146°42.76' E; Aug 14, 1998; L. J. Weis.

SH-98-LJW-54, 55: Stream that flows into Zvezdnaya Bay; 43°46.73' N, 146°36.49' E; Aug 16, 1998; L. J. Weis.

SH-98-LJW-56, 57: Stream that flows into Zvezdnaya Bay; 43°46.44' N, 146°36.58' E; Aug 16, 1998; L. J. Weis.

SH-98-LJW-60: Stream that flows into Gorobets Bay; 43°49.18' N, 146°42.58' E; Aug 18, 1998; L. J. Weis, N. Minakawa.

SH-98-LJW-61, 62: Marsh and ponds, inland from Gorobets Bay; 43°49.05' N, 146°42.68' E; Aug 18, 1998; L. J. Weis, N. Minakawa.

SH-98-LJW-63: Marsh and ponds, inland from Gorobets Bay; 43°48.02' N, 146°42.95' E; Aug 18, 1998; L. J. Weis, N. Minakawa.

SH-98-NM-30, 33: Stream that flows into Tserkovnaya Bay; 43°44.83' N, 146°41.98' E, Aug 14, 1998, N. Minakawa.

SH-98-NM-35: Near the mouth of Ostrovnaya River, Delfin Bay; 43°45.11' N, 146°37.41' E; Aug 15, 1998; N. Minakawa.

SH-98-VAT-42: Small stream that flows into Khromova Bay in southern Malokurilsk; 43°52.09' N, 146°48.52' E; Aug 12, 1998; V. A. Teslenko.

SH-98-VAT-45: Small stream that flows into Dimitrova Bay, west of Solov'Oeva Cape; 43°47.64' N, 146°48.63' E; Aug 13, 1998; V. A. Teslenko.

SH-98-VAT-47: Stream that flows into northeastern Srezhkova Bay; 43°47.59' N, 146°48.44' E; Aug 13, 1998; V. A. Teslenko.

SH-98-VAT-49: Small pond, inland from Tserkovnaya Bay, before river from Tomari Mountain, the river flows into the central part of the bay; 43°44.85' N, 146°41.61' E; Aug 14, 1998; V. A. Teslenko.

SH-98-VAT-50: Small drying pond inland from central part of Tserkovnaya Bay; 43°44.60' N, 146°41.50' E; Aug 14, 1998; V. A. Teslenko.

SH-98-VAT-51: Small stream that flows into central part of Tserkovnaya Bay; 43°44.77' N, 146°41.49' E; Aug 14, 1998; V. A. Teslenko.

SH-98-VAT-53: First tributary on the left side of Ostrovnaya River from the mouth, south-central part of Delfin Bay; 43°44.90' N, 146°39.00' E; Aug 15, 1998; V. A. Teslenko.

POLONSKOGO

PO-98-DJB-135: Inland from western side; 43°38.38' N, 146°18.58' E; Aug 21, 1998; D. J. Bennett.

PO-98-TIA-61, 64: Inland from western side, small unnamed lake, Moryakov Bay; Aug 21, 1998; T. I. Arefina.

ZELIONYI

ZE-94-NM-02: Lake Utinoye, western finger of lake, northern shore; 43°29'24" N, 146°06'48" E; Aug 5, 1994; R. I. Gara, N. Minakawa.

ZE-94-NM-03: Stream that flows into northeastern Lake Utinoye; 43°29'36" N, 146°07'54" E; Aug 6, 1994; R. I. Gara, N. Minakawa.

ZE-94-NM-05: Southeastern shore of Lake Kamenskoye; 43°30'12" N, 146°06'12" E; Aug 6, 1994; R. I. Gara, N. Minakawa.

ZE-94-RLC-04: Lake Utinoye, between 0-50 m west off southwestern shore; 43°48.0 N, 146°11.5 E; Aug 5, 1994; R. L. Crawford.

ZE-94-VAT-21: Stream that flows into northwestern Lake Utinoye; 43°29'12" N, 146°06'42" E; Aug 5, 1994, 1994; V. A. Teslenko.

ZE-94-VAT-24: Lake Utinoye, western finger of lake, northern shore; 43°29'24" N, 146°06'48" E; Aug 5, 1994; V. A. Teslenko.

ZE-94-VAT-25: Stream that flows into Lake Utinoye at north northeastern corner; 43°29'36" N, 146°07'54" E; Aug 6, 1994; V. A. Teslenko.

ZE-94-VAT-27: Southwestern shore of Lake Kamenskoye; 43°30'12" N, 146°06'12" E; Aug 6, 1994; V. A. Teslenko.

ZE-98-LJW-70: Marsh near Lake Utinoye; 43°29.45' N, 146°06.54' E; Aug 20, 1998; L. J. Weis, N. Minakawa.

IURII

IU-98-TIA-59: Lake near the sea shore, inland from Shyrokaya Bay; Aug 20, 1998; T. I. Arefina.

ANUCHINA

AN-98-TIA-55: Stream, inland from Boshoy Bay, northern part of the island; Aug 19, 1998; T. I. Arefina.

TANFILYEVA

TA-98-LJW-66: Shallow puddles, inland from Tanfilyevka Bay; 43°26.82' N, 145°54.36' E; Aug 19, 1998; L. J. Weis, N. Minakawa.

TA-98-VAT-65: Lake near Russian military base, Tanfilyeva Bay; Aug 19, 1998; V. A. Teslenko.

TA-98-TIA-57: Unnamed lake, Tanfilyeva Bay; Aug 19, 1998; T. I. Arefina.

TA-98-TIA-58: Stream that flows into the lake, Tanfilyeva Bay; Aug 19, 1998; T. I. Arefina.

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A new species of the genus *Kisaura* (Trichoptera: Philopotamidae) from the east Palaearctic

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Abstract The male and female of a new philopotamid species, *Kisaura dichotoma*, is described from the islands of Kunashir, Hokkaidô, Honshû, Shikoku and Kyûshû in the east Palaearctic.

Introduction

The genus *Kisaura*, a member of the caddisfly family Philopotamidae, is distributed in the Oriental and east Palearctic biogeographical regions. Up to the present, fourteen species have been recorded from the east Palaearctic region: seven species from China, one from the continental part of Russia to the Korean Peninsula and six from the Japanese Archipelago and the Kuril Archipelago.

We discovered an undescribed *Kisaura* species, which has quite unique male genitalia, in collections from Kunashir through the International Kuril Island Project (IKIP) and from the four main Japanese islands. In this paper, we describe the male and female of this new species.

Terminology for male genitalia largely follows Kuhara (1999). Type specimens are deposited in the collections of Laboratory of Systematic Entomology, Hokkaido University, Sapporo, Japan (SEHU), the Natural History Museum and Institute, Chiba, Japan (CBM), California Academy of Sciences, San Francisco, USA (CAS) and Institute of Biology and Soil Science, Far Eastern Branch of the Russian Academy of Sciences, Vladivostok, Russia (IBSS). Specimens without indication of depositories in the list of types below are deposited in SEHU. Unless otherwise stated, types are preserved in alcohol.

***Kisaura dichotoma* n. sp.**
Figs. 1–3

Dolophilodes (*Kisaura*) sp. 3: Kuhara 1997: 58 (listed).
Dolophilodes (*Kisaura*) sp. 4: Ito *et al.* 1997: 23 (listed).
Dolophilodes (*Kisaura*) sp. 2: Ito *et al.* 2000: 21 (listed).
Dolophilodes (*Kisaura*) sp.: Kuhara 2001: 14 (listed).

Adult. Forewing length male 4.7–6.6 mm (mean = 5.8 mm, n = 24), female 5.5–7.3 mm (mean = 6.3 mm, n = 28). Color and general appearance similar to those of *Kisaura tsudai* Botosaneanu, 1970 (see Kuhara 1999).

