

ON TAXONOMY OF SOME HEPATICS FROM PRIMORSKY TERRITORY  
(RUSSIAN FAR EAST), WITH THE LIST OF TAXA OF THE TERRITORY  
О ТАКСОНОМИИ НЕКОТОРЫХ ПЕЧЕНОЧНИКОВ ПРИМОРСКОГО  
КРАЯ (РОССИЙСКИЙ ДАЛЬНИЙ ВОСТОК) СО СПИСКОМ ТАКСОНОВ,  
ИЗВЕСТНЫХ В КРАЕ

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Abstract

The paper provides some taxonomic comments on hepatics in Primorsky Territory, including one species described as new to science (*Leiocolea ussuriensis* Bakalin). The diagnostic characters of the new species include paroicous inflorescence, very small size of shoots and not beaked perianth mouth. Currently 177 species are known from Primorsky Territory; their list is supplemented.

Резюме

Приводятся комментарии о таксономии некоторых печеночников, известных в Приморского крае, включая один вид, описанный как новый для науки (*Leiocolea ussuriensis* Bakalin). Характерными чертами нового вида являются обополость (пареция), мелкие размеры растений и периантий не клювовидный на верхушке. В настоящее время в Приморском крае известно 177 видов печеночников; приводится их список.

KEYWORDS: liverworts, taxonomy, *Calypogeia*, *Leiocolea*, *Pedinophyllum*, *Porella*, *Reboulia*, Russia, Primorsky Territory, biodiversity

The study of hepatics in Primorsky Territory was started in the middle XIX century. The history was overviewed by Gambaryan (1992) and Bakalin (2008a). Up to now the main publication on the hepatics of the area is the monograph "Hornworts and Liverworts of South Primorsky" (Gambaryan, 1992), where her own and scattered literature data on 132 hepatics were summarized. Since 1992, four papers were published (Gambaryan, 2001; Potemkin, 2003, 2004; Bakalin, 2007). Additional results were obtained in the autumn of 2008. Some of them were reported by Bakalin (2008b), while others that need more expanded comments are discussed in the present paper.

Currently 177 species of liverworts and hornworts are recorded in Primorsky Territory (see Appendix), and this is a rather high diversity (comparing with the other regions of Russia), more-

over all these data were collected only in its southern part (south of 45°N). The flora is outstanding in a number of specific elements: 20 species are known in Russia only from this area. They are representing mostly East Asian temperate elements, occurring however in this area in fir and spruce forests, e.g. *Porella chinensis*, *Plicanthus birmensis*, *Cephaloziella spinicaulis*, etc. (Bakalin, 2008a; Bardunov et al., 2008).

Below are comments on some taxa.

1. *Calypogeia* in Primorsky Territory.

Gambaryan (1992) listed two species for the territory: *C. muelleriana* and *C. neesiana*. Four species were added recently: *C. integristipula* Steph. (Bakalin, 2007), *C. azurea*, *C. neogaea*, *C. suecica* (Bakalin, 2008b). Below is a key for their identification:

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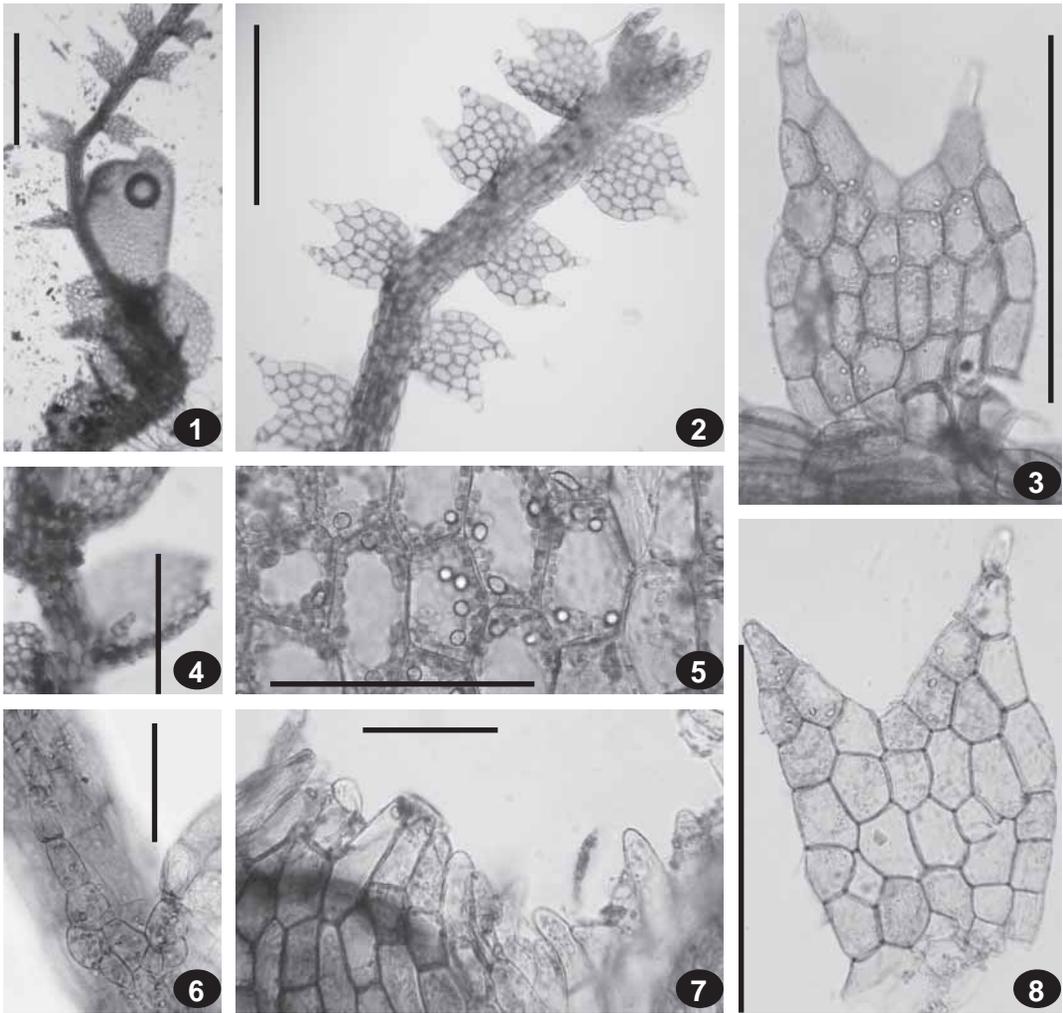


