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## *Steccherinum tenuispinum* (Polyporales, Basidiomycota), a new species from Russia, and notes on three other species

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A new species, *Steccherinum tenuispinum* Spirin, Zmitr. & V. Malysheva is described. Its closest relative is *S. robustius*, and it differs in having lighter-coloured spines, smaller spores, and a peculiar ecology. *Steccherinum narymicum* is reported for the first time after its original description in 1936. New records and some data on morphology, anatomy and ecology of *S. murashkinskyi* are given and *S. bourdotii* is reported as new to Russia.

Key words: new species, *Steccherinum*, taxonomy, wood-rotting fungi

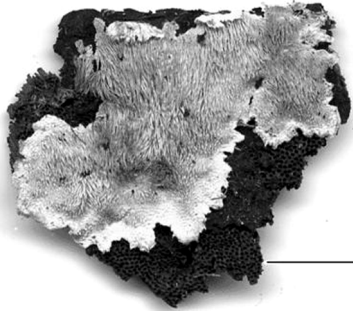
This paper deals with four species of the hydroid genus *Steccherinum*. Like its closest relatives, *Antrodiella* and *Junghuhnia*, this genus comprises numerous species complexes, which deserve much closer study. Some *Antrodiella* and *Junghuhnia* species have very distinct ecological preferences, growing on wood previously decayed by other fungi. It was a surprise to find still an unnamed *Steccherinum* species growing on dead basidiocarps of the polypore *Fomitopsis pinicola* and on wood decomposed by it. This species is here described as *Steccherinum tenuispinum*. In the second part of this paper the rare species *S. murashkinskyi* and *S. narymicum* are re-described, and their ecology is discussed.

The microscopic characters were studied with a Karl Zeiss amplival microscope. The chemical reagents used in the microscopic examination are 5% solution of potassium hydroxide (KOH),

Melzer's reagent (IKI) and Cotton Blue (CB). The measurements were made in CB; total of 30 spores from each specimen were measured. For presenting the variation in spore size, 5% of measurements were excluded from each end of the range, and are given in parentheses. The type material is placed in the herbarium of Botanical Museum, University of Helsinki (H); the duplicates and some specimens were carried into Mycological Herbarium of Komarov Botanical Institute (St. Petersburg, Russia, LE).

***Steccherinum tenuispinum* Spirin, Zmitr. & V. Malysheva, sp. nova** (Figs. 1 and 2)

*Fungus effuso-reflexus vel resupinatus, habitu Steccherinum robustius similis. Hymenophorum hydnoideum, pallido-ochraceum vel vina-*



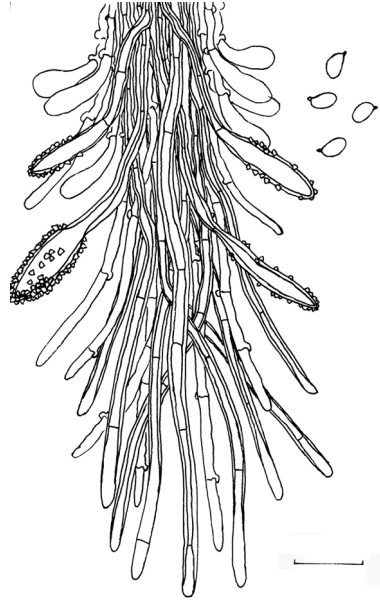
**Fig. 1.** *Steccherinum tenuispinum* (holotype). Basidiocarps on dead *Fomitopsis pinicola*. Scale bar = 0.5 cm.

*ceo-armeniacum*; *aculeis* 3–4 per mm. *Systema hypharum dimiticum*; *pseudocystidia adsunt in hymenio*. *Sporae lato-ellipsoideae*,  $2.8\text{--}3.9 \times 2.4\text{--}2.8 \mu\text{m}$ .