Male genitalia (Fig. 1). Abdominal segment IX slightly wider than high in lateral view; anterolateral margins somewhat expanded anteriorly; posterolateral margins oblique with shallow excision; anteroventral and posteroventral margins concave mesally in ventral view. Tergum X overall membranous, tapering abruptly to digitate apex in dorsal view. Preanal appendages knob-like with rounded apex. A pair of spiniform processes, arising from base of tergum X, very long, curved ventrad in lateral view, protruding beyond tergum X and base of terminal segment of inferior appendage; in dorsal view sword-like, each with a filiform process arising from base, which is shorter than main processes; all processes with long sclerotized dark apices. Basal segment of inferior appendages with well-developed subtriangular posteroventral expansions bearing several long setae apically; long sclerotized articulation process emerging from inner face of expansion, directed dorsocaudally. Terminal segment of inferior appendages shorter than basal segment, enlarged basally, bearing a basoventral semi-membranous process with dark apical spine curved ventrocaudally. Comb of black sclerotized teeth present on inner surface of terminal segment, curved inward in basal 1/3, and sometimes slightly curved outward in distal half in ventral view. Phallus consists of phallotheca and invaginated endotheca; phallotheca broad-based, semi-membranous, with ventral sclerotized plate having mesal ridge along basal 2/3; endotheca including small, weakly sclerotized armatures.

Female genitalia (Fig. 2). Tergum VII with long setae posteriorly. Sternum VII setose; posterolateral margins expanded. Segment VIII swollen anterodorsally, with paired apodemes on anterior margin; 2 or 3 prominent elongate setae emerging from each dorsolateral patch along posterior margin; posteroventral corner weakly extended caudally. Tergum IX lightly pigmented dorsally, with sclerotized band anteriorly; paired long apodemes emerging from anterolateral margins, as long as segment VIII. Sternum IX protruded caudally. Segment X composed of paired, setose bulbous lobes, each with apical cercus. Vaginal apparatus consists of membrane and sclerite complex; distal half with elongate mesal sclerite, paired lateral sclerites and transverse sclerite

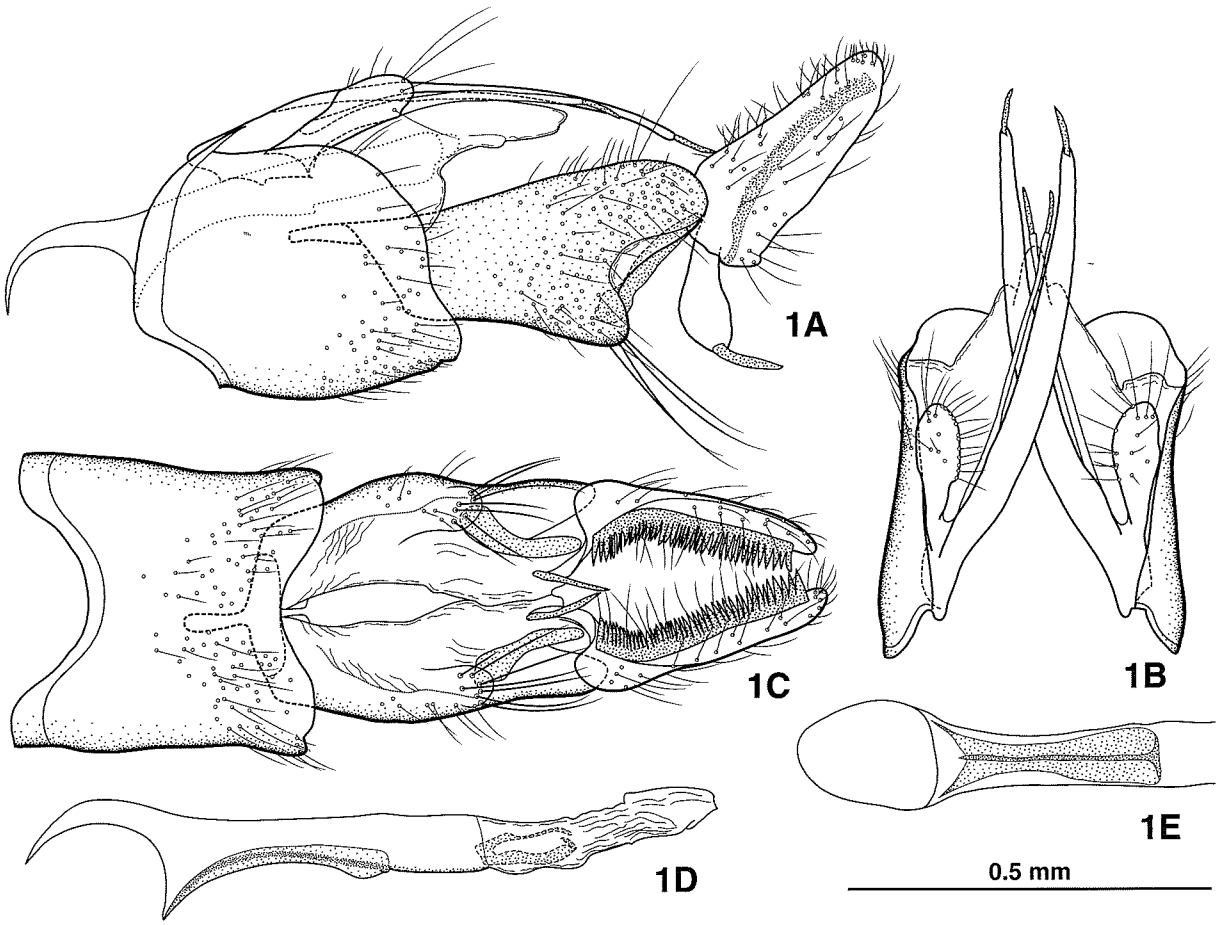

Figure 1. *Kisaura dichotoma* n. sp., male genitalia: A, lateral view; B, dorsal view; C, ventral view; D, phallotheca and endotheca, lateral view, endotheca everted; E, phallotheca, ventral view.

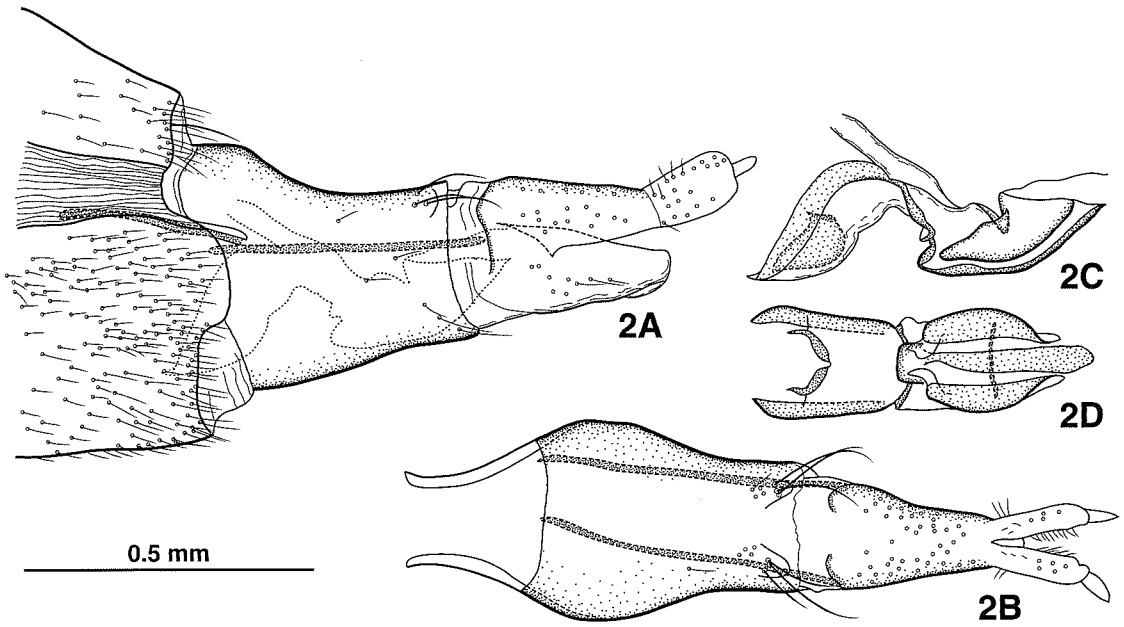

Figure 2. *Kisaura dichotoma* n. sp., female genitalia: A, lateral view; B, dorsal view; C, vaginal apparatus, lateral view; D, vaginal apparatus, ventral view.

Figure 3. Collection sites of *Kisaura dichotoma* n. sp.

connected to both lateral sclerites; anterior half strongly bowed ventrad in lateral view, with paired lateral sclerites connected with each other posteriorly and mesal sclerite, which is V- or U-shaped in ventral view.