Fig. 1. *Leiocolea ussuriensis* Bakalin (from holotype, VLA): 1 – perianthous plant; 2 – sterile plant; 3 – leaf; 4 – male bract; 5 – midleaf cells; 6 – underleaf; 7 – perianth mouth; 8 – leaf. Scale bars: 200  $\mu\text{m}$  for 1-4, 8; 50  $\mu\text{m}$  for 5-7.

1. Underleaves rounded with retuse or weakly 2-lobed apex, appressed to the stem; leaves imbricate, leaf apex rounded; plants green to bluish ..... 2
- Underleaves with deeply (below 1/2 of the length or nearly so) 2-lobed apex, deflexed away the stem; leaves deflected away the stem, leaf apex frequently apiculate to acute and shortly 2-lobed, rarely rounded; plants green and bluish to brownish ..... 3
2. Leaf marginal cells mainly elongate (at least 50% nearly twice longer than width); oil bodies absent in midleaf cells ..... *C. neesiana*
- Leaf marginal cells subquadrate; oil bodies present in midleaf cells . . . *C. integristipula*
3. Cells in the midleaf 25-35  $\mu\text{m}$  wide, trigones commonly present; underleaves twice or more wider than stem; oil bodies grayish ..... *C. suecica*
- Cells in the midleaf mostly wider 35  $\mu\text{m}$ , trigones absent; underleaves less than twice wider than stem or if twice or more wider, then oil bodies dark blue ..... 4
4. Underleaf undivided lamina 2-3 cells high, underleaves 1.0-1.5 times wider than stem; leaf apex acute, or, sometimes, shortly bidentate; oil bodies grayish ..... *C. neogaea*
- Underleaf undivided lamina more than 4 cells high, underleaves 1.1-2.5 times wider than stem; leaf apex mainly entire; oil bod-

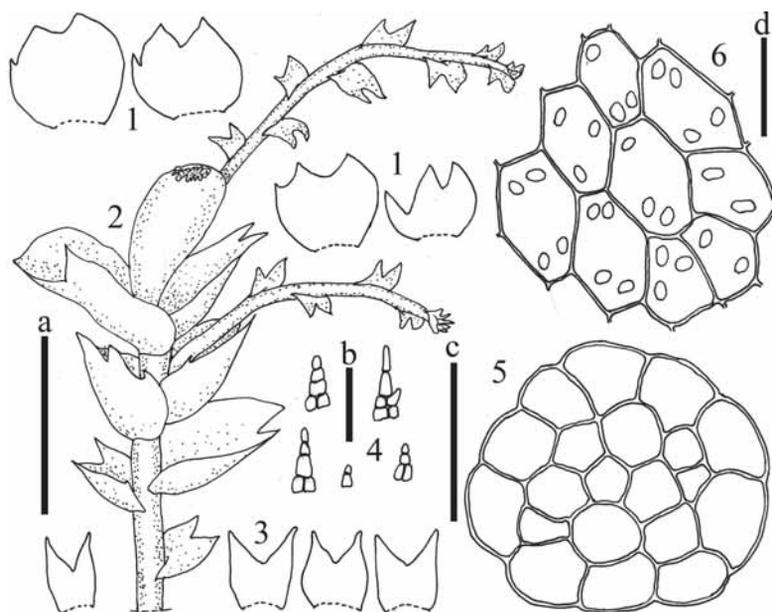


Fig. 2. *Leiocolea ussuriensis* Bakalin. 1 – antheridial bracts; 2 – plant habit; 3 – leaves; 4 – underleaves; 5 – stem cross section; 6 – cells in the midleaf. Scales: a – 500  $\mu$ m, for 1–3, b – 100  $\mu$ m, for 4, c – 30  $\mu$ m, for 5, d – 20  $\mu$ m, for 6. All from holotype, VLA.

ies grayish or dark blue (the correct identification is only possible in presence living cells for study) ..... 5