**HOLOTYPE:** Russia. Nizhny Novgorod Reg., Sharanga Dist., Kilemarsky Nat. Res., dead *Fomitopsis pinicola* on *Populus tremula*, 16.VIII.2004 *Spirin* 2116 (H; isotype LE).

Basidiocarp annual, effused-reflexed to resupinate, 12–50 mm in longest dimension, fibrillose-membranaceous when fresh, leathery in herbarium specimens, easily separable from substrate. Caps small, 2–6 mm wide, appearing as reflexed upper margin (pseudopilei); upper surface smooth to indistinctly zonate, whitish to dirty-ochraceous. Margin of effused and reflexed parts uneven, often slightly undulating or inrolling, more or less split, whitish to cream-coloured, developing short fimbriate rhizomorphs (0.5–1.5 mm thick) under mosses or in wood gaps. Context papery to densely membranaceous, striate, ochraceous to blackish-brown near substrate, white to cream-coloured between spines, 0.5–1 mm thick. Spines (1–)1.5–4(–5) mm long, thin, acute, often in conical groups, first cream-coloured to pale-ochraceous, in mature state pale orange to reddish with grayish or vinaceous-brown tints, in older specimens dirty-brownish, 3–4 per mm. No distinct odour, taste mild.

Hyphal structure dimitic. Context monomitic, consisting of thick-walled sklerified generative hyphae (4.5–)5–7  $\mu\text{m}$  wide, with large clamps and secondary septa. Spines dimitic, hyphae strictly parallel; skeletal (2–)2.5–3.4(–3.8)  $\mu\text{m}$  wide, thick-walled to subsolid, CB+; generative hyphae thin-walled or with thickened walls,



**Fig. 2.** *Steccherinum tenuispinum* (holotype). Hymenium and spores. Scale bar = 10  $\mu\text{m}$ .

clamped, 2–2.6  $\mu\text{m}$  wide; in older basidiocarps hyphae agglutinated by yellowish amorphous matter and becoming gelatinous in KOH. Pseudocystidia thick-walled, with hyaline or pale-yellowish crystalline encrustation, arising from tramal skeletal hyphae, 60–150  $\times$  7–10  $\mu\text{m}$ . Spine tips dimitic, consisting of generative hyphae and secondary-septate skeletal with thickened walls and rounded apices. Basidia clavate, four-spored, clamped, 12–24  $\times$  3.5–4.8  $\mu\text{m}$ . Basidiospores broadly-ellipsoid, (2.7–)2.8–3.9(–4.1)  $\times$  (2.3–)2.4–2.8(–2.9)  $\mu\text{m}$ , thin-walled, hyaline, sometimes guttulate, IKI–, CB–.

This new species looks like an intermediate between two other closely related hydroid species, *Steccherinum ochraceum* and *S. robustius*. Morphologically the first one differs from *S. tenuispinum* in having shorter (up to 2 mm long) and densely arranged (5–7 per mm) pale ochraceous spines, while the second is characterized by brighter, orange-brownish hymenophore. However, the clear differences can be seen only with microscope. The best diagnostic character of *S. tenuispinum* is the spore size, since the spores of *S. ochraceum* are smaller and narrower, 3.2–3.5(–4)  $\times$  (2–)2.2–2.5  $\mu\text{m}$  (Eriksson *et al.* 1984). *Steccherinum robustius* has larger spores (3.5–)3.6–4.8(–5.0)  $\times$  (2.7–)2.8–3.2  $\mu\text{m}$ ,

larger (8–15  $\mu\text{m}$  wide) brownish pseudocystidia, and up to 35  $\mu\text{m}$  long basidia.

The other boreal species in the *S. ochraceum* complex are *S. mukhinii*, *S. bourdotii*, and *S. laeticolor*. The first-mentioned species is a strictly resupinate counterpart of *S. ochraceus* differing by its dark-brown colour; their microscopic structures are almost identical, except for the brown cystidia of *S. mukhinii* (Kotiranta & Mukhin 1998). The general habit and colour of *S. laeticolor* are similar to those of *S. tenuispinum*, but the spores of *S. laeticolor* are smaller, short-cylindrical (2.6–)2.7–3.5(–3.6)  $\times$  (1.7–)1.8–2.1  $\mu\text{m}$ , and it has true pilei. *Steccherinum bourdotii* is also distinctly pileate, and has larger subglobose spores (see below).