Holotype. ♂, Shiriuchi-chô, Oshima, Hokkaidô, Japan, 8–13.VII.1976, T. Kumata (pinned).

Paratypes. KURIL ISLANDS. [Kunashir] 4♂8♀, small stream by geothermal pools, about 14 km west of Yuzhno-Kurilsk, 27.VII.1997, N. Minakawa & T. I. Ritchie (CAS); 2 ♂, ditto (IBSS). JAPAN. [Hokkaidô] Shiribeshi: 11 ♂3 ♀, Shirai-zawa, Okusawa-suigenchi, Otaru-shi, 9.VIII.1996, Y. Sasaki & F. Takahashi; 3 ♂ 1 ♀, ditto, 19.VIII.1996, Y. Sasaki & F. Takahashi; 1 ♂, ditto, 13.IX.1996, M. Ôhara & Y. Sasaki. Hiyama: 9♂5 ♀, Iwafuchi-zawa, Ken'ichi-gawa Riv., Kumaishi-chô, 10–20.VII.1995, Y. Ito & T. Ito; 4 ♂4 ♀, ditto, 20.VII–1.VIII.1995, Y. Ito & T. Ito; 4 ♂3 ♀, ditto, 1–10.VIII.1995, Y. Ito & T. Ito. [Honshû] Iwate: 2 ♂2 ♀, small stream tributary to Ôkawa Riv., Osada, Iwaizumi-chô, 12.VII.1997, N. Kuhara. Niigata: 1 ♂1 ♀, Irikon-zawa, el. 450 m, Kotaki, Itoigawa-shi, 16.VIII.1996, T. Hattori. Gifu: 2♂, Ogawabayashi, el. 600–700 m, Maze-mura, 16.VIII.1990, T. Hattori (pinned); 2 ♂, Hassô-gawa Riv., el. 600 m, Sakauchi-mura, 7.VI.1998, T. Hattori; 1♂, Nagara-gawa Riv., el. 870 m, Kamagahora, Takasu-mura, 30.VII.1995, T. Hattori (pinned). [Shikoku] Ehime: 1 ♂, Namakusa-dani, el. 1200 m, Odamiyama, Oda-chô, 4.VII.1998, E. Yamamoto (CBM); 1 ♂, ditto, 24.VII.2000, E. Yamamoto; 6♂, ditto, 15.VIII.2000, E. Yamamoto; 5♂6♀, ditto, 21.VIII.2000, E. Yamamoto; 1 ♂, ditto, 27.VIII.2000, E. Yamamoto; 1 ♀, ditto, 2.IX.2000, E. Yamamoto.

Other material examined. JAPAN. [Hokkaidô] Abashiri: 4 ♂1 ♀, Nukamappu-gawa Riv., Shari-chô, 30.VI–17.X.1992, K. Uesugi. Ishikari: 9 ♂2 ♀, brooklet, el. 240 m, Ichankoppe-zawa, Eniwa-shi, 11.VII–1.IX.1995, T. Ito; 1 ♀, Kan'non-zawa, Misumai, Sapporo-shi, 27.VII.1992, N. Kuhara; 1 ♂, ditto, 15.IX.1992, N. Kuhara. Shiribeshi: 6♂, brooklet, Anataki, Okusawa-suigenchi, Otaru-shi, 26.VII.1995, N. Kuhara; 1 ♂, Katsunai-gawa Riv., Anataki, Okusawa-suigenchi, Otaru-shi, 26.VII.1995, N. Kuhara; 24 ♂5 ♀, Shirai-zawa, Okusawa-suigenchi, Otaru-shi, 29.VII–27.IX.1996, M. Ôhara et al. Oshima: 1♂, Goyô-no-sawa, Namari-kawa Riv., Yakumo-chô, 22.VII.1997, A. Ohkawa. Hiyama: 8 ♂5 ♀, Iwafuchi-zawa, Ken'ichi-gawa Riv., Kumaishi-chô, 15.VI–21.IX.1995, Y. Ito & T. Ito. [Honshû] Aomori: 1♂, Yahazuyama, Kazamaura-mura, 27.VII.1999, N. Kawase. Iwate: 1 ♂1 ♀, Udore-sawa, Miyama-gawa Riv., Kadoma, Kawai-mura, 13.VII.1997, N. Kuhara; 1 ♂, Kuji-shi, 22.VII.1995, T. Murakami. Ibaraki: 3♂2♀, Uratsukuba, Mt. Tsukuba-san, 21.VII.1998, N. Kawase. Saitama: 1 ♂, Kudonosawa, el. 750 m, Ôtaki-mura, 7–28.VIII.1998, T. Kagaya et al. Shizuoka: 1 ♀, Nishiyama-zawa, el. 950 m, Ikawa, Shizuoka-shi, 25.VI.1994, T. Hattori. Mie: 12 ♂2 ♀, Ishigure-minami, Daian-chô, 1.VI–15.VIII.2001, H. Morita; 1 ♂, Kameyama-shi, 3.VII.1994, H. Morita. [Shikoku] Tokushima: 1 ♂, Kuwadaira, el. 1240 m, Ichiu-son, 25.IX.2002, T. Hattori. Ehime: 1♂, Hondani-keikoku, Odamiyama, Oda-chô, 10.VI.2001, E. Yamamoto; 1 ♂, Koya-yama, Odamiyama, Oda-chô, 7.VII.2000, E. Yamamoto & M. Doi; 2 ♂, ditto, 18.IX.2000, E. Yamamoto & M. Doi; 4 ♂2 ♀, Namakusa-dani, Odamiyama, Oda-chô, 14.VII–16.VIII.1998, E. Yamamoto & M. Doi; 3♂, small stream beside Miyama-sô, Odamiyama, Oda-chô, 15–16.VIII.2000, E. Yamamoto; 2 ♂, small stream, Oda-chô, 20.IX.2000, E. Yamamoto. Kôchi: 1 ♂, Teragawa, Hongawa-mura, 1.VII.1995, K. Konishi et al. [Kyûshû] Nagasaki: 1 ♂, Tara-dake, Takaki-chô, 16.VII.1998, S. Tsukaguchi.

Distribution (Fig. 3). Kuril Islands (Kunashir), Japan (Hokkaidô, Honshû, Shikoku, Kyûshû).

Etymology. *Kisaura dichotoma*, taken from the Greek for dichotomous, in reference to the two-branched male spiniform processes of this species.

Diagnosis. The new species shows quite unique specialization in male genitalia within the genus. The male of this species somewhat resembles *Kisaura euphemos* Sun and Malicky, 2002 in the shape of the inferior appendages, but can be easily recognized among all known *Kisaura* species by a pair of dichotomous spiniform processes associated with tergum X, and the semi-membranous process bearing an apical spine arising from the base of the terminal segment of the inferior appendages.

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New Evidence for Expansion of the Jomon Culture and the Ainu into the Kuril Islands: from IKIP 2000 Anthropological Research in the Kuril Islands

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Abstract This article presents the results of our 2000 IKIP fieldwork and focuses on applying Japanese archaeological knowledge to the consideration of Kuril prehistory. The characteristics of the distribution of both Epi-Jomon and Okhotsk cultures based on ceramics excavated on Matua Island, Kama River site on Urup Island, and the Peschanaya Bay Site on Chirpoi Island in terms of culture history are described (Table 1). It was noteworthy for us to find terminal Jomon and Epi-Jomon cord-marked ceramics in the stratigraphy that extend the geographic distribution of this culture farther northeast in the Kuril Islands than had previously been known. The expansion of Epi-Jomon pottery into the middle part of the Kuril islands can be linked archaeologically with the rapid spread of the expansion of contemporary human settlement northward into Sakhalin and eastward into the Kuril Islands. Specifically, this article discusses the significance of this expansion during the Epi-Jomon period.

This article also deals with the Kuril Ainu's sea mammal ritual that has previously been little researched. New evidence of the intentional arrangement of fur seal skulls according to their creed system in the animal ritual of the Ainu is antithetical to currently and widely accepted models of "the Bear Festival Complex" which assume that the bear festival occupies the core of Ainu culture (Watanabe 1972).