- 5. Oil bodies dark blue; underleaves frequently with additional teeth near base (on one or both sides); plants bluish to (rarely) slightly brownish ..... *C. azurea*
- Oil bodies grayish; underleaves with entire margin; plants green, yellowish green to brownish ..... *C. muelleriana*

**2. *Leiocolea ussuriensis* Bakalin sp. nov.**

*Plantae paroicae, decumbentis, vivide virides vel brunneolae, 0.25–0.35 mm lato. Caules in sectione transversali 40–60  $\mu$ m in diametro. Folia horizontaliter inserta, lobis aequalibus vel subaequalibus, cuticula striolato-verrucosa. Perianthium ad orem abrupte contractum.*

Holotypus: Russian Far East. Primorsky Territory: Ussurijsky Nature Reserve, Koryavaya Pad', Zmeinaya Mt. (43°38'N – 132°33'E), 214 m alt. Shady crevices in limestone cliffs in broad-leaved forest. leg. V.A. Bakalin 15.X.2008 P-64-10-08 (VLA).

Plants 2–4 x 0.25–0.35(–0.5) mm, up to 0.7 mm near perianth, prostrate, deep green to brownish in old parts. Stems ca. 40–60  $\mu$ m in diameter, sparsely branching, transverse section with 6–8(–10) outer and 6–8 inner cells, cell walls thin, ven-

tral surface dirty green; rhizoids sparse, but common in fertile shoots near apex, originated in dorsal side of stem at right angle ca. 1 mm length. Leaves succubous horizontally inserted, spreading, distant, flat, trapezoidal to widely ovate, 170–220 x 150–200  $\mu$ m, subequal lobes divided by U-shaped sinus descending up to 1/4–1/3 of leaf length, lobes with acute apices, frequently ending by 2 superposed cells; cells of midleaf nearly subquadrate to rectangular, 27–32 x 25–30  $\mu$ m, at base up to 35–35  $\mu$ m; cuticle faintly striolate verrucose, walls thin, trigones absent; oil-bodies spherical and 3.5–4.5  $\mu$ m in diameter or ovate 5–7 x 3–5  $\mu$ m, faintly papillose, 2–4(–5) per cell, grayish; underleaves absent or irregular, filiform, 2–4 cells (60–110  $\mu$ m) long. Specialized asexual reproduction not found. Sexual condition paroicous. Androecia below perianth with one pair of bracts, 2–3-lobed with additional teeth near dorsal base, ca. 0.35 x 0.35 mm; antheridia one per bract. Gynoecea terminal, with 1-2 innovations, female bracts in 1 pair, trapezoidal to widely ovate, entire, ca. 0.35 x 0.35 mm, divided to 1/4 of their length into 2 acute lobes with entire margin by angular sinus, not connate, bracteole absent. Perianth exerted to 2/3–3/4 of its length, cylindrical, tightened to mouth, ca. 0.8–1.0 x 0.2–0.25 mm, mouth dentate with teeth to 3 cells long, 1-stratose; with some ventral innovations. Mature sporophyte unknown,

Table 1. A comparison of *L. ussuriensis* with the related species (\* – based on Kitagawa, 1966).

Character	<i>L. ussuriensis</i>	<i>L. mayebarae</i> *	<i>L. chichibuensis</i> *
Width of shoots, mm	0.25–0.35	0.4–0.8	0.3–0.7
Diameter of stem, $\mu\text{m}$	40–60	60–90	80–120
Size of leaves, mm	0.17–0.22 x 0.15–0.2	0.2–0.4 x 0.15–0.4	0.4–0.6 x 0.3–0.5
Cells in the midleaf, $\mu\text{m}$	27–32 x 25–30	40–60 x 28–33	40–60 x 28–35
Trigones	absent	absent	distinct, minute
Leaf cuticle	faintly striolate verrucose	faintly striate-verrucose	papillose or striate-verrucose
Oil-bodies in midleaf cells	spherical 3.5–4.5 $\mu\text{m}$ , to ovate 5–7 x 3–5 $\mu\text{m}$ faintly papillose, 2–4(–5) per cell, grayish	elliptical to spherical, 5–10 $\mu\text{m}$ “in long diameter”, faintly papillose, 2–6 per cell, brownish gray	elliptical to fusiform, 4–6 $\mu\text{m}$ “in long diameter”, finely granular, 2–6 per cell
Underleaves	absent or irregular filiform	occasionally present, rudimentary, setulose	distinct but often disappearing, lanceolate to oblong-ovate, 0.1 mm long, 2–5 cells wide at base, acute, occasionally with 1–2 teeth along margin
Sexual condition	paroicous	dioicous	paroicous or synoicous
Size and exertion of perianth	exerted to 2/3–3/4 of its length, cylindrical, tightened to mouth, ca. 0.8–1.0 x 0.2–0.25 mm	wholly emergent, cylindrical, contracted to mouth	wholly emergent, cylindrical, weakly pluriplicate near mouth, rather suddenly contracted

only very young ovate capsule found within perianth (Figs. 1, 2).

