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MACROMYCETES OF KAMCHATKA I

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К. Каламеев, М. Ваасма. Макромицеты Камчатки I. — В списке приведены данные о распространении 110 видов, 7 вариаций и 1 формы макромицетов на Камчатке из порядков *Agaricales*, *Boletales* и *Russulales*. Материал был собран авторами со второй половины июля до середины сентября 1978 года в окрестностях городов Петропавловска и Елизова, на Центрально-Камчатской депрессии, в Кроноцком государственном заповеднике, а также в окрестностях Паужетки и Эссо.

The macromycetes of Kamchatka were studied by the authors by the route method in the course of two months from the second half of July to the second half of September 1978. Studies were carried out in the following geographical localities:

1. Petropavlovsk and its close vicinity: Khalaktyrka, Boische-Okeanskaya, Rodygino (at the foot of the volcano Avacha, up to 1000 m above sea level); 2. Yelizovo and its close vicinity up to 20 km northwards; 3. Paratunka; 4. The central plain of Kamchatka: Milkovo, Dolinovka, Kimitino (timber-cutting centre 20 km north-west of Dolinovka), Atlasovo, Krapivnaya, Maiskoye, Klyuchi and the area at the foot of the volcano Klyuchevskaya Sopka up to 20 km north of the settlement (up to 500 m above sea level); 5. Apoklonchich (observation point of the Volcanology Institute on the volcano Klyuchevskaya Sopka, 1600 m above sea level);

6. Esso (at the sanatorium "Gornyi", 30 km east of Esso, up to 500 m above sea level); 7. Kronotsk Nature Reserve: the Geyser Valley and the tundra plateau at the edge of the valley towards the sea, up to 900 m above sea level; Uzon Caldera and the areas of the tundra in the direction of the Geyser Valley, up to 600 m above sea level; Kronotsk lakeside, up to 600 m above sea level; 8. Pauzhetka.

The tree species growing on Kamchatka and named in this publication are in Latin as follows: alder — *Alnus kamtschaticus*, birches — *Betula ermanii* (in primary stands), *B. japonica*, etc. (in secondary stands), cedar pine — *Pinus pumila*, larch — *Larix dahurica*, spruce — *Picea jezoensis*. In Kamchatkan flood-plain forests there grow *Chosenia macrolepis*, *Populus suaveolens* (poplar), *Salix sachalinensis* and *Alnus hirsuta*.

The list includes 110 species, 7 varieties and 1 form of the orders *Agaricales*, *Boletales* and *Russulales* according to the system of M. Moser (1978). The nomenclature

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and taxonomy of species are given according to M. Moser, North-American species, which are lacking in Moser's book, are given according to R. Singer (1975) and A. H. Smith & H. D. Thiers (1971). The fungi of volcanic areas have been published earlier by K. Kalamees (1979).

Boletales

Boletinus paluster (Peck) Peck — mixed forests, tundra; Dolinovka, Kronotsk Nature Reserve (Kronotsk lakeside); VII—VIII.

Boletus clavipes (Peck) Pil. et Derm. (= *B. edulis* forma s. Kalamees 1979) — birch forests, also birch-dominated mixed forests and flood-plain deciduous forests; chiefly under *Betula ermanii* but also under other birch species and deciduous trees; with a low degree of abundance; Petropavlovsk, Paratunka, Dolinovka, Esso, Klyuchi, Yelizovo, Kronotsk Nature Reserve (Kronotsk lakeside); VII—VIII. In the literature *B. clavipes* has mainly been pointed out as a symbiont of conifers (cf. Dermek & Pilát, 1974; Snell & Dick, 1970). Only A. H. Smith and H. D. Thiers (1971) indicate that it grows under birches and alders. On Kamchatka *B. clavipes* is conspicuously associated with birches; in flood-plain forests, however, it is associated with other deciduous tree species (*Populus suaveolens*, *Alnus hirsuta* or *Chosenia macrolepis*). In coniferous-deciduous mixed forests it was always found under birches.

