

Finnish records of the genus *Russula*. The new species *R. olivina* and *R. taigarum*

JUHANI RUOTSALAINEN and JUKKA VAURAS

RUOTSALAINEN, J. & VAURAS, J. 1990: Finnish records of the genus *Russula*. The new species *R. olivina* and *R. taigarum*. — *Karstenia* 30:15–26.

Two new species are described from Fennoscandia, *Russula olivina* Ruotsalainen & Vauras and *Russula taigarum* Ruotsalainen & Vauras. Both are boreal fungi growing in moist rich forests with *Picea abies*, and characterized by their mild taste, and pileipellis with dermatocystidia and without encrusted elements. Further characteristics for *R. olivina* are the greenish pileus, 2-spored basidia and large spores with isolated spines, while *R. taigarum* has a matt brown-red pileus and stipe with unevenly distributed red colour. *R. postiana* Romell is lectotypified.

Key words: *Agaricales*, *Basidiomycetes*, NW Europe, *Picea abies*, *Russula olivina*, *R. postiana*, *R. taigarum*, taxonomy

Juhani Ruotsalainen, Metsätie 12 A 4, SF-71310 Vehmersalmi, Finland
Jukka Vauras, Herbarium of Åbo Akademi University, Department of Biology, SF-20500
Turku, Finland

Introduction

Recently, 75 Finnish *Russula* species were keyed by Korhonen & Vauras (1986). It seems, however, that many more species of the genus will be recorded in Finland. In this paper we describe two species which we have not been able to find in the European literature (e.g. Schaeffer 1952, Romagnesi 1967, Marchand 1977, Michael et al. 1983, Svrček et al. 1984, Bresinsky 1985, Einhellinger 1985, and Bon 1988).

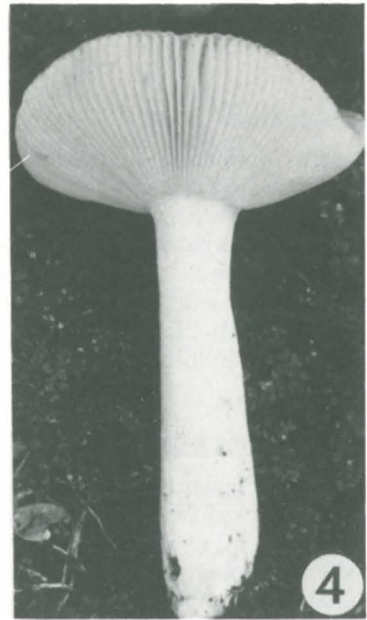
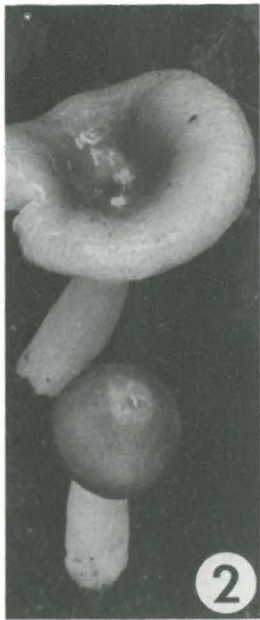
Material and methods

To find specimens of *R. olivina* in herbarium material, we checked the specimens filed as *R. olivascens* in H, KUO, M, O, OULU, S, TUR and UPS, and to find *R. taigarum* the specimens filed as *R. xerampelina* and *R. spp.* in H, KUO, OULU and TUR. The colours of fresh specimens were compared with those of Küppers (1981), and spore masses from spore prints were checked for colour matching between microscope slides. The microscopical characters of the hymenium were drawn and studied in Melzer's re-

agent. The spores were measured excluding the ornamentation, and the basidia lengths excluding the sterigmata. Pileocystidia were drawn from material mounted in water, after treatment with Fuchsin and 5% hydrochloric acid, and hyphae of the pileipellis in Congo Red. Soil samples were collected from the humus layer to a depth of 10 cm and analysed by Soil Analysis Service Ltd (Finland).

Russula olivina Ruotsalainen & Vauras, spec. nova, Figs. 1–7.

Species parvula vel media, pileo 1.7–9 cm lato, convexo, dein depresso, impolito, centro atroviride vel fuscoviride vel flavo, margine olivicolore vel flavovirente, obtuso, breviter sulcato. Lamellae moderatim confertae, cremeae, postea flavescentes. Stipes 3–9 x 0.8–2.5 cm, subclavatus, albus. Carne alba, odore indistincto, sapore mite. Sporae in cumulo flavae (Romagnesi 4b–c), 9.5–14 x 8.5–11.5 µm, echinatae, verrucis usque ad 2 µm altis. Basidia bisporica, claviformes, 40–56 x 10–15 µm. Cystidia hymenii acuta vel appendiculata, 9–16 µm lata. Cutis cum dermatocystidiis 3–9 µm latis. Habitatio: plerumque in silva calcarea, in Fennia semper in propinquitatem Picearum (Picea abies).



Figs. 1-4. — 1: Fruit bodies of *Russula olivina*, photographed in situ, x 1. — 1: holotype, KUO. — 2-4: *Ruotsalainen & Vauras 3128F*, TURA. Photos Juhani Ruotsalainen (1), Jukka Vauras (2-4).

Holotypus: Finland. Pohjois-Savo: Kuopio, Pitkälähti, E shore of lake Matkusjärvi, by path on slope in herb-rich mixed forest, near *Picea abies*, *Alnus incana*, *Populus tremula*, *Betula pendula*, *Sorbus aucuparia*, *Lonicera xylosteum*, *Daphne mezereum*, *Rosa* sp., *Angelica sylvestris*, *Cirsium helenioides*, *Convallaria majalis*, *Fragaria vesca*, *Geranium sylvaticum*, *Maianthemum bifolium*, *Oxalis acetosella*, *Rubus saxatilis*, *Trientalis europaea*, Grid 27°E: 69699:5299, alt. 84 m, 11.VIII.1988 J. Vauras & J. Ruotsalainen 1059F (KUO, isotypi in MICH, UPS).

Pileus 1.7–7(–9) cm in diam, first convex, later depressed at centre; often splitting, olive–green, centre black–green, dark brown–green ($Y_{50}M_{40}C_{60}$), dark dirty green, brown–green ($Y_{60}M_{30}C_{40}$), yellow–brownish green ($Y_{60}M_{10}C_{20}$), yellow–greenish grey, yellow, sometimes with pale brown ($S_{20}Y_{60}M_{10}$) flecks; margin yellow–green ($S_{20}C_{00}Y_{50}$), pale dirty green ($Y_{50}M_{10}C_{20}$), grey–green, up to 1 cm sulcate, blunt; surface matt, not pruinose, somewhat uneven, half or even more of pileipellis peeling.

Lamellae moderate crowded, up to 11 mm broad, first pale cream-coloured, then yellow, not forking, no lamellules, margin even; taste mild.

Stipe 3–9 cm long, 0.8–1.8(–2.5) cm wide, equal to subclavate, longitudinally rugulose, not pruinose, base rounded; soft and fragile, spongy inside, later hollow; white, later sometimes slightly brown at base, in exsiccatae mostly pale brown.