Another specimen examined:

Paratypus: Russian Far East. Primorsky Territory: Nakhodka Municipality District, Sestra Mountain (42°50'N – 133°00'E), 332 m alt. Shady crevices in limestone cliffs in *Quercus* forest. leg. V.A. Bakalin 17 Oct. 2008 P-70-2a-08 (VLA).

The species is more closely related to *Leiocolea mayebarae* (S. Hatt.) Furuki et Muzut. and *L. chichibuensis* (H. Inoue) H. Inoue (both are known only from Japan). Their distinction is given in Table 1.

The diagnostic characters of the new species include paroicous inflorescence, very small size of shoots (comparatively with other *Leiocolea* species). The most closely morphologically related species in our flora is *Leiocolea badensis*. It differs from the new species in dioicous inflorescence and shoots 0.3–0.8 mm wide. Worldwide two more species, *L. chichibuensis* and *L. mayebarae*, are allied to *L. ussuriensis*, but they differ in larger plants, and in addition *L. mayebarae* is dioicous, and *L. chichibuensis* has regular and considerably larger underleaves.

Currently the species is known from two collections only and data on its ecology is incomplete. Both collections are from limestone.

### 3. *Pedinophyllum* in Primorsky Territory.

*Pedinophyllum* includes 4 morphologically very similar species (Inoue, 1966). Two of them, *P. interruptum* and *P. truncatum*, occur in Russia. Their differences are rather small and *P. truncatum* is frequently treated as a subspecies of *P. interruptum* (Inoue, 1958). According to my observation, the species can be separated only basing on living material with oil bodies, but even in this case not always.

The species can be keyed as follow:

1. Oil bodies 4–8 per midleaf cell; spores 12–15  $\mu\text{m}$  in diameter, elaters 180–200 x 15  $\mu\text{m}$   
..... *P. interruptum*
- Oil bodies 8–14 per midleaf cell; spores 9–12  $\mu\text{m}$  in diameter, elaters ca. 90 x 9–10  $\mu\text{m}$   
..... *P. truncatum*

### 4. *Porella caespitans* in Primorsky Territory.

*Porella caespitans* is malleable in morphology and includes at least 5 varieties (Hattori, 1970). In Russian Far East two varieties are known, and they can be distinguished by the following key:

1. Dorsal leaf lobe long lingulate with obtuse apex, underleaves lingulate, with obtuse to truncate apex .. *P. caespitans* var. *caespitans*

- Dorsal lobe lanceolate with apex obtuse, subacute or with short setose tooth, underleaves mostly truncate and bidentate .....

*P. caespitans* var. *setigera* (Steph.) S. Hatt.

### 5. *Reboulia hemisphaerica* in Russia.

Schuster (1992) combined all the 7 subspecies of this species with almost cosmopolitan distribution, based mainly on inflorescences types (paroicous, dioicous and autoicous) and other features of sex organs as well. He also noted that “criteria separating populations are, in part, ambiguous” (l.c.: 160). I studied available material of *R. hemisphaerica* in VLA and found all samples in Russian Eastern Siberia are paroicous, in Sakhalin Island are autoicous, but in Primorsky Territory are both dioicous, paroicous and autoicous. Moreover, all three races were found in one small mountain (about 330 m alt.). In general, these observations rather support Schuster (l.c.), but certain differences in distribution of sexual types indicate that this problem may need further study. The key to subspecies found in Asian Russia can be as follow:

1. Plants monoicous ..... 2
- Plants dioicous [in Russia in Primorsky Territory only] .....  
*R. hemisphaerica* ssp. *dioica* R.M. Schust.
2. Plants autoicous [in Russia in Primorsky Territory, Sakhalin and Southern Kuril Islands].  
*R. hemisphaerica* ssp. *orientalis* R.M. Schust.
- Plants paroicous [most common subspecies in Russia, but not found in Sakhalin and Kurils]  
..... *R. hemisphaerica* ssp. *hemisphaerica*