Key words: Kuril Islands, Jomon culture, Epi-Jomon culture, Jomon pottery, Ainu culture, sea mammal ritual, bear ceremony, maritime adaptation

Introduction

From late July to mid August 2000, IKIP project anthropologists and geologists carried out a survey at a number of locations. This was the first full-scale, collaborative international anthropological field research in this area with joint American, Russian and Japanese participation, although a preliminarily IKIP research effort preceded this (Allen and Fitzhugh 1999). The results of this research, together with the results of other projects since the 1980's, has provided us a new source of knowledge from which to better understand Kuril prehistory. Besides, it should be added that parts of the results have already been published (Fitzhugh *et al.* 2002, 2004; Ishizuka 2001; Tezuka 2001). Our publication in 2002 (Fitzhugh *et al.* 2002) outlined the results of the 2000 IKIP fieldwork overall and introduced new AMS radiocarbon dates but did not much discuss the cultural implications of pottery or sea mammal features. This current article's primary focus is on the Jomon pottery and ritual site of sea mammal viewed from the standpoint of recent Japanese archaeology.

Field Sites and Methods

During this field season the archaeological research design was granted priority and the researchers were able to investigate a total of 14 locations on 11 Kuril Islands of high archaeological potential from Shumshu to Urup (Fig.1). The field season was limited to three weeks, and the survey was constrained to brief visits to 14 landing spots on 11 islands. This article mainly deals with three sites where cord-marked artifacts and superimposed sea lion crania as ritual features were excavated. Regular procedures consisting of stratigraphic observations of profiles, mapping features, and sampling organic materials for radiocarbon dates were done on each site. Archaeological artifacts from each spot were brought back to the *Okean*, the research vessel of the Russian Academy of Science, to be washed, numbered, measured, drawn and photographed by the end of the field season.

Cultural Chronology of the Kurils

Previous research in the Kurils and Hokkaido has identified four general periods of prehistoric occupation:

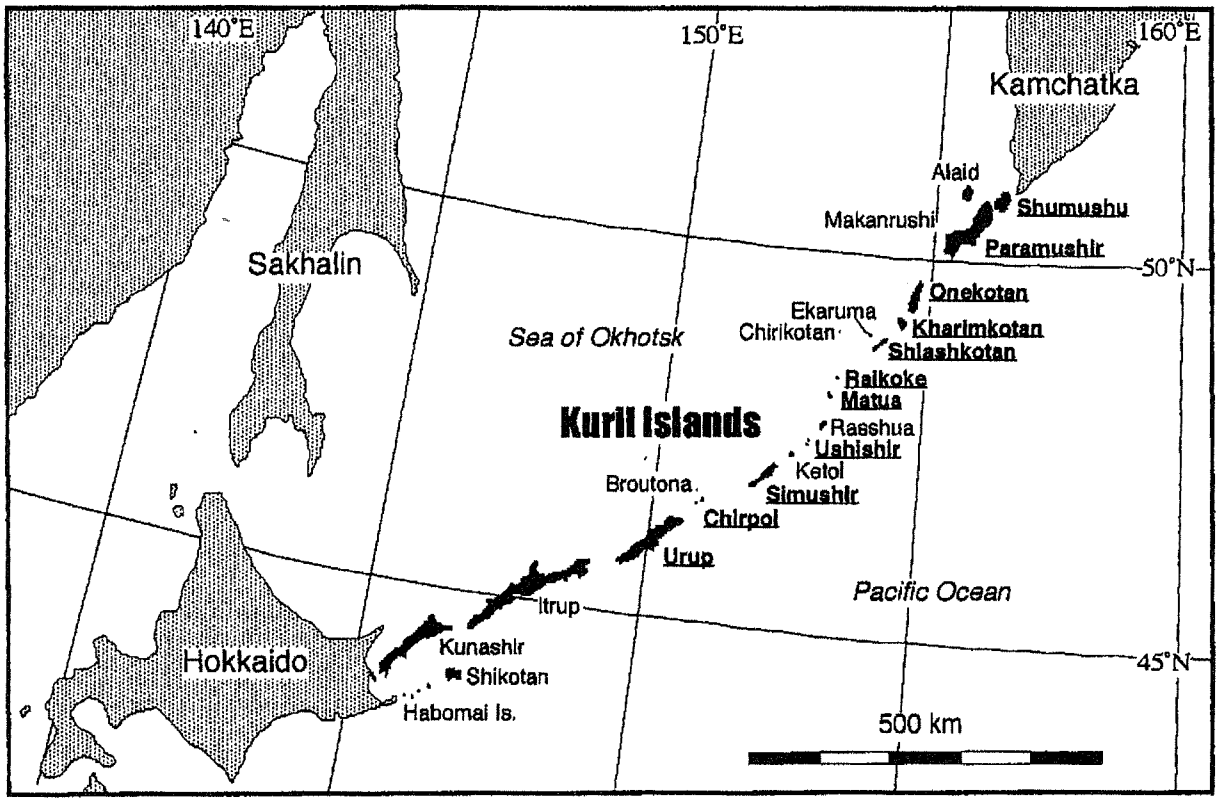

Figure 1. Map of IKIP 2000 study area.

Table 1. Prehistoric cultural chronology of Hokkaido cited in this article.

Epi-Jomon:		ca. 2nd c. BC – 6th c. AD
Okhotsk: four stages subdivided in terms of typology:		
Early Okhotsk:	circular punctuations with round sticks from the outside:	ca. 5th – 6th c. AD
Middle Okhotsk:	short successive incisions by sticks:	ca. 7th c. AD
Late Okhotsk:	shallow lines or tube decoration:	ca. end of 7th – 9th c. AD
Terminal Okhotsk:	Fusion type between the Okhotsk and Satsumon cultures:	ca. 9th – 12th c. AD
Satsumon:		ca. 7th – 12th c. AD
Ainu:		ca. 13th c. – to the present

Jomon, Epi-Jomon, Okhotsk, and Ainu. It is generally accepted that the Satsumon culture was the direct ancestor of the Ainu. However, there were other influences as well from the main island culture and from cultures of the northeast Asia, including the Okhotsk culture (Watanabe 1972,1974). The oldest culture in the Kurils is thought to belong to paleolithic age, though its definite evidence remains still unknown. Cultural chronology relevant to human occupation in the Kurils is outlined as shown in Table 1.

The known distribution of Jomon pottery is restricted to the southern Kuril Islands (Nomura and Sugiura 1995). Epi-Jomon pottery such as Simodanosawa, Utsunai and Kohoku-types were found in the Kurils. Lithic labrets and stone figurines are often observed in the assemblages of Epi-Jomon culture in the Kurils, which are influenced from the Tarya culture in Kamchatka. While sites of the Okhotsk culture are distributed throughout the Kuril Islands, the difference in the pottery designs and quantities between the northern Kurils and the southern Kurils are reported archaeologically (Sugiura 1999, p.184–185). Between 10th and 12th centuries, the Okhotsk culture was assimilated into the Satsumon culture in the southern Kurils as well as the eastern part of Hokkaido.

The Satsumon culture replaced the Epi-Jomon culture in southern and central Hokkaido in about the 7th century. The site locations of the Satsumon culture show inland orientation rather than the seaside location and its pottery was dispersed to the southern part of Sakhalin, and Tohoku area of the main island, Honshu, and even into the southern islands of the Kurils. After the 13th century when the Satsumon culture disappeared, archaeological evidence became very scarce on Hokkaido. One of the exceptions is earthenware pots with inner lugs which were recovered from a large number of sites in the Kurils. They are thought to be imitations of iron pots brought into Hokkaido, and they fill in an otherwise archaeologically sparse phase of the Ainu

culture in the Kurils. These pots continued into the historic Ainu period.

I. Expansion of Epi-Jomon Period into the Kuril Islands

Results

1. Pottery on Matua Island

We identified two archaeological deposits in Ainu Bay on Matua Island. The first is Ainu Bay 1 and the second one is Ainu Bay 2.

The cultural layer of the columnar section at Ainu Bay 2 (00MAT-5 lat.48°02.511'N. long.153°13.768'E) yielded cord marked shards of Jomon Pottery and a radiocarbon date from charcoal of 2345 ± 37 BP (AA-40943; see Fitzhugh *et al.*, 2002, Fig. 2).

The Jomon shards are characterized by the following 3 characteristics:

1) Inclined impressions with cords (LR) on the surface of the shards.