Context white, under pileipellis slightly yellow–green, $FeSO_4$ gradually turning stipe orange–red–brown, formol gradually somewhat reddish, phenol gradually pale brown. Smell indistinct, when old as in *R. lutea*. Taste mild.

Spores in mass yellow (Romagnesi 4b(–c)) as in *R. roseipes*, (9.5–)10–12(–14) × 8.5–10(–11.5) μm , total range of mean values 10.5–11.4 × 8.9–9.7 μm , $Q = 1.1–1.2(–1.3)$, warts isolated, cylindrical, up to 2 μm high, plage moderately amyloid.

Basidia 40–56 × 10–15 μm , clavate, 2-spored. Hyphal cystidia 9–16 μm broad, acute or appendiculate, in sulphovanillin pale yellow–grey to dark violet.

Apical cells of pileipellis 2–4 μm broad, cylindrical or tapering to apex. Dermotocystidia rather abundant, 3–9 μm broad, 1–9 septate, cylindrical to clavate, rarely with small lateral knobs, rarely branched; in sulphovanillin pale orange to dark violet.

In rich forests with *Picea abies*, mostly in moist sites. From Hemiboreal to Northern Boreal zone, rare in Finland and Sweden. July to September.

Distribution, ecology and phenology

Russula olivina has a wide distribution in Finland, from the SW archipelago to Lapland (Fig. 7). The distribution shows concentration in calcareous areas. In Kuopio, Central Finland, the species is known from four places. It seems to fruit regularly in the type locality, which contains many species typical of calcareous spruce forests, e.g. *Cortinarius orichalceus* (Batsch) Fr., *C. papulosus* Fr., *Hygrophorus atramentosus* (Alb. & Schw.) Haas & Haller, *Inocybe nitidiuscula* (Britz.) Sacc., *Lactarius deterrimus* Gröger, *L. scrobiculatus* (Scop.: Fr.) Fr., and *Russula queletii* Fr. Several localities are known in Kiiminki, in the vicinity of Oulu, Oulun Pohjanmaa, where at least some of the habitats are dry to dryish. However, most Finnish sites of *R. olivina* are moist, e.g. brook sides or depressions with moving nutrient-rich water. In Kuusamo, Oulanka National Park, the species grows in at least three sites. In the southernmost Finnish locality in Parainen, SW archipelago, *R. olivina* formed a group of 20 fruit bodies among mosses by a path in spruce forest, near e.g. *Clitocybe alexandri* (Gillet) Konrad, *Hygrophorus discoideus* (Pers.: Fr.) Fr., *Inocybe geophylla* (Fr.: Fr.) Kummer, *I. leucoblema* Kühner, *I. terrigena* (Fr.) Kuyper, and *Lactarius deterrimus*. Most Finnish localities can be classified as fairly calcareous. A common soil type is fine sand–moraine with a pH ranging from 6.0–6.4 (cf. Table 1).

Table 1. Surface soil characteristics in some localities of *Russula olivina* (1, 2) and *R. taigarum* (3–5). Localities 1–4 are in Finland, locality 5 in Sweden. 1) Pohjois-Savo: Kuopio, Pitkälähti, Matkusjärvi (type site), 3.IX.1989. 2) Varsinais-Suomi: Parainen, Valoniemi, 12.IX.1989. 3) Pohjois-Häme: Äänekoski, Suopellonmäki, 12.VIII.1988. 4) Pohjois-Häme: Saarijärvi, Linnankylä, 18.VIII.1989. 5) Medelpad: Torp, Skinnsjö S, 31.VIII.1989.

	1	2	3	4	5
	<i>R. olivina</i>			<i>R. taigarum</i>	
pH	6.4	6.0	6.1	5.5	4.5
Ca mg/l	3400	3200	1650	1650	1100
K mg/l	15	105	40	20	80
Mg mg/l	195	240	255	170	110
P mg/l	1	1	1	5	4

The Swedish locality in Jämtland is in the Upper Oroboreal zone, nearly in the uppermost mountain spruce forest. The southernmost locality known from

Europe is in Estonia. The other specimen from the Soviet Union, preserved in LE with insufficient collection data, was probably collected in Asia, near

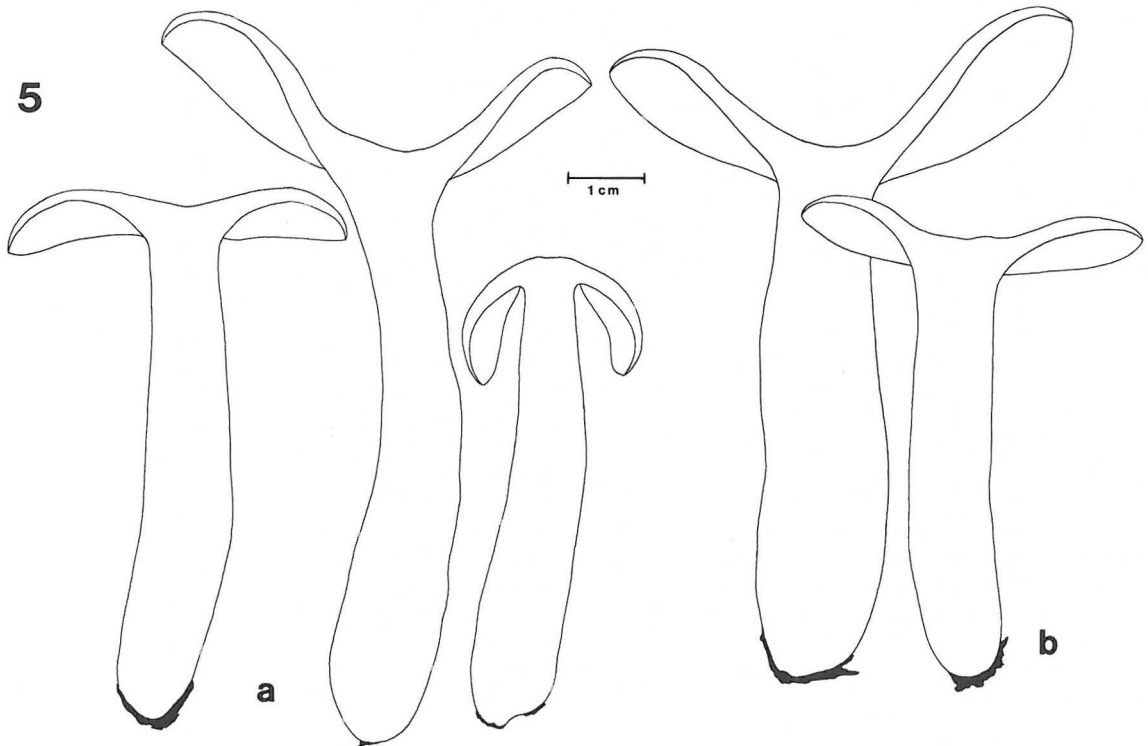


Fig. 5. Fruit bodies of *Russula olivina*, x 1 (a, holotype, KUO; b, Vauras 3832F, TURA).