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#### LITERATURE CITED

- BAKALIN, V. A. 2007. New liverwort records from Primorsky Territory. 1. – *Arctoa* **16**: 199-200.
- [BAKALIN, V. A.] БАКАЛИН В.А. 2008а. Особенности флоры печеночников юга российского Дальнего Востока – [Features of the liverwort flora of the Russian Far East] *Bot. Zhurn.* **93**(10): 1537-1544.
- BAKALIN, V.A. 2008b. New liverwort records from Primorsky Territory (Russian Far East). – *Arctoa* **17**: 221-226.
- [BARDUNOV, L. V., V. YA CHERDANTSEVA & V. A. BAKALIN] БАРДУНОВ Л.В., В.Я. ЧЕРДАНЦЕВА, В.А. БАКАЛИН 2008. Субтропические виды в бриофлоре южной части российского Дальнего Востока – [Subtropical species in the bryoflora of the Russian Far East] *Bot. Zhurn.* **93**(2): 263-270.
- [GAMBARYAN, S. K.] ГАМБАРЯН С. К. 1992. Антоцеротовые и печеночники Южного Приморья. – [Hornworts and Liverworts of South Primorsky] *Владивосток, Дальнаука [Vladivostok, Dal' nauka]*, 172.
- [GAMBARYAN, S. K.] ГАМБАРЯН С. К. 2001. Печеночники Сихотэ-Алинского заповедника (Приморский край). – [Liverworts of the Sikhote-Alin Reserve (Primorsky Territory)] *Arctoa* **10**: 31-42.
- HATTORI, S. 1970. Studies on Asiatic species of the genus *Porella* (Hepaticae). III. – *J. Hattori Bot. Lab.* **33**: 41-87.
- INOUE, H. 1958. The family Plagiochilaceae of Japan and Formosa. I. – *J. Hattori Bot. Lab.* **19**: 25-59.
- INOUE, H. 1966. Contribution to the knowledge of the Plagiochilaceae of southeastern Asia, IX. *Plagiochila autoica* Steph, with a review of *Pedinophyllum*. – *Bull. Nat. Sci. Mus. Tokyo* **9**(4): 571-575.
- KITAGAWA, N. 1966. A revision of the family Lophoziaceae of Japan and its adjacent regions. II. – *J. Hattori Bot. Lab.* **29**: 101-149.
- [ПОТЕМКИН, А. Д.] ПОТЕМКИН А. Д. 2003. Новые и малоизвестные для России печеночники с Камчатки и из Приморского края (Российский Дальний Восток) – [New and little-known for Russia hepatics from Kamchatka and Primorskiy Territory] *Arctoa* **12**: 75-82.
- [ПОТЕМКИН, А. Д.] ПОТЕМКИН А. Д. 2004. *Heteroscyphus* (Geocalycaceae, Hepaticae) - новый род печеночников для России. – [Heteroscyphus (Geocalycaceae) - a new liverwort genus for Russia] *Arctoa* **13**: 67-72.
- SCHUSTER, R. M. 1992. The Hepaticae and Anthocerotae of North America. Vol. VI. – *Chicago, Field Museum of Natural History*, 937.

#### APPENDIX

A list of Primorsky Territory hepatics (species that were checked by author are marked by exclamation mark !).

- ! *Anastrophyllum michauxii* (F. Weber) H. Buch (Gambaryan, 1992, 2001)
- ! *Aneura pinguis* (L.) Dumort. (Gambaryan, 1992, 2001)
- Anomylia cuneifolia* (Hook.) R.M. Schust. (Gambaryan, 1992)
- ! *Anthoceros agrestis* Paton (Gambaryan, 1992; Bakalin, 2008b)
- ! *Apometzgeria pubescens* (Schrank) Kuwah. (Gambaryan, 1992, 2001)
- ! *Asterella leptophylla* (Mont.) Grolle (Gambaryan, 1992)
- ! *Athalamia nana* (Shim. et S. Hatt.) S. Hatt. (Gambaryan, 1992; Bakalin, 2008b)
- ! *Barbilophozia barbata* (Schmid. ex Schreb.) Loeske (Gambaryan, 1992, 2001)
- ! *B. hatcheri* (Evans) Loeske (Bakalin, 2007)