Gomphidius gracilis Bk. et Br. s. Bres. — paludified mixed forest, under *Larix dahurica*; Krapivnaya; 3. VIII. *G. gracilis* s. Bres. (and s. Moser 1978) as a slender small fungus is clearly distinguishable from *G. maculatus* (Scop.) Fr., although many investigators consider these two species as synonyms. The spores of Kamchatkan *G. gracilis* are 7–8(8.5) μm broad, which fit well in with the measurements given by M. Moser (1978) and G. Bresadola (1927–1933).

Leccinum atrostopilatum Smith, Thiers et Watling (= *L. testaceoscabrum* s. Kalamees 1979) — birch-dominated mixed forests; Esso, Kronotsk Nature Reserve (Kronotsk lakeside); VIII.

L. chromapes (Frost) Sing. — birch-dominated deciduous forests, also on paludified soils; Krapivnaya, Yelizovo; VIII.

L. oxydabile (Sing.) Sing. s. Sing. 1967 — paludified birch forest; Krapivnaya; 3. VIII.

L. rotundifoliae (Sing.) Smith, Thiers et Watling — tundra, under *Betula exilis*; Kronotsk Nature Reserve (Kronotsk lakeside, Uzon Caldera); VIII.

L. scabrum (Fr.) S. F. Gray s. str. — birch-dominated deciduous and mixed forests; Dolinovka, Krapivnaya, Esso, Kronotsk Nature Reserve (Kronotsk lakeside, Uzon Caldera, Geyser Valley); VII—VIII.

Paxillus involutus (Fr.) Fr. — birch forests with *Betula ermanii*, tundra (thickets of *Pinus pumila* and *Betula exilis*); Klyuchi, Yelizovo, Petropavlovsk, Kronotsk Nature Reserve (Uzon Caldera); VIII.

Suillus deruginascens (Secr.) Snell — mixed forests, also on paludified soils, under *Larix dahurica*; Krapivnaya, Esso; VIII.

S. subluteus (Peck) Snell — tundra, cedar pine thickets, under *Pinus pumila*; with a high degree of abundance; Esso, Kronotsk Nature Reserve (Kronotsk lakeside, Uzon Caldera and its vicinity, on the tundra plateau at the edge of the Geyser Valley); VIII. Large black spots occur prominently on the stipe and on pores (even on the walls of tubes), just as A. H. Smith & H. D. Thiers (1971) and W. H. Snell & E. A. Dick (1970) report concerning the North-American material. *S. subluteus* found on the Primorye Territory had a scaly cap (Васильева, 1978). Kamchatkan *S. subluteus* with a bare cap does not fit in with the fungus of Primorye.

Xerocomus subtomentosus (Fr.) Quél. — larch-birch forests; Esso; VIII.

Agaricales

Agrocybe praecox (Fr.) Fay. — tall herbs; Kimitino; 29. VII. Unlike the majority of diagnoses given in the literature, the specimens found on Kamchatka have a hygrophanous cap with an olive-green shade and there are no rhizomorphs on the base of the stipe. However, A. Ricken (1915, p. 191) notes: "St. ... bis weilen mit fleischigen Wurzelfasern ..." (type spaced by us — K. K. & M. V.). G. Malençon and R. Bertault (1970, p. 261) note: "Chapeau ... à marge un peu hygrophane ...".

Amanita alba Gill. — birch forest with *Betula ermanii*; Petropavlovsk; 21. VII.

A. crocea (Quél.) Sing. — birch forests with *Betula ermanii*; with a high degree of abundance; Petropavlovsk, Paratunka, Dolinovka, Kronotsk Nature Reserve (Geyser Valley); VII—VIII.

A. lividopallescens Gill. — birch-alder forests with *Betula ermanii*, flood-plain birch-willow thickets; Kronotsk Nature Reserve (Geyser Valley); VIII.

A. muscaria (Fr.) Hooker — birch forests with *Betula ermanii*; Khalaktyrka, Yelizovo, Kronotsk Nature Reserve (Uzon Caldera); VIII.

A. rubescens (Fr.) S. F. Gray — birch and birch-alder forests with *Betula ermanii*; Yelizovo, Kronotsk Nature Reserve (Geyser Valley); VIII.

A. vaginata (Fr.) Vitt. var. *vaginata* — deciduous and mixed forests; Paratunka, Dolinovka, Esso, Yelizovo, Pauzhetka; VII—VIII.