The main ecological feature of *S. tenuispinum* is its growth on dead *Fomitopsis pinicola*, and on wood previously decayed by that polypore. Seven specimens were collected from the basidiocarps of its predecessor, and four times these species were observed together. When developing on spruce trunks, *S. tenuispinum* often occurs with *Antrodiella citrinella*, another successor of *F. pinicola*. Once *S. tenuispinum* was growing on an aspen trunk, decomposed by *Phellinus tremulae*, on which *Junghuhnia pseudozilingiana* was seen, too. It seems that the favoured substrates of *Steccherinum tenuispinum* are aspen (six finds) and spruce (four finds); only one record is on linden wood.

The preferred habitats of *S. tenuispinum* are old southern-taiga forests with large fallen aspen trees and spruce trunks. *Steccherinum ochraceum* and *S. robustius* have evidently different ecological preferences: they mostly occur in broad-leaved forests, inhabiting fallen branches and logs of *Quercus robur* and *Corylus avellana*. In the boreal zone *S. ochraceum* prefers intrazonal plant communities, i.e. alder or willow thickets, where it is commonly associated with *Fomes fomentarius* or the species of the *Phellinus igniarius* group.

OTHER SPECIMENS EXAMINED. — *Steccherinum tenuispinum* (paratypes). **Russia**. Nizhny Novgorod Reg., Sharanga Dist., Kilemarsky Nat. Res., dead *Fomitopsis pinicola* and wood of *P. tremula*, *Picea abies*, and *Tilia cordata*, 28.IX.1999 and 16–20.VIII.2004 *Spirin* 2117, 2206, 2211, 2222, 2227, 2230, 2256 (H; LE 213584); Arzamas Dist., Pustynsky Nat. Res., dead *Fomitopsis pinicola* on *Picea abies*, 18.VII.2000 *Spirin*

(LE 210061); Lukoyanov Dist., Panzelka, *P. tremula* inhabited by *Phellinus tremulae* and *Junghuhnia pseudozilingiana*, 23.VII.1999 *Spirin* (LE 213698). — *Steccherinum laeticolor*. **Russia**. Nizhny Novgorod Reg., Bogorodsk, *Caragana arborescens*, *Spirin* (LE 213419); Lukoyanov Dist., Razino, *Acer platanoides*, *Spirin* 2507 (H, LE). — *Steccherinum mukhinii*. **China**. Jilin Prov., Antu County, Changbaishan Nat. Res., *Abies*, *Dai* 29876 & Niemelä (H). — *Steccherinum ochraceum*. **Russia**. Nizhny Novgorod Reg., Lukoyanov Dist., Sanki, *Corylus avellana*, *Spirin* (LE 213508). — *S. robustius*. **Russia**. Nizhny Novgorod Reg., Arzamas Dist., Pustynsky Nat. Res., *Populus tremula*, *Spirin* (LE 210062).

### *Steccherinum bourdotii* Saliba & David

Cryptogamie Mycologie 9: 100. 1988.

This species is here reported as new to Russia. Its morphology, anatomy and distribution were thoroughly described by Niemelä (1998). *Steccherinum bourdotii* often develops minute caps 2–4 mm thick, with pubescent or tomentose upper surface; spines are cylindrical or slightly flattened, pale rose to pale reddish, in older basidiocarps grayish to brownish, 3–4 per mm. The basidiospores are subglobose, in our specimens (4.2–)4.4–5.1(–5.6)  $\times$  (3.2–)3.4–4.2  $\mu\text{m}$ , very thin-walled and occasionally guttulate.