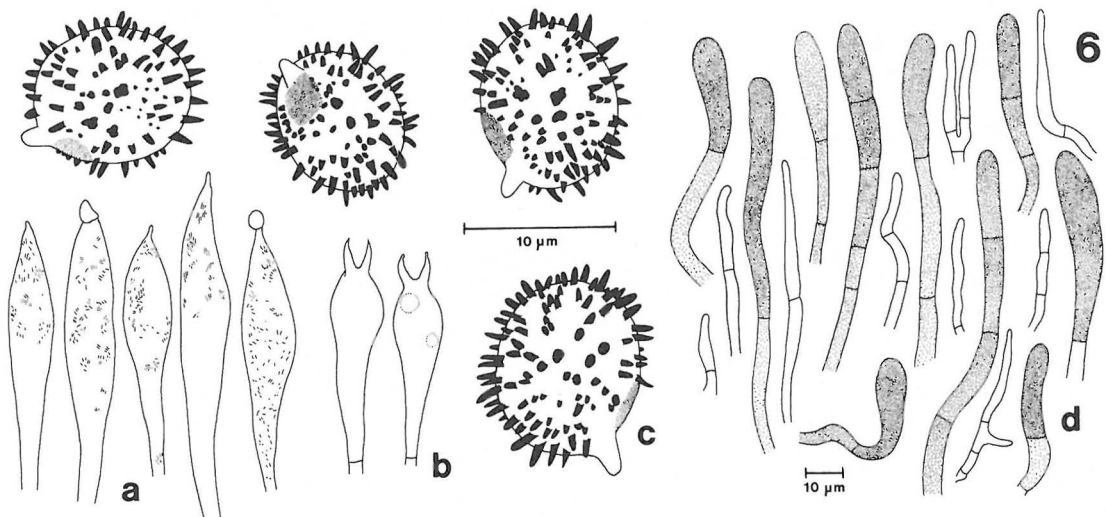


Fig. 6a–d. Microscopical details of *Russula olivina* (holotype, KUO). a: hyphal cystidia, b: basidia, c: spores, d: elements of pileipellis. Scales: spores x 2 000, others x 500.

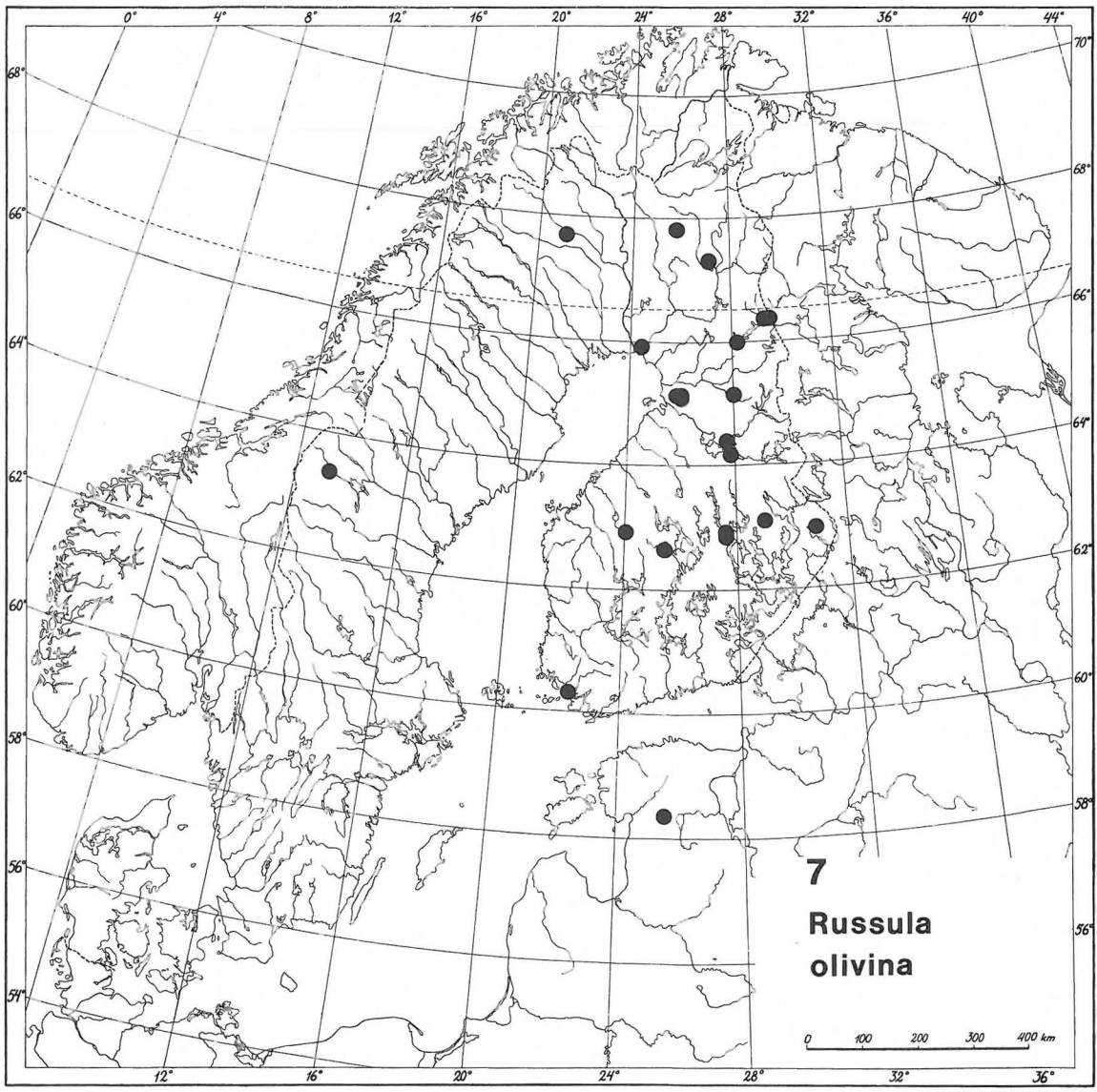


Fig. 7. Distribution of *Russula olivina* in NW Europe.

Alma-Ata or in the Altai Mts. (cf. Singer 1938). It was deposited in LE under the name *Russula alutacea* subsp. *integra* f. *pseudo-olivascens* Singer.

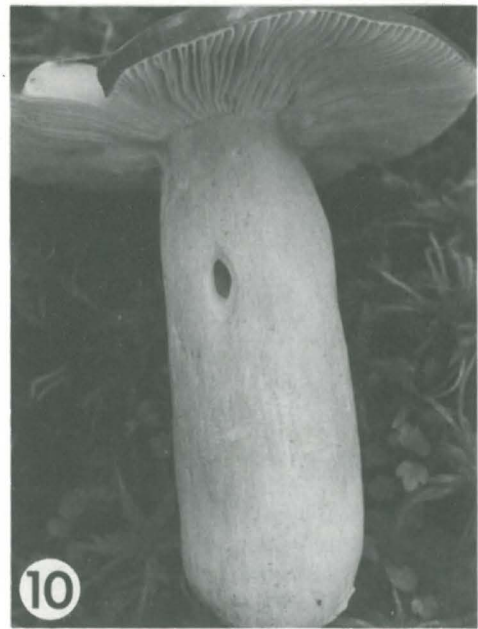
In Finland the fruiting period of *R. olivina* starts in late July, reaches the maximum in early August–early September, and ceases in mid-September.