Armillariella mellea (Fr.) Karst. — birch and alder forests; wood saprobiont (or parasite) on *Betula ermanii* and *Atraster kamtschaticus*; Klyuchi, Pauzhetka, Khalaktyrka, Yelizovo, Petropavlovsk, Rodygino, Kronotsk Nature Reserve (Uzon Caldera, Geyser Valley); VIII—IX. Beside the typical fruit-bodies of *A. mellea* in an alder thicket at Pauzhetka there were found fruit-bodies with a bright-yellow veil, which can be identified as var. *lutea* Secr.

Calocybe naucoria (Murr.) Sing. (= *Tricholoma fallax* Peck) — larch-birch forests; carbobiont; with a high degree of abundance; Esso; VIII.

Clitocybe clavipes (Fr.) Kummer — mixed forest; Esso; 6. VIII.

C. fragrans (Fr.) Kummer [= *C. suaveolens* (Fr.) Kummer] — birch forest with *Betula ermanii*; Klyuchi; 12. VIII.

C. odora (Fr.) Kummer — flood-plain poplar forest; Esso; 4. VIII.

Collybia cirrhata (Fr.) Kummer — deciduous, coniferous and mixed forests, tundra, occurring also on paludified soils; fungal saprobiont; Dolinovka, Kimitino, Atlasovo, Kravpinnaya, Klyuchi, Kronotsk Nature Reserve (Uzon Caldera, Geyser Valley); VII—VIII.

C. confluens (Fr.) Kummer — birch and mixed forests; Dolinovka, Kimitino, Esso, Yelizovo; VII—VIII.

C. cookei (Bres.) J. D. Arnold — birch and alder forests, flood-plain deciduous forests, tall herbs; Esso, Klyuchi, Pauzhetka, Kronotsk Nature Reserve (Geyser Valley); VIII.

C. dryophila (Fr.) Kummer — deciduous and mixed forests, tundra, also on very decayed deciduous wood; with a high degree of abundance; Paratunka, Dolinovka, Kimitino, Esso, Klyuchi, Petropavlovsk, Yelizovo; VII—VIII.

C. tuberosa (Fr.) Kummer — birch and alder-birch forests with *Betula ermanii*; Yelizovo; VIII.

Canocybe subovalis (Kühn.) Kühn. et Romagn. s. Moser 1978 — flood-plain deciduous forest; Kimitino; 27. VII.

Coprinus atramentarius (Fr.) Fr. — flood-plain deciduous forests, anthropogenic sites (in wayside settlements); Kimitino, Maiskoye; VII—VIII.

C. comatus (Fr.) S. F. Gray — cultivated grassland; Khalaktyrka; 17. VIII.

C. disseminatus (Fr.) S. F. Gray — flood-plain deciduous forests; Esso; VIII.

C. micaceus (Fr.) Fr. — birch forests with *Betula ermanii*, flood-plain deciduous

forests, on the stem and on the ground round the stem of *Alnus hirsuta* and *Betula ermanii*; with a high degree of abundance; Dolinovka, Klyuchi, Maiskoye; VII—VIII. An interesting habitat is a *Carex-Peucedanum-Equisetum limosum* flood-plain area at Maiskoye where fruit-bodies grew on the ground in exceptionally large masses.

Cortinarius armillatus (Fr.) Fr. — larch-birch forest; Esso; 6. VIII.

C. delibutus Fr. — mixed forest; Esso; 6. VIII.

Crepidotus calolepis (Fr.) Karst. — flood-plain deciduous forests; wood saprobiont on *Populus suaveolens* and *Alnus hirsuta*; with a high degree of abundance; Kimitino; VII.

Cystoderma amianthinum (Fr.) Fay. — deciduous and mixed forests; Esso, Yelizovo, Kronotsk Nature Reserve (Geyser Valley); VIII.

Dermocybe sphagnogena Mos. — bogs; Kimitino, Kronotsk Nature Reserve (Uzon Caldera); VII—VIII.

Hygrocybe coccineocrenata (Orton) Mos. — tundra; Kronotsk Nature Reserve (Uzon Caldera); VIII.