- ! *B. lycopodioides* (Wallr.) Loeske (Gambaryan, 2001)  
 ! *Bazzania bidentula* (Steph.) Steph. (Gambaryan, 1992, 2001)  
 ! *B. japonica* (Sande Lac.) Lindb. (Gambaryan, 1992)  
 ! *B. ovifolia* (Steph.) Hatt. (Gambaryan, 1992, 2001)  
 ! *B. tricrenata* (Wahlenb.) Lindb. (Gambaryan, 1992, 2001)  
 ! *B. trilobata* (L.) S. Gray (Gambaryan, 1992, 2001)  
 ! *Blasia pusilla* L. (Gambaryan, 1992, 2001)  
 ! *Blepharostoma minus* Horikawa (Bakalin, 2008b)  
 ! *B. trichophyllum* (L.) Dumort. (Gambaryan, 1992, 2001)  
 ! *Calycularia crispula* Mitt. (Bakalin, 2007)  
 ! *Calyptogea azurea* Stotler et Crotz (Bakalin, 2008b)  
 ! *C. integristipula* Steph. (Bakalin, 2007)  
 ! *C. muelleriana* (Schiffn.) Mull.Frib. (Gambaryan, 1992, 2001)  
 ! *C. neesiana* (C. Massal. et Carest) Mull.Frib. (Gambaryan, 1992, 2001)  
 ! *C. neogaea* (R.M. Schust.) Bakalin (Bakalin, 2008b)  
 ! *C. suecica* (Arnell et J. Perss.) Mull. Frib. (Bakalin, 2008b)  
 ! *Cephalozia bicuspidata* (L.) Dumort. (Gambaryan, 1992)  
 ! *C. catenulata* (Huebener) Lindb. (Bakalin, 2007)  
 ! *C. connivens* (Dicks.) Lindb. (Gambaryan, 1992)  
 ! *C. leucantha* Spruce (Gambaryan, 1992, 2001)  
 ! *C. lunulifolia* (Dumort.) Dumort. (Gambaryan, 1992, 2001)  
 ! *C. otaruensis* Steph. (Gambaryan, 1992)  
 ! *Cephaloziella divaricata* (Sm.) Schiffn. (Gambaryan, 1992)  
 ! *C. spinicaulis* Douin Gambaryan, 1992 (Bakalin, 2008b)  
 ! *Cheilolejeunea obtusifolia* (Steph.) S. Hatt. (Bakalin, 2007)  
 ! *Chiloscyphus fragilis* (A.Roth) Schiffn. (Bakalin, 2007)  
 ! *C. pallescens* (Ehrh. ex Hoffm.) Dumort. (Gambaryan, 1992, 2001)  
 ! *C. polyanthos* (L.) Corda (Gambaryan, 1992, 2001)  
 ! *C. rivularis* (Schrad.) Hazsl. (Gambaryan, 1992, 2001)  
 ! *Cladopodiella fluitans* (Nees) H. Buch (Gambaryan, 1992)  
 ! *Cololejeunea japonica* (Schiffn) S. Hatt. in Mizut. (Potemkin, 2003)  
 ! *C. ornata* A.W. Evans (Gambaryan, 2001; Bakalin, 2008b)  
 ! *Conocephalum conicum* (L.) Und. (Gambaryan, 1992, 2001)  
 ! *C. japonicum* (Thunb.) Grolle (Gambaryan, 1992, 2001)  
 ! *Crossogyna autumnalis* (DC) Schljakov (Gambaryan, 1992, 2001)  
 ! *Diplophyllum obtusifolium* (Hook.) Dumort. (Gambaryan, 1992)  
 ! *D. taxifolium* (Wahlenb.) Dumort. (Gambaryan, 1992, 2001)  
 ! *Fossombronia alaskana* Steere et Inoue (Bakalin, 2008b)  
 ! *Frullania appendiculata* Steph. (Gambaryan, 1992, 2001, as *F. moniliata* auct. non (Reinw. et al.) Mont.)  
 ! *F. bolanderi* Aust. (Gambaryan, 1992, 2001)  
 ! *F. crispilicata* Yuzawa et S. Hatt. (Gambaryan, 1992)  
 ! *F. davurica* Hampe (Gambaryan, 1992, 2001)  
 ! *F. dilatata* (L.) Dumort. (Gambaryan, 1992, 2001)  
 ! *F. diversitexta* Steph. (Gambaryan, 1992)  
 ! *F. fuscovirens* Steph. (Bakalin, 2007)  
 ! *F. inflata* Gottsche (Gambaryan, 1992, 2001)  
 ! *F. kopenhagenii* S. Hatt. (Gambaryan, 1992)  
 ! *F. muscicola* Steph. (Gambaryan, 1992, 2001; Bakalin, 2008b)  
 ! *F. parvistipula* Steph. (Gambaryan, 2001)  
 ! *F. polyptera* Tayl. (Bakalin, 2008b)  
 ! *F. taradakensis* Steph. (Gambaryan, 1992, 2001)  
 ! *Geocalyx graveolens* (Schrad.) Nees (Gambaryan, 1992, 2001)  
 ! *G. cf. lancistipulus* (Steph.) S. Hatt. (Bakalin, 2008b)  
 ! *Gymnocolea inflata* (Huds.) Dumort. (Gambaryan, 1992)  
 ! *Harpanthus flotovianus* (Nees) Nees (Gambaryan, 1992, 2001)  
 ! *H. scutatus* (F. Weber et D. Mohr) Spruce (Bakalin, 2008b)  
 ! *Hattorianthus erimonus* (Steph.) R.M. Schust. et Inoue (Gambaryan, 1992; Bakalin, 2008b)  
 ! *Herbertus aduncus* (Dicks.) Gray (Gambaryan, 1992)  
 ! *H. dicranus* (Taylor ex Gottsche et al.) Trevis. (Bakalin, 2007; Bakalin, 2008b)  
 ! *Heteroscyphus planus* (Mitt.) Schiffn. (Potemkin, 2004)  
 ! *Isopaches bicrenatus* (Schmid. ex Hoffm.) Buch (Bakalin, 2007)  
 ! *Jubula japonica* Steph. (Gambaryan, 1992; Bakalin, 2008b)  
 ! *Jungermannia atrovirens* Dumort. (Bakalin, 2007; Bakalin, 2008b)  
 ! *J. exsertifolia* Steph. (Potemkin, 2003; Bakalin, 2008b)  
 ! *Leiocolea heterocolpos* (Thed. ex Hartm.) H. Buch (Bakalin, 2007)  
 ! *L. ussuriensis* Bakalin (present paper)  
 ! *Lejeunea cavifolia* (Ehrh) Lindb. (Gambaryan, 1992, 2001)  
 ! *L. japonica* Mitt. (Gambaryan, 1992, 2001)  
 ! *Lepidozia reptans* (L.) Dumort. (Gambaryan, 1992, 2001)  
 ! *Liochlaena subulata* (Evans) Schljak. (Gambaryan, 1992, 2001)  
 ! *Lophocolea bidentata* (L.) Dumort. (Gambaryan, 1992)  
 ! *L. cuspidata* (Nees) Limpr. (Bakalin, 2007)  
 ! *L. heterophylla* (Schrad.) Dumort. (Gambaryan, 1992, 2001)