This species is evidently widespread in hemiboreal (nemoral) and boreal zones, where it was overlooked or confused with *S. ochraceum* until recently. Our records derive from moist broad-leaved forests, dominated by *Quercus robur*, *Tilia cordata* and *Populus tremula*, and growing on rich calcareous soils. *Steccherinum bourdotii* occurs on both standing and recently fallen thin trunks of deciduous trees. The basidiocarps are often overwintered and, probably, biennial.

SPECIMENS EXAMINED. — **Russia**. Leningrad Reg., Otradnoye, *Betula pubescens*, 5.VIII.2003 *Zmitrovich* (LE). Nizhny Novgorod Reg., Lukoyanov Dist., Sanki, *Ulmus scabra*, *Spirin* 2318 (H, LE); Pochinki Dist., Kommunar, *Salix caprea*, *Spirin* (LE 213690).

### *Steccherinum murashkinskyi* (Burt) Maas Geest. (Fig. 3)

Persoonia 2: 405. 1962. — *Hydnum murashkinskyi* Burt.

Basidiocarps annual, sessile, pileate to decur-

rent. Caps 5–14 × 10–50 × (0.5–)1–5 mm, coriaceous, fragile when dry, firmly attached to the substrate; cap surface tomentose, later naked, concentrically zonate, rather uneven, cinnamon brown. Margin distinct, sharp or blunt, bolster-like, even or in some specimens distinctly down-curved, in resupinate basidiocarps well-developed, dull yellow to pale buff, 0.5–2 mm wide. Context at first cottony, later densely fibrillose, pale cinnamon, 1–2 mm thick. Hymenophore hydroid; teeth conical, 0.5–5 mm long, dense, smoke-brown, 4–6 per mm; in exceptional cases hymenophore irpicoid or even poroid, consisting of teeth fusing together by their tips and producing irregular, lacerate pores 4–5 per mm. Odour distinct, spicy, persisting very long in herbarium specimens.

Hyphal structure dimitic. Context monomitic, consisting of thick-walled sklerified generative hyphae (4.5–)5–7  $\mu\text{m}$  wide, with large clamps. Spines dimitic, hyphae strictly parallel; skeletal hyphae thick-walled, with clear lumina, straight, non-branching, 2.2–5.4  $\mu\text{m}$  wide, brownish, CB+; generative hyphae thin- to slightly thick-walled, 1.5–2.5  $\mu\text{m}$  wide, hyaline to pale yellowish. Pseudocystidia thick-walled, encrusted, deeply-rooting, 4.5–7.5  $\mu\text{m}$  wide at the apex. Spine tips dimitic, often without cystidia. Basidia four-spored, narrowly clavate, clamped, 9–12 × 2.4–3.6  $\mu\text{m}$ . Basidiospores short-cylindrical, (3.3–)3.6–4.5(–4.7) × (1.7–)1.8–2.3(–2.4)  $\mu\text{m}$ , occasionally guttulate, IKI–, CB–.

On wood of deciduous trees. Causes a white rot.

This species can be easily distinguished due to its pileate basidiocarps with cinnamon shades, and highly specific odour reminiscent that of the polypore *Antrodiella fragrans*. The primary microscopic feature are the small cylindrical spores. Poroid fruitbodies may be confused with old specimens of *Irpex lacteus*, which, however, has larger pores and a quite different microscopy (no clamps).

In Russia this species has a nemoral (hemiboreal) distribution. In southern parts of European Russia (so-called oak zone) it is very common on fallen broad-leaved trees (mostly on *Quercus robur*); some finds from birch and aspen were made, too. In northern mixed forests *S. murashkinskyi* prefers wood of *Salicaceae*,

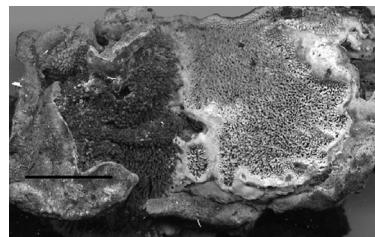


Fig. 3. *Steccherinum murashkinskyi*. Basidiocarp with 'poroid' hymenophore (LE 210682). Scale bar = 1 cm.

which often is decayed by *Phellinus* species; the favorite habitats are moist, herb-rich aspen forests or mixed forests with large corticated fallen logs.