H. conica (Fr.) Kummer s. Moser — alder forest, slag and ash fields; Apokhonchich; 9. VIII (Kalamees, 1979).

H. psittacina (Fr.) Karst. — tall herbs; Pauzhetka; 14. VIII.

Inocybe geophylla (Fr.) Kummer var. *geophylla* — birch-dominated mixed forest; Esso; 6. VIII.

I. geophylla var. *lateritia* (Weinm.) Mos. — flood-plain deciduous forest; Kimitino; 30. VII.

I. geophylla var. *violacea* Pat. — flood-plain deciduous forest; Kimitino; 30. VII.

I. lacera (Fr.) Kummer — slag and ash fields; Apokhonchich; 9. VIII. On volcanic areas *I. lacera* had a little larger spores (13—22 μm in measurements) than under usual conditions (10—18 μm) (Kalamees, 1979).

Laccaria bicolor (R. Mre.) Orton — deciduous, coniferous and mixed forests, slag and ash fields; on volcanic soils with a high degree of abundance; Kimitino, Atlasovo, Esso, Kronotsk Nature Reserve (Kronotsk lakeside, Geyser Valley), Rodygino; VII—IX. The fungi growing in forests have spores (6.5)—7.5—9 μm , with long spikes (ca 0.7—1.2 μm). At Rodygino on volcanic soil near the Avacha volcano there grows a variety with larger spores (7.5)—8.5—11—(12.5) μm and with short spikes (0.3—0.5 μm) (Kalamees, 1979).

L. lacata (Fr.) Bk. et Br. — birch forests with *Betula ermanii*, tundra; Petropavlovsk, Kronotsk Nature Reserve (on the tundra plateau at the edge of Geyser Valley); VII—VIII.

L. montana Sing. — tundra; occurs sporadically with a high degree of abundance; Kronotsk Nature Reserve (Uzon Caldera and its vicinity); VIII.

L. tortilis (Bolt.) S. F. Gray s. Moser 1978 — flood-plain area, on a clayey pebbly flood-plain area covered with moss; Kronotsk Nature Reserve (Uzon Caldera); 21. VIII.

Lepiota clypeolaria (Fr.) Kummer — birch and birch-dominated mixed forests; Esso, Klyuchi, Yelizovo; VIII.

Lepista gilva (Fr.) Roze — larch-dominated mixed forest; Esso; 6. VIII.

Limacella illinata (Fr.) Murr. — flood-plain mixed forest (burnt area); Esso; 5. VIII.

Marasmius androsaceus (Fr.) Fr. — birch-larch forests, tundra; wood saprobiont on *Larix dahurica*, herb saprobiont on tundra plants; Kimitino, Kronotsk Nature Reserve (Uzon Caldera); VII—VIII.

M. brassicolens Romagn. — birch and alder-birch forests; Paratunka, Milkovo; VII.

M. epiphyllus (Fr.) Fr. — mixed forests; leaf-debris saprobiont on *Sorbus sambucifolia* and *Betula* sp.; Dolinovka; VII.

M. scorodoni (Fr.) Fr. — deciduous and mixed forests, tundra; wood and debris saprobiont on *Picea jezoensis*, *Betula exilis*, *Betula* sp., *Rosa* sp., etc.; with a high degree of abundance; Dolinovka, Kimitino, Klyuchi, Kronotsk Nature Reserve (Uzon Caldera and its vicinity, Geyser Valley), Petropavlovsk; VII—VIII.

M. siccus (Shw.) Fr. s. Gilliam 1976 — birch forest with *Betula ermanii*; leaf-debris saprobiont on *Betula ermanii*; Klyuchi; 12. VIII. The group of *M. siccus* (cf. Gilliam, 1976) is widely distributed on Kamchatka; however, differentiation of species demands collection of additional material.

Mycena acicula (Fr.) Kummer — flood-plain deciduous forests; wood saprobiont on *Chosenia macrolepis* and *Populus suaveolens*; Kimitino, Esso; VII—VIII.

M. amicta (Fr.) Quél. — spruce-dominated mixed forest; Kimitino; 29. VII.

M. avenacea (Fr.) Quél. var. *roseofusca* Kühn. — spruce-dominated mixed forest; Kimitino; 29. VII.

M. galopoda (Fr.) Quél. var. *leucogala* (Cke.) Lge. (= var. *nigra* Fl. Dan. s. Moser) — alder forest; Paratunka; 23. VII.