Discussion

The green species of *Russula* belong to several sections. The habit, spore print colour and microscopical

characters of *R. olivina* indicate that it is a member of subsection *Laricinae* (Romagn.) Bon.

Some other mild-tasting green *Russula* species with a yellow spore print occur in Finland. The most common is *R. postiana* Romell (= *R. olivascens* Pers. ss. Bresadola, *R. chamaeleontina* Fr. ss. J. Schaeffer, *R. neglecta* Singer nom. inval., and *R. multicolor* Blum ex Bon; see p. 25). This species has been confusing because of its many pileus colours, ranging from violet to brown and green. The green forms of *R. postiana* differ from *R. olivina* in their orange lamel-



Figs. 8–10. Fruit bodies of *Russula taigarum*, photographed in situ, $\times 0.9$. — 8: holotype, KUO. — 9–10: a fruit body showing the matt pileus and uneven red colour on stipe (Storbacka & Vauras 2118F, TURA). Photos Juhani Ruotsalainen (8), Jukka Vauras (9–10).

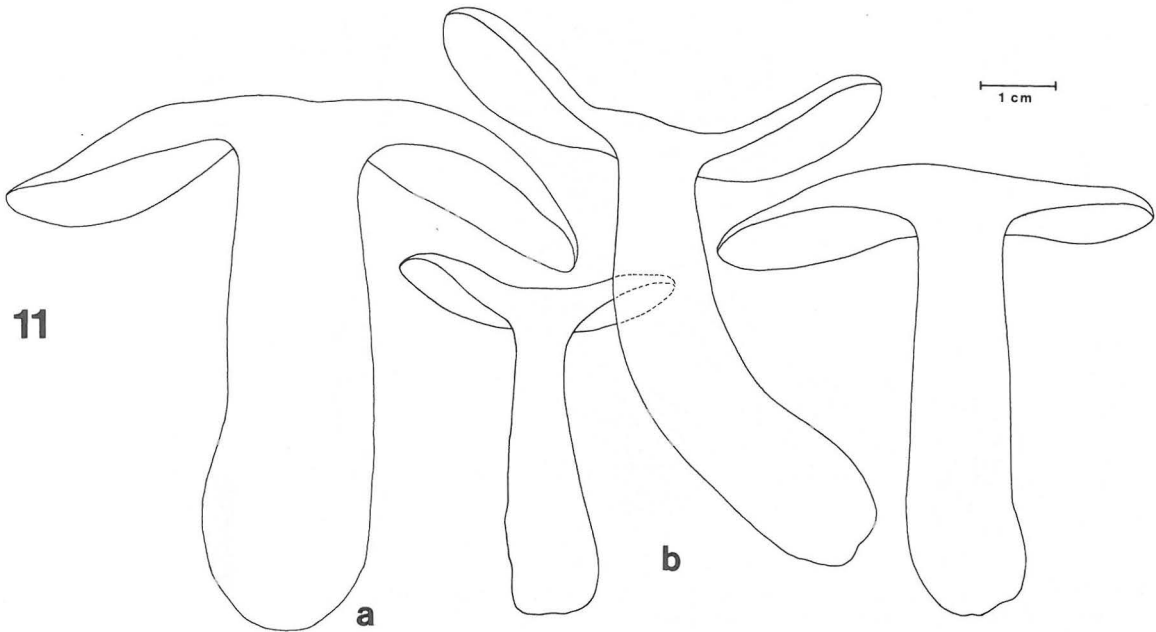


Fig. 11. Fruit bodies of *Russula taigarum*, x 1 (a, *Vauras 2121*, TURA; b, *Ruotsalainen & Vauras 3117*, TURA).

lae, darker spores in mass (Romagnesi 4d–e), often pruinose stipe with a smell of iodine at the base, encrusted elements in the pileipellis and smaller spores (8–10(–11) x 7–9 μ m).

Further, *R. olivina* can easily be recognized by its 2-spored basidia. Two species with 2-spored basidia are known from the Scandinavian mountains, viz. *R. heterochroa* Kühner and *R. pseudocampestris* Kühner. However, the former has a pileus with a dark purplish red colour, and the latter with a brown colour (Kühner 1975).

R. mollis Quélet ss. J. Lange (Lange 1940; Plate 196G) matches *R. olivina* in habit. However, judging from Lange's description, the flesh is slightly bitter, the spores smaller, and the habitat frondose woods. *R. mollis* was interpreted by Romagnesi (1967) as a species with encrusted elements in the pileipellis and rather small spores.

R. luteoviridans Mart. is mostly interpreted as an acrid species, belonging to the group of *R. cuprea* Krombh. and *R. urens* Romell (Romagnesi 1967). *R. olivicolor* Britz. is a member of subsection *Atropurpurinae* (Romagn.) Bon (Bon 1988). Likewise, the green North American *R. redolens* Burl. and *R. viridioculata* Burl. are acrid species with a white spore print (Burlingham 1921).

Specimens examined

Finland. Varsinais-Suomi: Parainen, Valoniemi, 1989 Lehtonen (TUR), *Vauras 3832F* (C, JYV, L, MICH, O, S, TURA). **Pohjois-Häme:** Saarijärvi, Linnankylä, 1982 *Storbacka* (TUR), 1986 *Storbacka* (OULU), *Storbacka & Vauras 2122* (TURA), 1988 *Storbacka 88009* (TURA), *Storbacka & Vauras 3156* (KUO, TURA). **Pohjois-Savo:** Kuopio, Neulaniemi, 1983 *Vauras 1466* (TURA), 1988 *Ruotsalainen 1052* (KUO); Pitkälähti, Matkusjärvi, 1986 *Vauras 2270* (KUO), 1987 *Ruotsalainen 682F* (KUO), *Kytövuori 87983a* (H), 1988 *Vauras & Ruotsalainen 1059F* (type), *Ruotsalainen & Vauras 3128F* (TURA), 1989 *Ruotsalainen 1451* (KUO). **Pohjois-Karjala:** Ilomantsi, Kontiovaara, 1985 *Vauras 1991* (TURA). Juuka, Pääkylä, 1987 *Kytövuori 87723* (H). **Keski-Pohjanmaa:** Soini, Laasala, 1988 *Kytövuori 88-249* (H). **Kainuu:** Paltamo, Melalahti, 1987 *Ulvinen* (OULU). Puolanka, Suolijärvi, 1988 *Kytövuori 88-884* (H). Sotkamo, Kontinjoki 1986 *Ulvinen* (OULU). **Oulun Pohjanmaa:** Kiiminki, Pikkuhalmeeenmaa, 1970 *Ulvinen* (OULU); Juuansydänmaa, 1966 *Ulvinen* (OULU), 1971 *M. Ohenoja 71-22* (OULU), 1972 *M. Ohenoja 72-30B* (OULU); Pöksälänkangas, 1970 *M. Ohenoja 70-8* (OULU). **Perä-Pohjanmaa:** Tornio, Kalkkimaa, 1986 *Ulvinen* (OULU). **Koillismaa:** Kuusamo, Oulanka National Park, Kiutaköngäs, 1976 *Ulvinen* (OULU); Liikasenvaara, 1976 *Ulvinen* (OULU), *Tuomikoski* (H), 1985 *Vauras & Ruotsalainen 67* (KUO). Posio, Livojärvi, 1977 *Ulvinen* (OULU). **Kitilän Lappi:** Kittilä, Vesmajärvi, 1988 *Kytövuori 88-1165* (H). **Sompion Lappi:** Pelkosenniemi, Aapajärvi, 1988 *Kytövuori 88-1094a* (H).