- ! *L. minor* Nees (Gambaryan, 1992, 2001)  
 ! *Lophozia excisa* (Dicks.) Dumort. (Gambaryan, 1992)  
 ! *L. lantratoviae* Bakalin (Bakalin, 2007)  
 ! *L. propagulifera* (Gottsche) Steph. (Gambaryan, 1992, as *L. jurensis* Meyl.)  
 ! *L. sudetica* (Nees ex Hueb.) Grolle (Gambaryan, 1992)  
 ! *L. ventricosa* (Dicks.) Dumort. var. *longiflora* (Nees) Macoun (Gambaryan, 1992, 2001)  
 ! *Macrodiplophyllum microdontum* (Mitt.) H.Perss. (Gambaryan, 1992, 2001)  
 ! *M. plicatum* (Lindb.) H.Perss. (Gambaryan, 1992, 2001)  
 ! *Macvicaria ulophylla* (Steph.) S. Hatt. (Gambaryan, 1992, 2001)  
 ! *Mannia fragrans* (Balb.) Frye et Clark (Gambaryan, 1992; Bakalin, 2008b)  
 ! *M. pilosa* (Horn) Frey et Clark (Gambaryan, 1992; Bakalin, 2008b)  
 ! *Marchantia alpestris* (Nees) Burgeff (Gambaryan, 1992)  
 ! *M. aquatica* (Nees) Burgeff (Gambaryan, 2001)  
 ! *M. polymorpha* L. (Gambaryan, 1992, 2001)  
 ! *Marsupella commutata* (Limpr.) H.Bern. (Gambaryan, 2001)  
 ! *M. emarginata* (Ehrh.) Dumort. (Gambaryan, 2001)  
 ! *M. tubulosa* Steph. (Gambaryan, 1992) (Gambaryan, 2001)  
 ! *Metacalypogeia cordifolia* (Steph.) H. Inoue (Gambaryan, 1992, 2001)  
 ! *Metzgeria conjugata* Lindb. (Gambaryan, 1992, 2001)  
 ! *M. furcata* (L.) Dumort. (Gambaryan, 1992, 2001)  
 ! *Mylia nuda* H. Inoue et Yang (Bakalin, 2008b)  
 ! *M. taylorii* (Hook.) S. Gray (Gambaryan, 1992, 2001)  
 ! *M. verrucosa* Lindb. (Gambaryan, 1992, 2001)  
 ! *Nowellia curvifolia* (Dicks.) Mitt. (Gambaryan, 1992, 2001)  
 ! *Odontoschisma denudatum* (Mart.) Dumort. (Gambaryan, 1992, 2001)  
 ! *Orthocaulis attenuatus* (Mart.) Evans (Gambaryan, 2001)  
 ! *Pedinophyllum interruptum* (Nees) Lindb. (Gambaryan, 1992; Bakalin, 2008b)  
 ! *P. truncatum* (Steph.) H. Inoue (Gambaryan, 1992, 2001; Bakalin, 2008b)  
 ! *Pellia endiviifolia* (Dicks.) Dumort. (Gambaryan, 1992)  
 ! *P. neesiana* (Gottsche) Limpr. (Gambaryan, 1992, 2001)  
 ! *Peltolepis japonica* (Shm. et S. Hatt.) S. Hatt. (Gambaryan, 1992)  
*Phaeoceros laevis* Prosk. (Gambaryan, 1992)  
 ! *Plagiochasma japonicum* (Steph.) Hass. (Gambaryan, 1992)  
 ! *Plagiochila hakkodensis* Steph. (Gambaryan, 1992)  
 ! *P. ovalifolia* Mitt. (Bakalin, 2007)  
 ! *P. porelloides* (Torrey ex Nees) Lindenb. (= *P. satoi* S. Hatt.) (Gambaryan, 1992, 2001)  
 ! *Plectocolea hyalina* (Lyell) Mitt. (Gambaryan, 1992)  
 ! *P. infusca* Mitt. var. *ovalifolia* Amakawa (Gambaryan, 1992)  
 ! *P. obovata* (Nees) Lindb. (Gambaryan, 1992)  
 ! *P. rosulans* (Steph.) S. Hatt. (Bakalin, 2007)  
 ! *Plicanthus birmensis* (Steph.) R.M. Schust. (Gambaryan, 1992, as *Chandoninthus birmensis* Steph.)  
 ! *Porella caespitans* (Steph.) S. Hatt. var. *caespitans* (Gambaryan, 1992; Bakalin, 2008b)  
 ! – var. *setigera* (Steph.) S. Hatt. (Gambaryan, 1992, as *P. caespitans* var. *cordifolia* (Steph.) S. Hatt.)  
 ! *P. chinensis* (Steph.) S. Hatt. (Gambaryan, 1992, 2001)  
 ! *P. densifolia* (Steph.) S. Hatt. (Gambaryan, 1992)  
 ! *P. fauriei* (Steph.) S. Hatt. (Gambaryan, 1992, 2001; Bakalin, 2008b)  
 ! *P. gracillima* Mitt. (Gambaryan, 1992) (= *P. urogea* (Mass.) Chen)  
 ! *P. grandiloba* Lindb. (Gambaryan, 1992)  
 ! *P. nitens* (Steph.) S. Hatt. in Hara (Bakalin, 2008b)  
 ! *P. nitidula* (Mass.) S. Hatt. (Bakalin, 2008b)  
 ! *P. oblongifolia* S. Hatt. (Gambaryan, 1992; Bakalin, 2008b)  
 ! *P. platyphylla* (L.) Pfeiff. (Gambaryan, 1992, 2001)  
 ! *P. tosana* (Steph.) S. Hatt. (Bakalin, 2007) (Bakalin, 2008b)  
 ! *P. vernicosa* Lindb. (Gambaryan, 1992, 2001)  
 ! *Preissia quadrata* (Scop.) Nees (Bakalin, 2007)  
 ! *Ptilidium ciliare* (L.) Hampe (Gambaryan, 1992, 2001)  
 ! *P. pulcherrimum* (G. Web.) Vain. (Gambaryan, 1992, 2001)  
 ! *Radula auriculata* Steph. (Gambaryan, 1992)  
 ! *R. complanata* (L.) Dumort. (Gambaryan, 1992, 2001)  
 ! *R. constricta* Steph. (Gambaryan, 1992, 2001)  
 ! *R. japonica* Gottsche in Steph. (Potemkin, 2003)  
 ! *R. obtusiloba* Steph. (Gambaryan, 1992)  
 ! *Reboulia hemisphaerica* (L.) Raddi ssp. *hemisphaerica* (Gambaryan, 1992, 2001; Bakalin, 2008b)  
 ! – ssp. *dioica* R.M. Schust. (present paper)  
 ! – ssp. *orientalis* R.M. Schust. (present paper)  
 ! *Riccardia latifrons* (Lindb.) Lindb. (Gambaryan, 1992)  
 ! *R. multifida* (L.) Gray (Gambaryan, 1992)  
 ! *R. palmata* (Hedw.) Carruth. (Gambaryan, 1992, 2001)  
 ! *Riccia fluitans* Lindenb. (Gambaryan, 1992, 2001)  
 ! *R. glauca* L. (Bakalin, 2008b)  
 ! *R. huebeneriana* Lindenb. (Gambaryan, 1992; Bakalin, 2008b)  
 ! *Riccocarpos natans* (L.) Corda (Gambaryan, 1992; Bakalin, 2008b)  
 ! *Scapania apiculata* Spruce (Gambaryan, 1992, 2001)  
 ! *S. bolanderi* Austin (Gambaryan, 2001)  
 ! *S. crassiretis* Bryhn (Bakalin, 2007; Bakalin, 2008b)  
 ! *S. irrigua* (Nees) Nees (Gambaryan, 2001)  
 ! *S. lingulata* H. Buch (Gambaryan, 2001)