M. haematopoda (Fr.) Kummer — birch and alder forests; wood saprobiont on *Betula ermanii* and *Alnaster kamtschaticus*; Paratunka, Klyuchi, Kronotsk Nature Reserve (Geyser Valley); VII—VIII.

M. longiseta v. Höhnelt — alder forest; wood saprobiont on *Alnaster kamtschaticus* and herb saprobiont on a fern; Paratunka; 23. VII.

M. luteoalcalina Sing. — larch and larch-dominated mixed forests; wood saprobiont on *Larix dahurica*; Esso, Atlasovo; VIII.

M. pura (Fr.) Kummer f. *pura* — deciduous and mixed forests, also in flood-plain forests; occurs sporadically with a high degree of abundance; Dolinovka, Esso, Klyuchi, Yelizovo, Pauzhetka, Petropavlovsk; VII—VIII.

M. pura f. *rosea* Schum. — birch forests with *Betula ermanii* and alder forests; Yelizovo, Petropavlovsk; VIII.

M. rorida (Fr.) Quél. — birch and alder forests, meadow fens; forest litter and wood saprobiont on *Betula ermanii* and *Alnaster kamtschaticus*, moss saprobiont (in meadow fens, on *Mnium* sp.); occurs sporadically with a high degree of abundance; Petropavlovsk, Paratunka, Kimitino; VII.

M. rubromarginata (Fr.) Kummer — birch-larch forest; wood saprobiont on *Larix dahurica*; Atlasovo; 1. VIII.

M. sanguinolenta (Fr.) Kummer — alder forest; Paratunka; 23. VII.

M. viscosa (Secr.) R. Mre. s. A. H. Smith — mixed forests, also in flood-plain forests; forest litter and wood saprobiont on *Picea jezoensis* and *Larix dahurica*; Dolinovka, Kimitino, Atlasovo, Esso; VII—VIII. Kamchatkan *M. viscosa* is a rather delicate fungus (cap 1—2 cm) with a light grey-yellow cap (only when quite mature it turns dirty brown) like *M. viscosa* growing in North America (cf. Smith, 1971); it grows typically on the ground (on forest litter), more rarely on conifer wood. In all this Kamchatkan *M. viscosa* is outwardly similar to *M. epipterygia* (Fr.) S. F. Gray, but *M. epipterygia* had no characteristic feature typical of *M. viscosa* — red-brown blotchiness (particularly on the base of the stipe). European *M. viscosa* (cf. Konrad et Maublanc, 1924—1933) is from the beginning a fungus with a grey or grey-brown cap and a robust appearance (cap 2—4 cm) growing only on wood of conifers.

Omphalina epichysium (Fr.) Quél. — flood-plain deciduous and mixed forests; deciduous wood saprobiont on *Populus suaveolens*, etc.; Esso, Kronotsk Nature Reserve (Geyser Valley); VIII. According to the data available in the literature, it is essentially a conifer saprobiont, but according to L. N. Vassilieva (1973), it occurs in the Primorye Territory also on deciduous wood.

Pholiota carbonaria (Fr.) Sing. — coniferous and mixed forests, also in flood-plain forests; carbobiont; Atlasovo, Krapivnaya, Esso; VIII.

Pluteus atricapillus (Secr.) Sing. — deciduous and mixed forests, also in paludified soils, flood-plain forests and cut-over areas; birch-wood saprobiont on *Betula ermanii*, etc.; Kimitino, Krapivnaya, Esso, Klyuchi, Kronotsk Nature Reserve (Geyser Valley); VII—VIII.

P. galeroideus P. D. Orton — flood-plain deciduous forest; wood saprobiont on *Alnus hirsuta*; Kimitino; 27. VII.

P. griseopus P. D. Orton — flood-plain deciduous forest (burnt area); deciduous-wood saprobiont; Esso; 4. VIII. Cells of the cellular cap cuticle are pyriform but a little larger than in P. D. Orton (1960), on average 35 μm in diameter.

P. leoninus (Fr.) Kummer — birch-larch forest; wood saprobiont on *Betula* sp.; Kimitino; 28. VII. Spores on Kamchatkan specimens are a little larger than on European material, namely 7—7.5(8) $\times$ 5.5—6.5 μm .