2) Parallel double impressions with cords (*Josenmon*) around the rim.

3) Absence of small nodules made with round sticks from the inside.

Judging from these characteristics, these pieces can be classified into types associated with the terminal Jomon to Epi-Jomon periods, probably to early Shimodanosawa-type 1, which are assigned to the early Epi-Jomon period in Hokkaido chronology of archaeology (Kumaki 2000, p.44).

Because cord marked ceramics discovered in the past farther northeast beyond Chirpoi Island are limited to surface collection, such as cord marked shards of Jomon Pottery found on Shiashkotan Island (Ishikawa 1894, p.129; Torii 1903, p.26) and on Shumshu (Nomura and Sugiura 1995, p.64), it is noteworthy that cord marked ceramics presented here were definitely confirmed in the cultural layer of the stratigraphic deposit (an illustration of the stratigraphic profile is presented in Fitzhugh *et al.* 2002, Fig. 5).

Figure 2. A cord-marked fragment of pottery affiliated with terminal to Epi-Jomon period at Ainu Bay 2 on Matua Island.

2. Pottery from cliff exposure near the Peschanaya Bay site on Chirpoi Island

The Peschanaya Bay site is located on a dune at the foot of a hill on the eastern end of Chirpoi Island. The western edge of the dune is actively eroding and contains several intact cultural and natural strata in an exposed section at least 5 m deep.

Two thick and obvious cultural layers can be recognized in this section (called the "Camp Profile"). These layers can be divided into an upper level (more clearly exposed in the south of the profile) and a lower level (with several occupation lenses) including Epi-Jomon period ceramics. Radiocarbon dates from this section range from 2290 ± 43 BP (AA-42205) near the base to 1272 ± 58 BP (AA-42203) in the stratigraphically superior deposit in the southern end of the section. The majority of the exposed section yielded radiocarbon dates between 1800 and 2200 BP (radiocarbon; see Fitzhugh *et al.* 2002, Fig. 8).

Epi-Jomon earthenware from the Camp Profile section has the following characteristics used to identify the lower cultural layer and supported by radiocarbon dates presented above (Fig. 3):

1) Inclined impressions with cords (LR) on the surface of the pots.

2) Protuberant ornamentation of small clay attached to the outside of the rim.

3. Kama River Site on Urup Island

Two test trenches named Kama Profile 1 and 2 along the Kama river valley on the southwest end of Urup Island were mapped and tested. The cultural strata and the typological information on the artifacts from the trenches can be outlined as follows.

Kama Profile 1 has 6 cultural levels of which Cultural Level 2 with a radiocarbon date of 916 ± 38 BP (AA-44269) produces Okhotsk (Haritsukemon) Type pottery shards (Fig. 4) and the lower Cultural Level 6 with date of 1621 ± 37 BP (AA-44270) yields pottery belonging to the Epi-Jomon period (a second date on the same charcoal sample is rejected at 1016 ± 38 BP, AA-40949).

Kama Profile 2 also has multiple cultural levels. There are two cultural levels which contain ceramics. One is 120 cm deep from the surface and the other is 200 cm deep. Since most of the pottery is devoid of any diagnostic decoration or design except for an example from the upper layer with horizontal and inclined triple impressions at equal intervals with cords (*Josenmon*) corresponding to the Epi-Jomon period (Fig. 5), it is difficult for us to determine the period based on ceramic typology. Radiocarbon dates from this profile supporting an Epi-Jomon attribution range from 1731 ± 47 BP to 2157 ± 37 BP (Fitzhugh *et al.* 2002, Tab. 2).

Discussion

Synthesis of archaeological collections from several archaeological sites on Urup, Chirpoi, Simushir and Matua reveals that there was a distinctive expansion and stable maritime adaptation of terminal Jomon to Epi-Jomon culture into the middle part of the Kuril Islands. It is currently impossible to know if this occupation was intermittent or continuous; however, the recurrence of Epi-Jomon occupation layers in many of these locations suggests a presence that was successful for several centuries, in whatever form it took.

These facts show that the distribution of pottery from the terminal Jomon period to the first half of the Epi-Jomon period, including the Simodanosawa type, certainly expands farther northeast in the Kuril Islands than had previously been known. While the extent of the earlier Jomon pottery so far appears to be restricted to Hokkaido and southern Kuril Islands (Kumaki 2003, p.69), the early Epi-Jomon people could succeed in enlarging their territory. This demonstrates the features characteristic of the Epi-Jomon culture that inherited the tradition of Jomon and developed further, adapting aptly to the environment (Kimura 1982, pp.162–163). From this evidence it is natural that the chronology and knowledge of Hokkaido archaeology can at least apply as far as the middle part of Kuril Islands. Recent research on the Holocene paleoceanography reveals that the climatic conditions in the southwestern part of the Sea of Okhotsk were cooler in the phase of transition from terminal Jomon to Epi-Jomon than in the several hundreds of years before and after that phase (Shimada *et al.* 2000). It is essential to examine more thoroughly the reason why Epi-Jomon people could expand their territory into the central Kurils during this phase.

Calibrated AMS radiocarbon dates (B.C. 481–379; Fitzhugh *et al.* 2002, p.39) from Ainu Bay 2 on Matua Island seem to roughly coincide with early Epi-Jomon period which was dated back to ca 2200 years B.P. in the traditional cultural chronology of Japan (Kimura 1982, p.143; Utagawa 1995, p.180). However, the beginning of Epi-Jomon period might be reexamined in the near future because a claim is recently advocated that the beginning of Yayoi, and hence the end of Jomon, should be advanced by 500 years based on new calibrated AMS radiocarbon dates (Harunari 2003, pp.7–8; Fujii 2003, p.8).

It is widely known that the Epi-Jomon period was characterized by the expansion and peopling from the Cold-temperate Zone in the previously uninhabited sub-Arctic habitats such as the Kuril Islands and Sakhalin, which are greatly different from Hokkaido (Kumaki 2003, p.69), and it suggests the development of subsistence adaptation to a broader environment including marine resources during that time period. Kohoku culture in the latter half of the Epi-Jomon period further extended southward even to the main island Honshu. The Kuril data suggests that it was difficult to complete full-scale maritime adaptation during the terminal Pleistocene and early Holocene, although it seems likely that sites older than 2500 BP may have existed and may still remain to be discovered in the geologically active Kuril Chain. Regardless of the possibility of older occupations, the results of the 2000 IKIP research provided us new clues for understanding the highly adaptable maritime capabilities of the Epi-Jomon culture. More importantly from the multi-disciplinary and biogeographical perspective of the IKIP project, these findings suggest that at least one major taxa (humans) colonized the Kurils during the Holocene (compare with Pietsch *et al.* 2003).

II. Sea Mammal Sending Ritual on Chirpoi

Results

A Pit Dwelling on Chirpoi Island

House 31 is a semi-subterranean house pit located on the eastern side of a hill and its floor is approximately 4 m in diameter (Fig. 6). The material evidence from the house itself, including a deteriorated gun mechanism and mica fragments, indicates an early colonial occupation

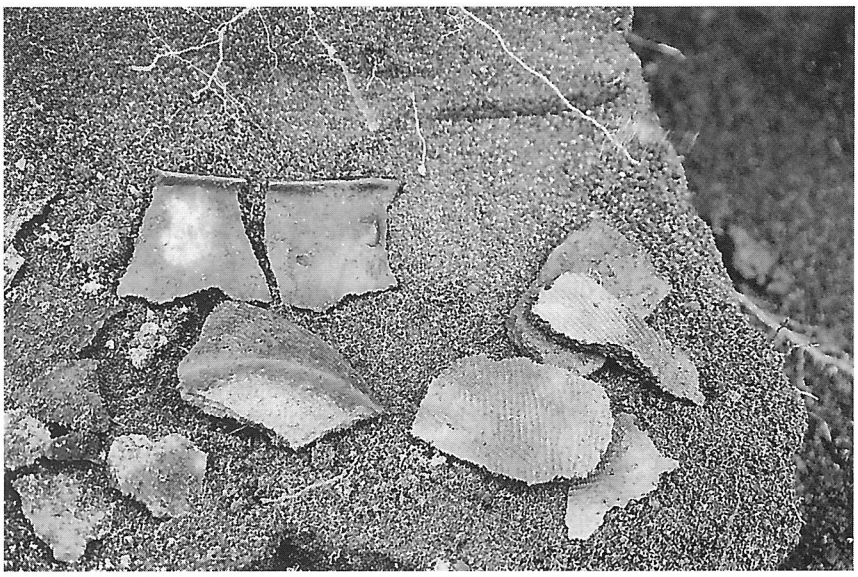

Figure 3. Epi-Jomon pottery chronologically assigned to Shimodanosawa type from the camp profile at Peschanaya Bay 1, Chirpoi Island.