Sweden. Jämtland: Undersåker, Trillevallen, Mt. Välliste, 1982 *Hakala* (OULU). **Torne Lappmark:** Kiruna, Svappavaara, 1986 *Kytövuori 86176* (H).

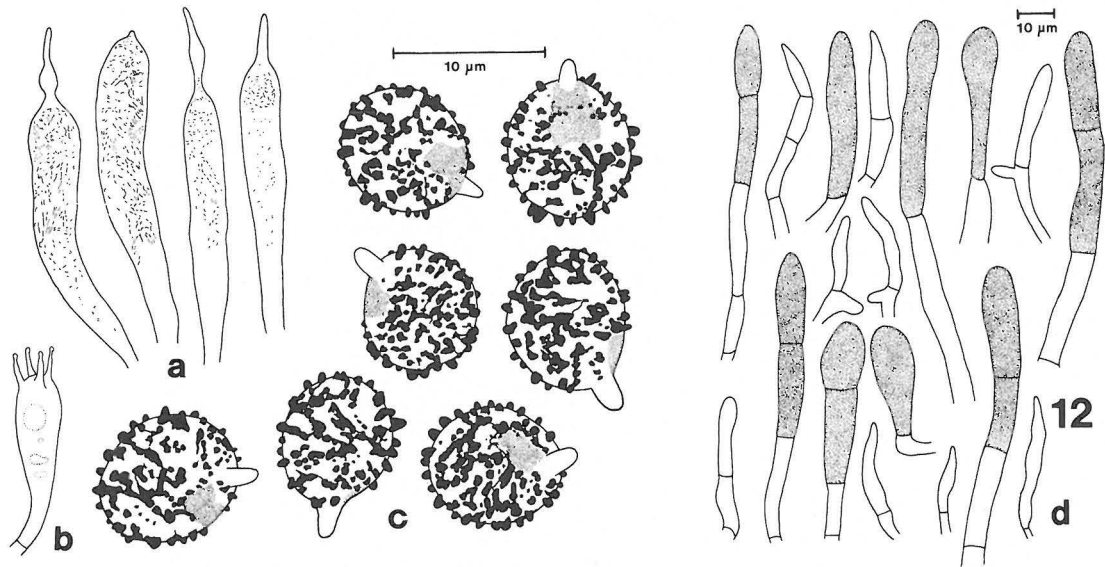


Fig. 12. Microscopical details of *Russula taigarum* (holotype, KUO). a: hymenial cystidia, b: basidium, c: spores from spore print, d: elements of pileipellis. Scales: spores $\times 2\,000$, others $\times 500$.

U.S.S.R. Estonian S.S.R.: Viljandi, Loodi, 1989 *Kytõvuori* 89-249 (H). Not localizable, 1937 *Singer* (LE, No. 15195).

***Russula taigarum* Ruotsalainen & Vauras, spec. nova, Figs. 8–13.**

Species media, pileo 2.2–12 cm lato, plano-convexo vel depresso, saepe irregulare, impolito, multicolorato, centro saepe sordide subnigro-purpureo vel sordide ochraceo-olivaceo, margine fere brunneo-vinoso et obtuso, initio glabro tum breviter sulcato. Lamellae fere latae, cremeae, postea subflavescentes. Stipes 2.5–15 \times 0.7–3 cm, leviter clavatus, carmineo-roseus, basi et interdum etiam apice albo. Carne alba, odore indistincto, sapore mite vel parce acre. Sporae in cumulo ochraceae (*Romagnesi* 3b–c), 8–10 \times 7–9.5 μm , nonnihil reticulatae, ornamentis ad 1 μm altis. Basidia tetrasporica, claviformes, 38–57 \times 8–14 μm . Cystidia hymenii diverse appendiculata, 10–16 μm lata. Cutis cum dermatocystidiis abundantibus, 7–16 μm latis. *Habitatio*: in silva uda in propinquitatem *Picearum* (*Picea abies*).

Holotypus: Finland. Pohjois-Savo: Siilinjärvi, Toivala, W side of the hill Ruskeisenmäki, on slope in somewhat paludified mixed forest, near *Picea abies*, *Pinus sylvestris*, *Betula pendula*, *Alnus incana*, by path, on *Sphagnum girgensohnii*, Grid 27°E: 69851:5364, alt. 115 m, 2.IX.1986 J. Ruotsalainen 458F (KUO, isotypi in MICH, UPS).

Pileus (2.2–)4–12 cm in diam, convex, later flattening to depressed at centre; often somewhat irregular, multicoloured, dark vinaceous red–brown to brown–violet, centre dirty black–brown, dark purple ($Y_{40}M_{70}C_{80}$), dark ruby-red ($Y_{40}M_{60}C_{60}$, $Y_{40}M_{70}C_{60}$, $Y_{50}M_{99}C_{80}$), brown–violet ($Y_{40}M_{70}C_{40}$, $Y_{50}M_{70}C_{60}$,

$Y_{60}M_{70}C_{70}$), yellowish red–brown ($Y_{60}M_{50}C_{40}$), pale red–brown ($Y_{40}M_{40}C_{30}$, $Y_{40}M_{40}C_{40}$), dirty pale red, yellow–brownish green, cream coloured; margin brown–violet, brown–red ($Y_{40}M_{50}C_{30}$, $Y_{50}M_{60}C_{50}$, $Y_{50}M_{70}C_{50}$), red–brown ($Y_{70}M_{60}C_{50}$), blunt, when young smooth, later becoming narrowly (up to 15 mm) sulcate; surface matt, sometimes whitish pruinose, after rain slimy, half of pileipellis peeling.

Lamellae when young moderately crowded, later rather thick and subdistant (4–8 lamellae/cm at pileus margin), narrowly adnate, fairly broad (up to 17 mm), cream-coloured to pale yellow, sometimes with brownish spotting, no lamellules, some forking, margin often narrowly red (up to 5 mm) at pileus margin.