P. lutescens (Fr.) Bres. s. Malençon et Bert. — flood-plain deciduous forests; deciduous-wood saprobiont on *Alnus hirsuta*, etc.; Esso; VIII. On our specimens the cap is fine-velvety; in this respect they correspond to *P. lutescens* according to G. Malençon & R. Bertoult (1970, p. 102): "Chapeau ... velouté-granuleux sous la loupe...". However to P. Konrad & A. Maublanc (1924) and R. Kühner & H. Romagnesi (1953) the cap of *P. lutescens* is bare.

P. pellitus (Fr.) Kummer s. Orton 1960 — birch-larch forest; wood saprobiont on *Betula* sp.; Kimitino; 28. VII.

P. thomsonii (Berk. et Br.) Dennis (= *P. godeyi* Gill. s. Kühn. et Romagn.) — flood-plain deciduous forest; deciduous-wood saprobiont; Kimitino; 29. VII. On our specimens the cap has no radial veining or is visible only very faintly.

P. umbrosus (Fr.) Kummer — flood-plain deciduous forest; wood saprobiont on *Betula* sp.; Kimitino; 30. VII.

Psathyrella candolleana (Fr.) Mre. — paludified birch forests and willow thickets; Milkovo, Maiskoye; VII—VIII.

Rhodocybe nitellina (Fr.) Sing. — flood-plain deciduous forest; Esso; 6. VIII.

Rickenella fibula (Fr.) Raith. — deciduous and mixed forests, bogs, tall herbs, flood-plain areas, thermal areas; moss saprobiont; with a high degree of abundance; Milkovo, Kimitino, Pauzhetka, Kronotsk Nature Reserve (Uzon Caldera, Geyser Valley); VII—VIII.

R. setipes (Fr.) Raith. — deciduous and mixed forests and thickets; moss and humus saprobiont; Kimitino, Klyuchi, Kronotsk Nature Reserve (Uzon Caldera); VII—VIII.

Stropharia semiglobata (Fr.) Qué. s. Kühn. et Romagn. — stony gorges and folds (on mountain pass); Kronotsk Nature Reserve (in the vicinity of Uzon Caldera); 24. VIII.

Tectella patellaris (Fr.) Murr. — alder and birch-alder forests; wood saprobiont on *Alnus kamtschaticus*; with a high degree of abundance; Klyuchi, Kronotsk Nature Reserve (Geyser Valley); VIII. On our material spores are large: 4.5—5.5 $\times$ 1.5—2.2 μm (cf. Moser, 1978: 3—4 $\times$ 1—1.5 μm). But according to R. Singer (1975) spores may be up to 5.5 μm long.

Tephrocye anthracophila (Lasch) Orton (= *Lyophyllum sphaerosporum* Kühn. et Romagn.) — larch forest; carbobiont; Krapivnaya; 3. VIII.

Tricholoma album (Fr.) Kummer — birch and alder-birch forests with *Betula ermanii*; Petropavlovsk, Yelizovo; VIII.

T. flavobrunneum (Fr.) Kummer — birch forest with *Betula ermanii*; Kronotsk Nature Reserve (Geyser Valley); 25. VIII.

Tricholomopsis rutilans (Fr.) Quél. — larch-birch forest; wood saprobiont; Esso; 5. VIII.

Xeromphalina caulicinalis (Fr.) Kühn. et R. Mre. (= *Marasmius tomentosipes* Peck) — tundra, cedar pine thicket; Kronotsk Nature Reserve (Uzon Caldera); 23. VIII.

X. cornui (Quél.) Favre — paludified spruce forest; Kimitino; 28. VII.

Russulales

Lactarius alpigenes Kühn. (= *L. subalpinus* Kühn., *L. luteus* s. Neuh.) — alder forest, inside fern tuft; Pauzhetka; 14. VIII. M. Moser (1978) identifies this species with *L. pusillus* Bres. One can hardly regard *L. alpigenes* Kühn. with a pretty ochre-orange (Kühner et Romagnesi, 1953) or ochre-yellow cap (fungi of Kamchatka) as a synonym of Bresadola's species *L. pusillus* the cap of which is flesh-coloured ("...carnosulus...", Bresadola, 1927—1933, tab. 395,2).