- !*S. mucronata* H. Buch (Gambaryan, 2001)  
 !*S. paludicola* Loeske & Mull.Frib. (Gambaryan, 2001)  
 !*S. parvifolia* Warnst. Bakalin, 2007 (Bakalin, 2008b)  
*S. scandica* (H.Arnell & Buch) Macv. (Gambaryan, 1992)  
 !*S. sphaerifera* H. Buch. Bakalin, 2007 (Bakalin, 2008b)  
 !*S. subalpina* (Nees ex Lindenb.) Dumort. (Gambaryan, 1992, 2001)  
 !*S. undulata* (L.) Dumort. (Gambaryan, 1992, 2001)  
*S. verrucosa* Heeg (Potemkin, 2003)  
 !*Schistochilopsis cornuta* (Steph.) Konstant. (Gambaryan, 1992, 2001, as *Massularia cornuta* (Steph.) Gambaryan; Bakalin, 2008b)  
 !*S. incisa* (Schrad.) Konst. (Gambaryan, 1992, 2001, as *Massularia incisa* (Schrad.) Schljakov)  
 !*Solenostoma pyriformum* Steph. (Gambaryan, 1992, as *S. rishiriense* Amakawa)  
 !*S. sphaerocarpum* (Hook.) Steph. (Bakalin, 2007)  
 !*Sphenolobus minutus* (Schreb.) Berggr. (Gambaryan, 1992, 2001)  
 !*S. saxicola* (Schrad.) Steph. (Gambaryan, 1992, 2001)
- !*Targionia hypophylla* L. (Gambaryan, 1992, 2001)  
*T. indica* Udar et Gupta (Gambaryan, 1992)  
 !*Tetralophozia setiformis* (Ehrh.) Schljak. (Bakalin, 2008b)  
 !*Trichocoleopsis sacculata* (Mitt.) Okam. (Gambaryan, 1992; Bakalin, 2008b)  
 !*Tritomaria exsecta* (Schmid. ex Schrad.) Loeske (Gambaryan, 1992, 2001)  
 !*T. quinquedentata* (Huds.) H. Buch (Gambaryan, 1992, 2001)  
 !*Trocholejeunea sandvicensis* (Gottsche) Mizutani (Gambaryan, 1992)

## EXCLUDED TAXA:

- Moerckia hibernica* (Hook.) Gottsche (Gambaryan, 1992). – There is only one record of the species for Primorsky Territory (leg. V.N. Woroshilov 28.IX.1950, det. J. Vana, cf. Gambaryan, 1992). The sample represent *Calycularia crispula*, but not *Moerckia*.  
*Odontoschisma elongatum* (Lindb.) Evans (Gambaryan, 1992, 2001). – There are many samples named as *O. elongatum* in VLA, but all of them are really represent *O. denudatum* s. str.