Figure 4. Okhotsk (Haritukemon) type pottery from cultural level 2 of Kama profile 1, Urup Island.

Figure 5. Epi-Jomon pottery from Kama profile 2, Urup Island.

(a radiocarbon date from the hearth is 162 ± 40 BP, AA-40945). Two sets of paired sea lion crania were found just outside of the house walls at the northern and western corners (Fig. 7). Those skulls appear to have been associated with the house pit, based on their placement and best guess marine reservoir effect corrections of radiocarbon dates made on the sea lion crania (Fitzhugh *et al.* 2002, p.79 and Endnote 3). As to the potential ritual significance of these sea mammal features, we will examine that later in the Conclusion.

Discussion

As it is reported in many publications about the ideology of Ainu's Bear Sending Ceremony (or *Iyomante*), the Ainu people believed that all animals hunted daily by them are gods who come from heaven to give them food and furs, and that each type of game has its own spirit: such as the bear with the spirit of the mountain god, the killer whale or the dolphin with the spirit of the god of offing, the owl with the spirit of the guardian god of the settlement (Kôno 1935, p.12–13; Sato 2001, p.113–114).

Prayer at the Ainu Bear Ceremony

"O thou divine one, thou didst come into this world for us to hunt. O thou precious little one, we worship thee; pray hear our prayers. We have nourished thee and brought thee up with great pains and care, and all because we loved thee so much. Now, as thou hast grown big, we are about to send thee to thy parents. When thou comest to them, please speak well of us and tell them how kind we have been to thee. We beseech thee to return to us once more, that we may again entertain thee." ("Ainu Life and Lore" Batchelor J. 1927, p.207)

The Ainu bear (*Ursus arctos*) sending off ceremony or ritual known as "Iyomante," occupied an important position in Ainu ceremonialism. It was divided into two categories, one was performed when and where adult bears were hunted, and the other was carried out during winter at a settlement after raising a bear cub for a few years.

Although animals other than bear were usually treated in the same way as the hunted bear, there were a few cases in which the head was brought back to a settlement. Whenever an animal's spirit was sent off at a settlement, the animal head was fixed and tied with strings of shavings in a crook in the top of a pole leaned against a fence set up at the *nusa* place just outside a dwelling.

Origin of the raising bear ceremony has provoked a great deal of controversy and still remains an unsolved problem (Tezuka and Ikeda 2001). It can be traced back to the Okhotsk culture (Watanabe 1974; Amano 1990; Wakusaka 1993), or to the Satsumon culture (Nishimoto 1989, Nisihomoto and Sato 1991; Sato 1993). On the other hand, there is an argument that the ceremony could have been transferred from the lower Amur basin to the Ainu of Sakhalin and Hokkaido during the 16-17th centuries (Ohyi 1997). Harunari thought otherwise based on the same continental origination theory. He believes that when a custom of raising pigs and their ritualistic treatment originated in the Mohe culture of northeast Asia (c. A.D. 563–742), it spread to Hokkiado, where the custom was transformed to apply to bears in the Okhotsk culture (Harunari 1995).

In the northern part of Hokkaido, components of species remained unchanged (Fig. 8), while in eastern Hokkaido from the Late Okhotsk period they eventually became more complicated with newly added animals such as deer and sea mammals (Fig. 9). It is further suggested by some archaeologists that a predominant religious practice from the end of the Okhotsk period involved display of skulls and mandibles of bears rather than those of various animals outside of a house from the end of the Late Okhotsk period was predominant in its religious practice (Harunari 1995, p.86). Here we wish to consider the extent to which the system of animal ritual, as suggested by the Late Okhotsk components, had an influence upon the Ainu culture which followed.

There is a difference between the Ainu and the

Table 2. Comparison of the Okhotsk and Ainu cultures in terms of animal ritual.

Elements / Culture	Okhotsk Culture	Ainu Culture
Accumulation of Bones	Indoors Dominant	Outdoors Dominant
Skull Piercing	Scarcity of Regularity	Difference of Treatment by Sex
Raising Bear Cub	Less than One Year	A Few Years

Okhotsk cultures (Tab. 2; Fig. 10) based on the evidence of animal rituals. While the former seldom built an accumulation of hunted animals in a dwelling, the latter accumulated such remains in front of the innermost back wall of a house.

However, there were a few cases in which the Okhotsk people piled up skulls and other bones on the outside of dwellings as seen in the stone piling structure built on the paved floor of the abandoned pit house No.2 at the Kabukai A site on Rebun Island, and the accumulation of mainly bear skulls poured into house pit No. 11 at the Sakaeura 2 site in Tokoro, and so forth (Oba and Ohyi 1976, 1981). The stone piling structure, consisting of numerous cobbles, has a round plan some 3 m in diameter and 20 cm in depth, at the base of which 7 skulls of pilot whales and the skull of a dolphin forming a circle were found forth. The scholar reporting this site considers that this structure was involved in rites for whale hunting (Oba and Ohyi 1981). An arrangement of two skulls of seals was confirmed at the back of the oldest pit dwelling No.2 at the Kabukai A site on Rebun Island, dating to the Middle Okhotsk period, along with some bear skulls. On the other hand, in the later pit dwellings there were only bear skull accumulations with no sea mammal skulls. The site reporter, Ohyi recognizes some changes in the ritual thought or treatment of sea mammals by the Okhotsk people (Oba and Ohyi 1981, p.478–479). This suggests that a dichotomy between sea mammals and bears was established in the latter half of the Middle Okhotsk period.