Stipe (2.5–)4–15 cm long, (0.7–)1.2–3 cm wide, mostly subclavate, most expanded at base, sometimes cylindrical, base mostly rounded, often with notch; violet–red, pale red ($S_{00}Y_{20}M_{40}$, $Y_{30}M_{50}C_{00}$), pale rosate ($Y_{20}M_{40}C_{00}$, $Y_{20}M_{50}C_{00}$), pastel red ($S_{00}Y_{10}M_{30}$, $S_{00}Y_{20}M_{30}$, $S_{00}Y_{20}M_{40}$), in dried specimens more clearly with violet tint ($S_{10}Y_{20}M_{30}$, $S_{10}Y_{20}M_{50}$, $S_{20}Y_{30}M_{50}$, $S_{50}Y_{10}M_{50}$); colour typically spotty and uneven, base mostly white but sometimes partly brownish to yellow–brown, apex occasionally white.

Context white, under pileipellis pale red or partly white, FeSO_4 gradually turning stipe brown–red, formal pink, phenol dirty violet. Smell indistinct, occasionally reminiscent of old meal. Taste mostly mild, but sometimes slightly acrid (as in *R. paludosa*).

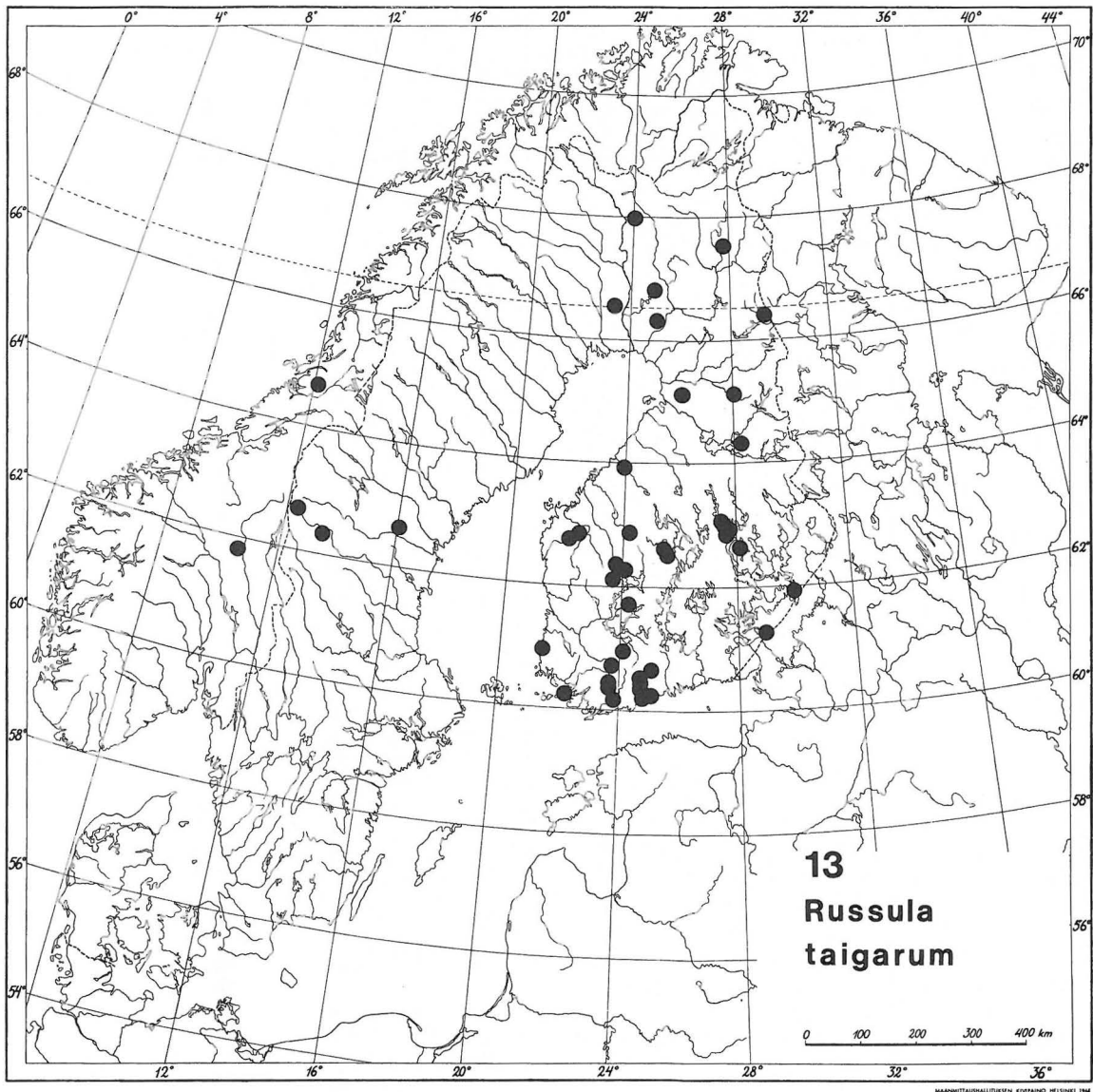


Fig. 13. Distribution of *Russula taigarum* in Fennoscandia.

Spores in mass ochre (Romagnesi 3b-c) as in *R. claroflava* or *R. nitida*, $8-10 \times 7-9.5 \mu\text{m}$, total range of mean values $8.5-9.4 \times 7.3-8.4 \mu\text{m}$, $Q = 1.1-1.2(-1.3)$, warts hemispherical to conical, up to $1 \mu\text{m}$ high, many joined or near to each other, giving a partial reticulum, with some thin connectives, plage slightly amyloid.

Basidia $38-57 \times 8-14 \mu\text{m}$, clavate, 4-spored. Hymenial cystidia $10-16 \mu\text{m}$ broad, mostly appendiculate, in sulphovanillin dark violet.

Apical cells of pileipellis $2-5 \mu\text{m}$ broad, cylindrical or tapering to apex. Dermotocystidia abundant, $7-14(-16) \mu\text{m}$ broad, mostly 1-2-septate, cylindrical to clavate, rarely with small lateral knobs, in sulphovanillin dark violet.

In spruce-hardwood swamps or slightly paludified mixed forests, favouring more fertile soils, often on *Sphagnum*, with *Picea abies*. From Hemiboreal to Northern Boreal zone, not infrequent in suitable habitats in Finland. July to September.

Distribution, ecology and phenology

Russula taigarum has a wide distribution in Finland, from the southwestern archipelago to Lapland. The species is also known from Sweden and Norway. The distribution shows some concentration in the Southern Boreal zone and the southern part of the Middle Boreal zone (Fig. 13). However, it has been found even in the Upper Oroboreal zone, the nearly uppermost mountain spruce forest. The fruit bodies occur singly or in small groups.

R. taigarum seems to grow with *Picea abies*, occurring in moist, often spring-fed or slightly paludified depressions in rather rich spruce forests, mostly on *Sphagnum*, but occasionally also on paths. The soil type is often *Sphagnum* turf with a pH ranging from 4.5 to 6.1 (cf. Table 1). The fungi growing nearby have included *Hydnum repandum* L., *Inocybe napipes* J. Lange, *I. nematoloma* Joss., *I. rivularis* Jacobsson & Vauras, *Lactarius repraesentaneus* Britz., *L. theogalus* (Bull.: Fr.) S.F. Gray, *L. tuomikoskii* Kytöv., *Russula paludosa* Britz., *R. persicina* Krombh. and *R. sphagnophila* Kauffm.