SELECTED SPECIMENS EXAMINED. — **Russia**. Nizhny Novgorod Reg., Arzamas Dist., Pustynsky Nat. Res., *Populus tremula* and dead *Phellinus tremulae*, *Spirin* (LE 210120); Lukoyanov Dist., Razino, *Betula pubescens* decayed by *Phellinus laevigatus* and *Elmerina caryae*, 16.VII.1999 *Spirin* (H; LE 210682 — specimen with poroid hymenophore), *Salix alba* decayed by *Phellinus ignarius*, *Spirin* (LE 211304); Panzelka, *Populus tremula* and *Quercus robur*, *Spirin* 2054, 2367, 2371 (H, specimen 2371 with poroid-irpicoid hymenophore); Sanki, *Q. robur*, *Spirin* 2388 (H). Samara Reg., Zhiguli Nat. Res., *P. tremula*, *V. Malysheva* 53 (LE).

### *Steccherinum narymicum* (Pilát) Parmasto

Consp. Syst. Cort.: 173. 1968. — *Mycolepton narymicus* Pilát.

Basidiocarps annual, resupinate, 1–2 mm thick (incl. spines), waxy-fibrillose. Margin pruinose, gradually merging the substrate, up to 0.5 mm wide, without rhizomorphs. Subiculum very thin, floccose. Spines 0.5–1.5 mm long, thin, with sharp or slightly flattened apices, pale-cream to pale straw-coloured, 3–4 per mm.

Hyphal structure dimitic throughout. Spines consisting of strictly parallel hyphae; skeletal hyphae thick-walled, with clear lumina and occasional branchings, 2–2.5  $\mu\text{m}$  wide, swelling and partly dissolving in KOH, slightly amyloid, CB+; generative hyphae thin-walled, mostly clamped, 2.5–3.5(–4)  $\mu\text{m}$  wide. Pseudocystidia encrusted, thick-walled, 60–120 × 4–7.5  $\mu\text{m}$  (encrusted part 30–60  $\mu\text{m}$  long). Basidia clavate, four-spored, clamped, 14–18 × 4.5–6  $\mu\text{m}$ . Basidiospores ellip-

soid, (3.4–)3.6–5.1(–5.4) × (2.6–)2.8–3.4(–3.5) μm, slightly flattened on ventral side, IKI–, CB– or only faintly CB+.

On wood of *Padus avium*. Causes a white rot.

The species was described by Pilát (1936) from Siberia (Tomsk Region, Russia) and until now known only from the type locality (Spirin 2004). As noted by Nikolaeva (1961), *S. narymicum* is similar to *S. litschaueri*, and differs macroscopically by its pruinose margin, which is fimbriate and rhizomorphic in *S. litschaueri*. Maas Geesteranus (1974) was of the opinion that the spores in holotype of *S. narymicum* are immature, measuring 3.8–4 × 2.7 μm; in our specimen the spores are larger but partly overlap the type material. Spore size is the main difference to distinguish *S. narymicum* from *S. litschaueri*; the spores of the latter are cylindrical and curved, (3.6–)3.7–5.4(–5.6) × (1.8–)1.9–2.2 μm.

SPECIMENS EXAMINED. — *Steccherinum narymicum*.

**Russia.** Nizhny Novgorod Reg., Lukoyanov Dist., Panzelka, *Padus avium*, 20.VII.1999 Spirin (H; LE 210692). — *S. litschaueri*. **Russia.** Nizhny Novgorod Reg., Sharanga Dist., Kilemarsky Nat. Res., *Picea abies*, Spirin (LE 210119), Spirin 2189 (H).

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