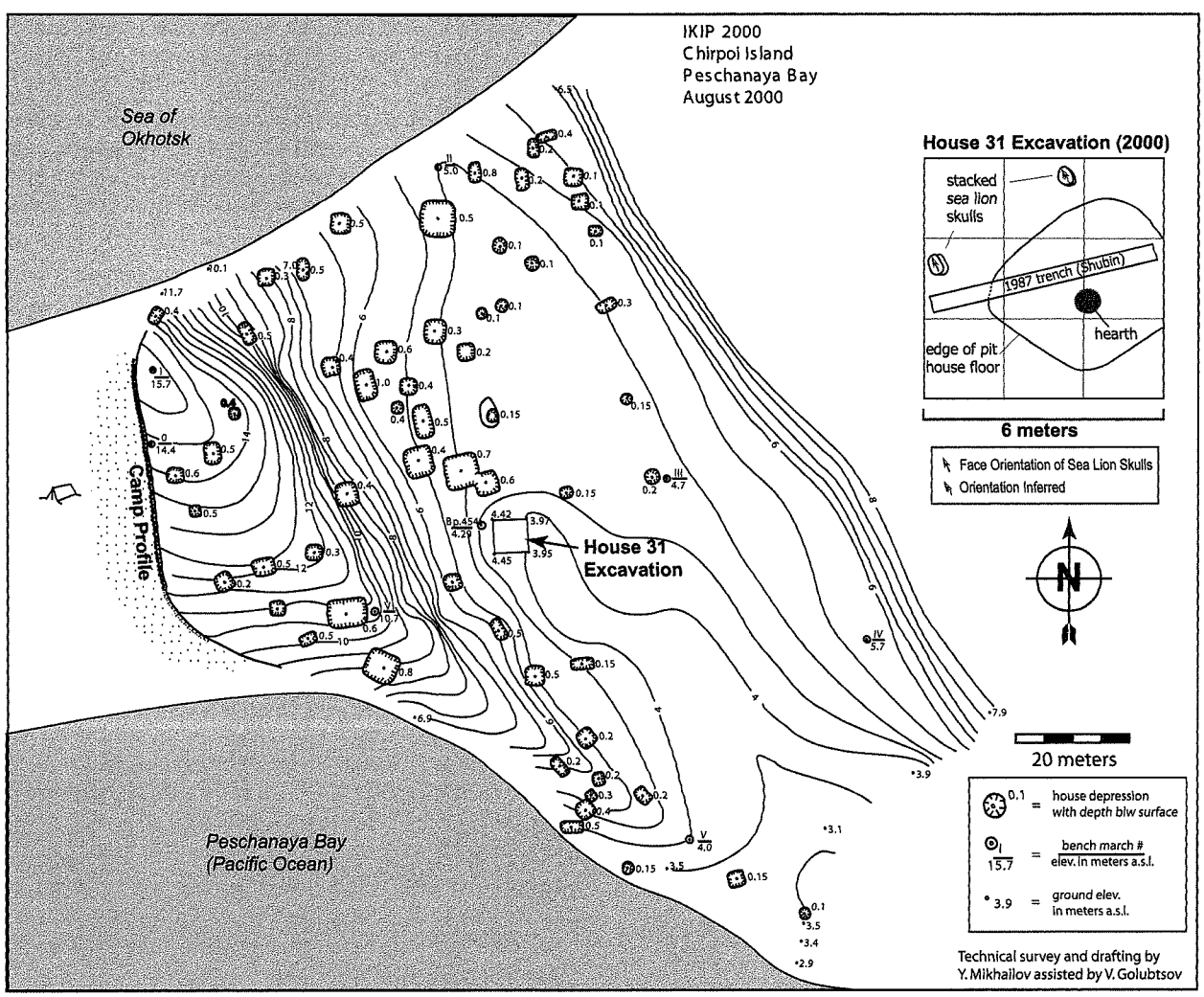

Figure 6. Technical surface map of Peschanaya Bay 1, Chirpoi Island (from Fitzhugh *et al.* 2002, Fig. 6).

Figure 7. Stacked sea lion skulls at the western corner of House 31 at Peschanaya Bay 1 on Chirpoi Island.

Table 3. Regional variations of grave pits of the Okhotsk culture (based on Takabatake 1999).

Element / Loc.	Rebun Is.	Esashi	Abashiri	Shiretoko-Nemuro
Body Position	Flexed	Stretched	Flexed	Flexed
Head Orientation	NW	W-SW	NW	NW
Pot Covering	Absent	Dominate	Dominate	Rare

Conclusion

On the basis of the discussion, it is appropriate to consider the connection between the Chirpoi example and Kuril Ainu's Sea Mammal Ritual. The Okhotsk evidence from Hokkaido and Rebun Island is very instructive since it seems to match the placement of the two sets of sea lion skulls (*Eumetopias jubatus*) placed outside of a semi-subterranean dwelling dating to the late Ainu period (probably about 200 years ago, #1) at the Peschanaya Bay site on Chirpoi Island. We think this is evidence for the first important case of an outdoor ritual site found in the Kuril Islands. The sea lion skulls were from adults.

These skulls were placed 100 cm outside of the north and west corners of the dwelling with the heads facing northwest. It seems probable that the Ainu inhabitants of the house concerned themselves with the sending off practice of the spirits of sea lions. Evidence that the Ainu's ritual treatment of animal and human skulls resembles each other can be seen in an example of Tokachi district presented by Kôno (1935). The NW direction is predominant in all grave sites of the Okhotsk culture except in the Esashi district (Tab. 3; Fig. 11). It is reported that the head orientation of a total of 16 Ainu grave pits is not E but W direction on Shumshu Island (Kodama 1939, p.45), the truth is consist with the ethnographic data for Kuril Ainu (Hayashi 1953, p.340). The Kuril Ainu's head orientation may have someting to do with the Okhotsk tradition since the Hokkaido Ainu's head orientation in their graves generally concentrates on East-South East directions (Tamura 1983, p.54; Hirakawa 1984, p.410). As is supported by some archaeologists, some traits of the Okhotsk culture were inherited by the Hokkaido Ainu by way of the Satsumon people, whereas the Sakhalin Ainu or the Kuril Ainu derived other traits directly from the Okhotsk culture (Kikuchi 1984, p.345; Utagawa 2001, p.466).

However, it is not clear under present conditions whether two sets of sea lions were pointing in a NW direction intentionally or casually. Furthermore, those skulls are several hundreds years later than the last Okhotsk people. In any event, in order to reach a stable conclusion, it is necessary to have several more cases.

Since the Kuril Ainu were adapting to a remote and isolated environment, it might be thought that they depended primarily on marine resources. However, ethnographic data on the Kuril Islands from the 19th century suggests that they did not really develop a significant ritual and creed system for sea mammals. It is hence difficult to confirm the positive cultural relationship between the Kuril Ainu and sea mammals and birds from the ethnographies and reports dealing with them. The influence of the Russian Orthodox Church is pointed out for this reason (Sasaki 1996). Although it is not possible to assume from ethnographic data on the modern Kuril Ainu, the Kuril Ainu in an earlier stage before the contact period must have adopted the tradition with respect to sea mammals' rituals from the Okhotsk culture.

The Ainu culture originated in northern Japan about 800 yr BP. The routes and times of the spread of their culture through the Kuril Islands are relatively well

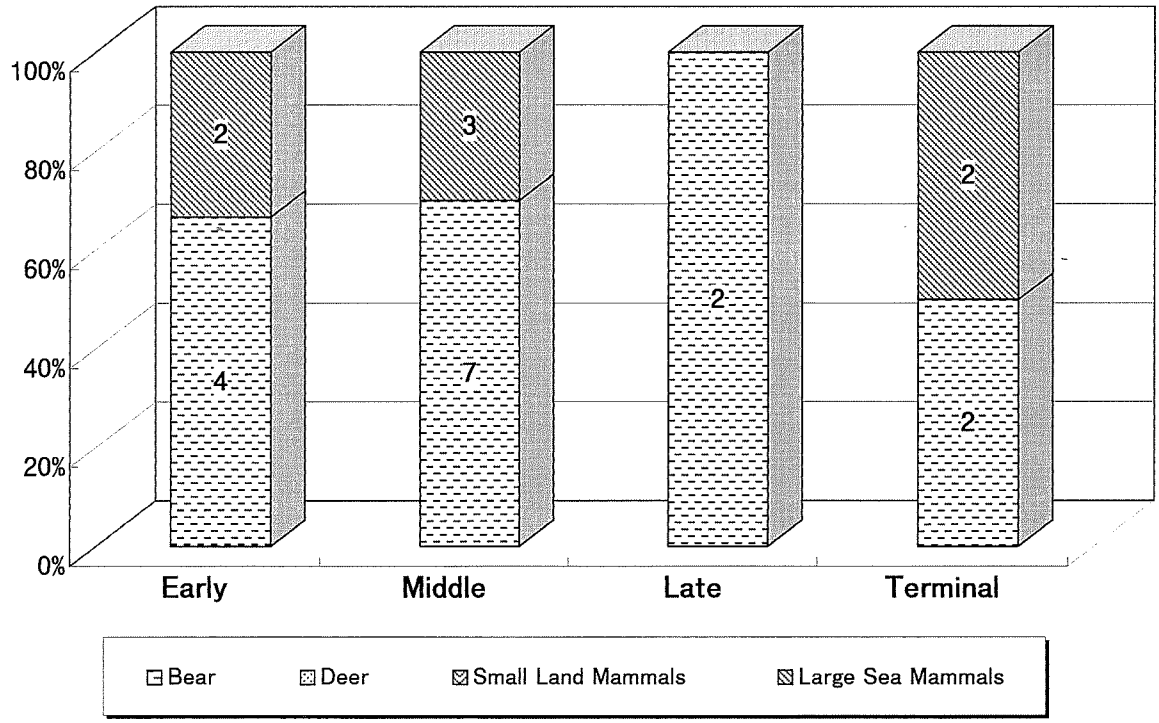

Figure 8. Change of species during periods of the Okhotsk culture based on bones from middens in the back of dwellings in northern Hokkaido (after Sato 2000).