In Finland the fruiting period of *R. taigarum* may start as soon as early July, reaches a peak in late July–early September, and ceases in late September (Fig. 14).

Discussion

Russula taigarum is a characteristic species which is fairly easily recognized in the field and in herbarium material. With its matt vinous–brown pileus and red stipe with occasional yellow–brown areas at the base, the species resembles the *R. xerampelina* group. However, *R. taigarum* lacks the characteristic smell of herring and the greenish reaction with FeSO_4 . *R. amoena* Quélet and *R. amoenicolor* Romagn. (neither known to occur in Finland) differ from *R. taigarum* in their smell of cooking Jerusalem artichokes and the microscopical characters.

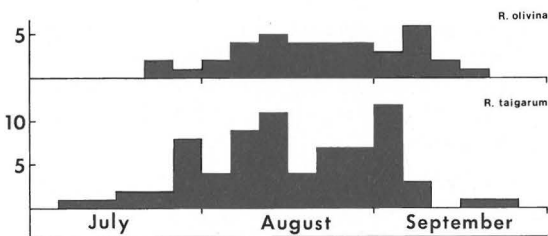


Fig. 14. Fruiting periods of *Russula olivina* and *R. taigarum*, divided into pentads.

In herbarium material *R. taigarum* is distinguished from the species of the *R. xerampelina* group by the lamellae that remain pale yellow and the stipe lacking a greenish reaction with FeSO_4 . When dried, the species in the *R. xerampelina* group are mostly characterized by lamellae with a dark grey–brown tint. In herbarium material *R. taigarum* can also somewhat resemble the acrid species *R. queletii* Fr. and *R. sardonica* Fr.

The microscopical pileipellis characters seem to place *R. taigarum* in the subsection *Sphagnophilinae* Singer, close to *R. nitida* and *R. sphagnophila*. It differs clearly from these species both macroscopically and in its spores.

With its mild or only slightly acrid taste, *R. taigarum* is an edible fungus, but it has not much importance as such because of its scattered occurrence.

Specimens examined

Finland. *Varsinais-Suomi*: Parainen, 1988 Heinonen (TUR). Suomensjärvi, 1984 Kytövuori 84273 (H), 1986 Kytövuori 86491 (H). Uusikaupunki, 1989 Kulmala (TURA). *Uusimaa*: Espoo, 1986 Kytövuori 86409 (H), 1988 Kytövuori 88-599 (H). Helsinki, 1951 Tuomikoski (H), 1986 Kytövuori 86458 (H). Hyvinkää, 1986 Höijer (H). Karjaa, 1988 Kytövuori 88-612 (H). Nurmijärvi, 1977 Askola (H), 1986 Kytövuori 86469 (H). Vantaa, 1988 Höijer (KUO). *Etelä-Häme*: Hattula, 1968 Uotila (H). Orivesi, 1988 Kytövuori 88-531 (H). Ruovesi, 1966 P. & I. Kytövuori 2592 (H). Tammela, 1986, 1988 Höijer (H). Virrat (Pohjaslahti), 1988 Kytövuori 88-137 (H). *Etelä-Savo*: Ruokolahti, 1988 Ruotsalainen 945 (KUO). *Etelä-Pohjanmaa*: Ilmajoki, 1988 Kytövuori 88-307 (H). Jurva, 1988 Kytövuori 88-348, 88-365 (H). *Pohjois-Häme*: Saarijärvi, 1986 Ruotsalainen 398 (KUO). *Vauras* 2121 (TURA), 1988 *Storbacka* 88038 (C, TURA), *Vauras* 3159, 3160 (TURA), *Storbacka* & *Vauras* 3162 (TURA), 1989 *Vauras* & Ruotsalainen 1536 (KUO). Virrat, 1966 Kytövuori (H), 1988 Kytövuori 88-159 (H). Äänekoski, 1986 *Storbacka* & *Vauras* 2118F (TURA), 1988 *Vauras* 3147F (JYV, TURA). *Pohjois-Savo*: Kuopio, 1986 Ruotsalainen 239 (KUO), 1988 M. Korhonen, E. Korhonen & Ruotsalainen 1017 (KUO), Heikkilä, *Vauras* & Ruotsalainen 1047 (KUO), Ruotsalainen & *Vauras* 3117 (L, NYS, TURA), 3130 (S, TURA), *Vauras* 3119, 3137 (TURA). Leppävirta, 1988 Ruotsalainen 838 (KUO). Siilinjärvi, 1985 Ruotsalainen 112, 120, 165 (KUO), *Vauras* & Ruotsalainen 116F (KUO), 1986 Ruotsalainen 458F (type), 349, 417, 430 (KUO), 1987 *Vauras* 2862 (TURA), 1988 Ruotsalainen 872 (KUO), 1989 *Vauras* 3780 (TURA), Huhtinen (TUR). *Pohjois-Karjala*: Kesälahti, 1987 Kytövuori 87414 (H). *Keski-Pohjanmaa*: Kannus, 1988 *Storbacka* (TURA). Soini, 1988 Kytövuori 88-242 (H). *Kainuu*: Paltamo, 1972 M. Ohenoja (OULU). Puolanka, 1988 Kytövuori 88-879 (H). *Oulun Pohjanmaa*: Kiiminki, 1966 Ulvinen (OULU). *Perä-Pohjanmaa*: Rovaniemi rural commune, 1976 E. Ohenoja (OULU). *Koillismaa*: Kuusamo, 1966 P. & I. Kytövuori 2372 (H). *Kiitilän Lappi*: Muonio, 1988 Kytövuori 88-1412 (H). *Sompion Lappi*: Savukoski, 1988 Kytövuori 88-1054 (H).

Sweden. *Härjedalen*: Hede, 1986 Kytövuori 86770 (H), Tännäs, 1986 Kytövuori 86791 (H). *Medelpad*: Torp, 1989 Ruotsalainen & *Vauras* 3734 (TURA). *Norrbotten*: Övertorneå, 1986 Kytövuori 86361 (H).

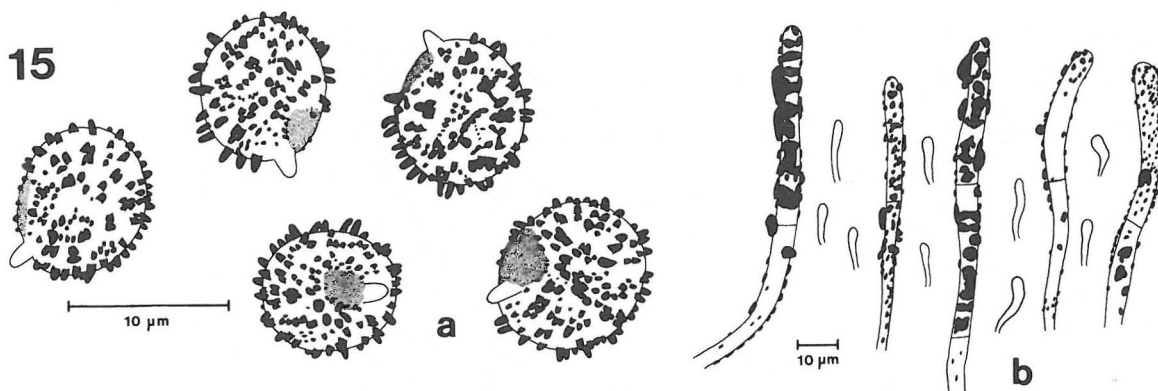


Fig. 15. Microscopical details of *Russula postiana* (lectotype, S). a: spores, b: elements of pileipellis. Scales: spores $\times 2\,000$, others $\times 500$.