L. aspideus Fr. var. *flavidus* (Boud.) Neuh. — birch forest with *Betula ermanii*; Yelizovo; 27. VIII.

L. glyciosmus (Fr.) Fr. — alder-birch forest; Esso; 4. VIII.

L. lepidotus Smith et Hesler (= *L. griseus* s. Kühn., Neuh.) — alder forest; Rodygino; 4. IX.

L. necator (Fr.) Karst. — birch forest with *Betula ermanii*; Klyuchi; 12. VIII.

L. obscuratus (Lasch) Fr. — alder forests and flood-plain deciduous forests, under *Alnaster kamtschaticus* and *Alnus hirsuta*, sometimes on their roots; with a high degree of abundance; Esso, Rodygino, Pauzhetka, Kronotsk Nature Reserve (Geyser Valley); VIII—IX.

L. pubescens Fr. — birch forests, also on paludified soils; Krapivnaya, Kronotsk Nature Reserve (Geyser Valley), Bolshe-Okeanskaya; VIII—IX.

L. rufus Fr. — tundra, cedar pine thickets; Kronotsk Nature Reserve (Uzon Caldera, on the tundra plateau at the edge of the Geyser Valley); VIII.

L. speciosus (Burl.) Sacc. — birch-larch forest; Esso; 6. VIII.

L. torminosus (Fr.) S. F. Gray — birch forests, also on paludified soils; Krapivnaya, Yelizovo; VIII. Kamchatkan *L. torminosus* is conspicuous for its dark pinkish-brown colour of the cap.

L. trivialis Fr. — birch-larch forests; Kimitino, Esso; VII—VIII. Our specimens have spores with measurements $8-8.5 \times 6.5-7 \mu\text{m}$ and thus they are a little smaller than indicated in the literature (cf. M. Moser, 1978: $8.5-10 \times 7-8.5 \mu\text{m}$).

L. vietus (Fr.) Fr. — birch forests and birch-dominated mixed forests; with a high degree of abundance; Esso, Kronotsk Nature Reserve (Geyser Valley); VIII.

Russula aeruginea Lindbl. — birch and birch-dominated deciduous and mixed forests, also on paludified soils, tundra, alder-cedar-pine thickets; Petropavlovsk, Dolinovka, Krapivnaya, Esso, Yelizovo, Kronotsk Nature Reserve (Geyser Valley and at its edge on the tundra plateau); VII—VIII. All specimens of Kamchatkan *R. aeruginea* have a grey-green cap, the spores have a distinct riblike ornamentation (measurements $7-8.5-(9) \times 5.5-7-(8) \mu\text{m}$), there occur numerous dermatocystidia. The peculiar habitat for this fungus known as a birch-symbiont is located on the tundra plateau on the Kronotsk Nature Reserve at the edge of the Geyser Valley in alder-cedar-pine thicket absolutely bare of any birches. The fungi growing on the above patch were conspicuous for spores which were a little larger / $(7.5)-8-8.5-(9) \times 6.5-7-(8) \mu\text{m}$ /.

R. decolorans Fr. — tundra, cedar pine thicket; Kronotsk Nature Reserve (on the tundra plateau at the edge of the Geyser Valley); 28. VIII.

R. delica Fr. — birch forests with *Betula ermanii*; Yelizovo, Klyuchi, Kronotsk Nature Reserve (Geyser Valley); VIII.

R. foetens Fr. — birch forests with *Betula ermanii*; Klyuchi, Yelizovo; VIII.

R. grisea (Secr.) Fr. s. J. Schaeff. — birch forests with *Betula ermanii*; Klyuchi, Yelizovo; VIII.

R. lutea (Fr.) S. F. Gray s. Moser 1978 — birch forests with *Betula ermanii*; Klyuchi, Kronotsk Nature Reserve (Kronotsk lakeside); VIII.

R. paludosa Britz. — tundra, cedar pine thicket; Kronotsk Nature Reserve (on the tundra plateau at the edge of the Geyser Valley); 28. VIII.

R. pulchella Borszcz. — birch-dominated mixed forest; Esso; 6. VIII.

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