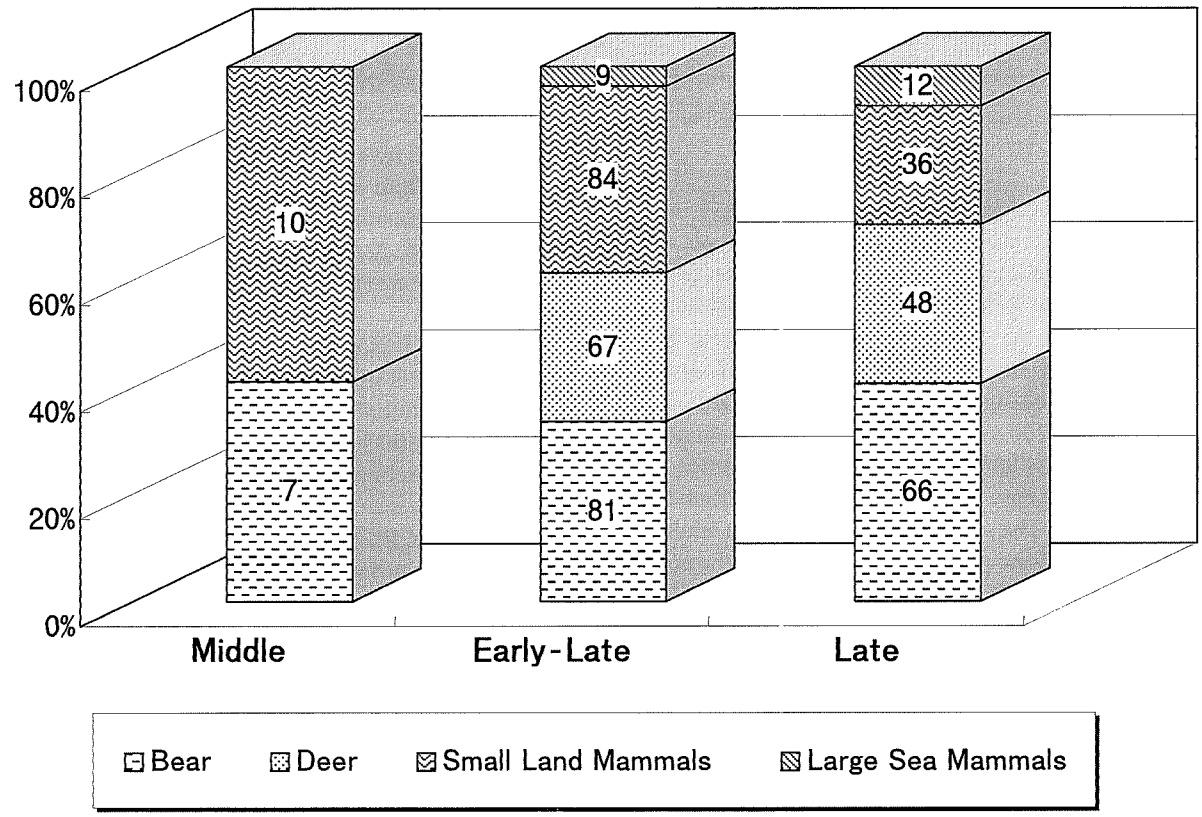

Figure 9. Change of species during periods of the Okhotsk culture based on bones from middens in the back of dwellings in eastern Hokkaido (after Sato 2000).

established (Kikuchi 1995, p.355), but not its manner of transition from the antecedent Okhotsk culture.

Discovery of two sets of sea lion skulls placed outside of a semi-subterranean house dating to the late Ainu period on the Peschanaya Bay site on Chirpoi Island is a very rare but important opportunity not only to reconstruct the spiritual life of this isolated chain of islanders, but also to provide a specific clue to the comprehension of the cultural transition.

While these findings may represent localized

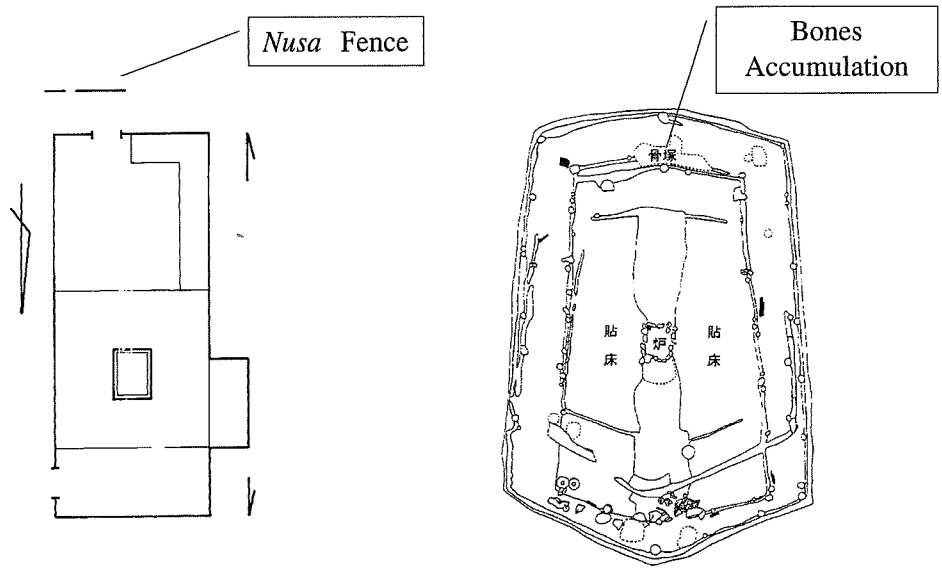

Figure 10. A comparison of dwellings between the Ainu and the Okhotsk cultures.

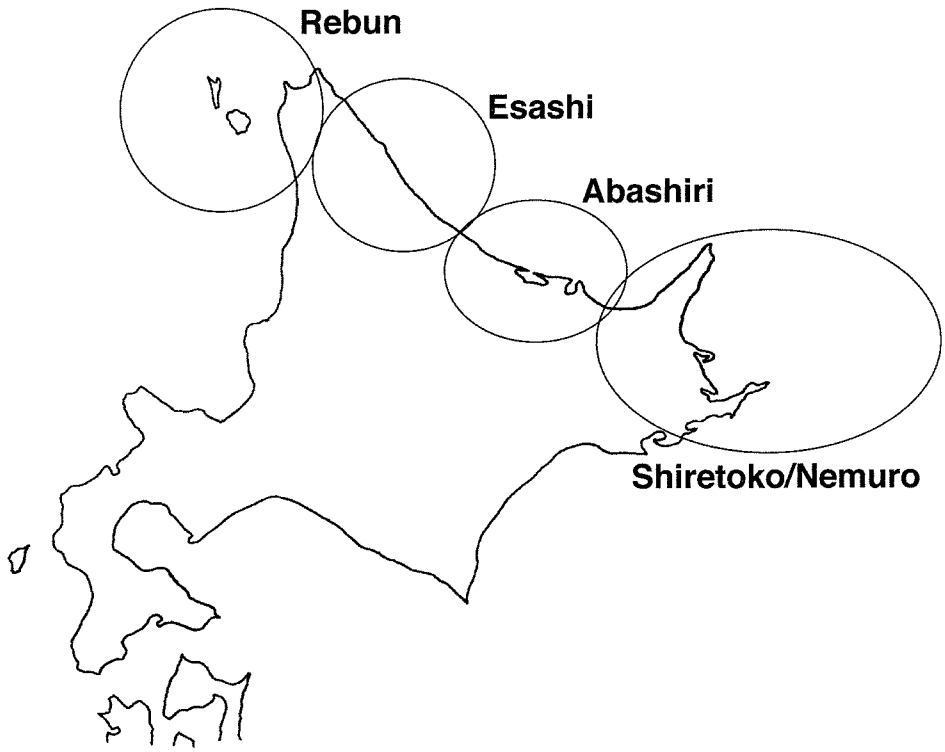

Figure 11. Regional groups of grave sites of the Okhotsk culture.

adaptations to special conditions on these islands more dependent on near-shore readily encountered and captured marine mammals than on land large mammals such as bears, they call for expansion of the understanding of Ainu animal rituals. While brown bear were predominant in Hokkaido ritual, sea lions and other marine mammals appear to have been important in Kuril Ainu ceremonies.

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Endnote

#1 The radiocarbon date from a fragment of one of the skulls returned a date of 825±36 BP. (AA-40946). With reservoir correction, this calibrated date approximately

A.D. 1850 and is approximately consistent with the charcoal date from the hearth of House 31 (Fitzhugh *et al.* 2002, p.83).

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