Norway. Hedmark: Stor-Elvdal, 1989 Kytövuori 89-470 (H, O). Nord-Trøndelag: Høylandet, 1988 K. & E. Bendiksen 165-88, 175-88 (O).

Russula postiana Romell, Fig. 15.

Russula postiana Romell, Öfvers. Kongl. Vetensk. Akad. Förhandl. 3:182. 1891. — Lectotype: Sweden. Stockholm: Uggleviksskogen, 4.VIII.1888 L. Romell 6609 (S).

Selected illustrations. Schaeffer, *Russula-Monographie*: pl. 12, fig. 38 (as *R. olivascens*), fig. 41 (as *R. chamaeleontina*). 1952. — Marchand, *Champignons du nord et du Midi* 5: pl. 464 (as *R. olivascens*). 1977. — Michael, Hennig & Kreisel, *Handbuch für Pilzfreunde* 5: pl. 120 (as *R. olivascens*), pl. 124 (as *R. neglecta*). 1983. — Ryman & Holmsen, *Svampar*: 540 (as *R. olivascens*). 1984. — Einhellinger, *Hoppea* 43: pl. 22 (as *R. olivascens*). 1985. — Ruotsalainen, *Sienilehti* 42:61. 1990.

Romell did not designate a holotype for *R. postiana*. Amongst the authentic material, preserved in S, a collection from Uggleviksskogen (4.VIII.1888) is selected by us as the lectotype. It consists of some fragments of two fruit bodies and of a water-colour plate (No. 756) showing the two fruit bodies when whole and in longitudinal section. The specimens on the plate have a pale grey-green pileus, typically orange-yellow lamellae, and a white stipe, which is somewhat chambered inside.

The study of the lectotype specimen showed the following details. Spores $8-9.5(-10) \times 7-8.5 \mu\text{m}$, mean value $9.0 \times 7.7 \mu\text{m}$, $Q = 1.1-1.25$, echinulate, sometimes with a few connections, warts blunt, up to $1 \mu\text{m}$ high. Intact basidia or hymenial cystidia not seen. Apical cells of pileipellis $2-3 \mu\text{m}$ broad, somewhat clavate. Primordial hyphae slender, $3-7 \mu\text{m}$ broad, mostly $1-3$ -septate, rather strongly encrusted.

Four collections of *R. postiana*, gathered by L. Romell from the type locality, are preserved in S.

Altogether, 21 collections were made by L. Romell in the Stockholm area. However, only some of them have been labelled by him as *R. postiana*. Some fruit bodies collected under that name have a violet pileus, as mentioned in the original diagnosis. We have observed in Finland that the pileus colour of *R. postiana* is in fact rather variable, ranging from greenish to violet, even within a distance of 2-3 m, though the specimens have been microscopically identical. Thus the name *Russula multicolor* Blum ex Bon fits the species very well. However, the oldest certainly interpretable name is *R. postiana*. We also studied seven Italian specimens of *R. olivascens*, collected and named by G. Bresadola, and deposited in M (2 ex.) and S (5 ex.). They all fit well with our concept of *R. postiana*. The 10 Swedish specimens in S named *R. neglecta* by R. Singer are also conspecific with *R. postiana*. The species is not infrequent in Sweden, around Stockholm and in Uppland, and in southern Finland. It seems to grow with both *Picea abies* and *Pinus sylvestris*.

Acknowledgements. Our sincere thanks are due to the curators of the herbaria which kindly sent material on loan. We are especially grateful to Dr. Ilkka Kytövuori (Helsinki) for sending us several important specimens of the two new taxa and providing us with many ecological notes. In addition, Mr Paavo Höijer (Porvoo) and Mr Rolf Storbacka, M.Sc. (Kokkola), placed their specimens at our disposal. We are indebted to Prof. Teuvo Ahti (Helsinki), Dr. Seppo Huhtinen (Turku), and Mr Tauno Ulvinen, Lic.Phil. (Oulu), for their comments on the manuscript. Prof. Teuvo Ahti also helped us with nomenclatural problems, and valuable advice was received from Ms Heli Heikkilä, Lic.Phil. (Kuopio), Ms Esteri Ohenoja, Lic.Phil. (Oulu), and Mr Martti Ohenoja (Oulu). The linguistic revision of the manuscript was done by Ms Anna Damström, M.A. We are grateful to Kuopion Luonnon Ystävien Yhdistys for a grant to cover the colour printing.

References

- Bon, M.** 1988: Clé monographique des russules d'Europe. — *Doc. Mycol.* 18:1–125.
- Bresinsky, A.** 1985: Die Arten der Gattung *Russula* in der Bundesrepublik Deutschland und deren Bestimmung nach Romagnesi. — *Hoppea* 43:287–342.
- Burlingham, G.S.** 1921: Some new species of *Russula*. — *Mycologia* 13:129–134.
- Einhellinger, A.** 1985: Die Gattung *Russula* in Bayern. — *Hoppea* 43:5–286.
- Korhonen, M. & Vauras, J.** 1986: Suomen haperoista. — *Sienilehti* 38:58–69.
- Kühner, R.** 1975: Agaricales de la zone alpine. Genre *Russula* Pers. ex S.F. Gray. — *Bull. Soc. Mycol. France* 91: 313–390.
- Küppers, H.** 1981: *DuMont's Farben-Atlas*. 2nd ed. — 163 pp. Köln.
- Lange, J.E.** 1940: *Flora Agaricina Danica*. V. — 105 pp., 40 pls. Copenhagen.
- Marchand, A.** 1977: *Champignons du Nord et du Midi* 5. Les Russules. — 301 pp. Perpignan.
- Michael, E., Hennig, B. & Kreisel, H.** 1983: *Handbuch für Pilzfreunde* 5. 2nd ed. — 408 pp. Stuttgart.
- Romagnesi, H.** 1967: *Les Russules d'Europe et d'Afrique du Nord*. — 998 pp. Paris.
- Schaeffer, J.** 1952: *Russula-Monographie*. — 295 pp., 20 pls. Bad Heilbrunn.
- Singer, R.** 1938: Contribution à l'étude des Russules. 3. Quelques Russules américaines et asiatiques. — *Bull. Soc. Mycol. France* 54:132–177.
- Svrček, M., Erhart, J. & Erhartova, M.** 1984: *Holubinky*. — 165 pp. Praha.

Received on 5 February 1990