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New species in *Junghuhnia* (Polyporales, Basidiomycota)

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Three new *Junghuhnia* species are described. *Junghuhnia autumnale* Spirin, Zmitr. & V. Malysheva is pileate or effused-reflexed, with pale-ochraceous to reddish hymenophore; its spores are broadly ellipsoid. *Junghuhnia imbricata* Spirin has substipitate basidiocarps, ellipsoid spores, and very thick-walled and heavily encrusted cystidia. *Junghuhnia micropora* Spirin, Zmitr. & V. Malysheva is strictly resupinate, with tiny pores; its spores are cylindrical and smallest among the *Junghuhnia* species known in temperate Northern hemisphere. All three species grow on large fallen trunks of *Populus tremula* in old broad-leaved forests. In addition, a new combination, *J. aurantilaeta* (Corner) Spirin, is proposed; *Junghuhnia vitellina* Spirin is its taxonomic synonym.

Key words: *Junghuhnia*, new species, polypores, taxonomy, wood-inhabiting fungi

The polypore genus *Junghuhnia* comprises about 20 species (Pouzar 2003, Rajchenberg 2003, Spirin 2005, and http://www.cbs.knaw.nl/databases/index.htm), having dimitic hyphal structure with strongly encrusted pseudocystidia (skeletocystidia), and causing a white rot. Its closest relatives are *Steccherinum* and *Antrodiella*. Recent molecular data showed that the species in the core of *Junghuhnia* constitute a well-supported group with some species of *Antrodiella*; at the same time, the tropical *Junghuhnia subundata* is very distant from the *Antrodiella–Junghuhnia* complex (Binder *et al*. 2005). Vesterholt (in Knudsen & Hansen 1996) included *Junghuhnia* into *Steccherinum*. We prefer *Junghuhnia* instead of *Steccherinum* mostly for pragmatic reasons, following the recent manuals of Bernicchia (2005) and Niemelä (2005).

This paper is devoted to studies of the *Junghuhnia* species in temperate Northern hemisphere. After an examination of herbarium material, three new species are revealed. Their descriptions as well as a new combination are given below.

The microscopic routine used in this study is described in Spirin and Zmitrovich (2003). The type material is in herbarium of Botanical Museum, University of Helsinki (Finland, H); some duplicates are in herbaria of Komarov Botanical Institute (St. Petersburg, Russia, LE), and Kuopio Natural History Museum (Finland, KUO).

Junghuhnia autumnale Spirin, Zmitr. & V. Malysheva, *sp. nova* (Fig. 1)

Basidiomata annua, pileata, effuso-reflexa vel effusa, coriacea. Porae circulatae vel laceratae, (4–)5–7 per mm. Systema hypharum dimiticum;

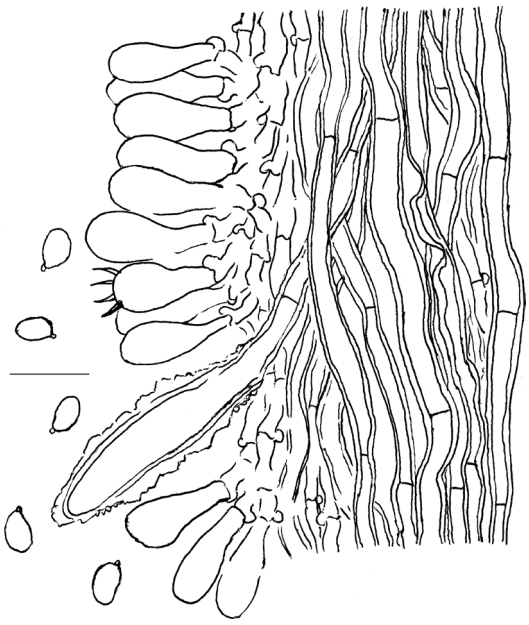

Fig. 1. *Junghuhnia autumnale* (from holotype). Trama, hymenium and basidiospores. Scale bar = 10 µm.

pseudocystidia adsunt in hymenio. Sporae lato-ellipsoideae, 3.1–4.1 × 2.1–3.0 µm.

HOLOTYPE: Russia. Nizhny Novgorod Reg., Lukoyanov Dist., Razino, *Populus tremula*, 14.VIII.2006 *Spirin 2514* (H).

ETYMOLOGY: *autumnale* (Lat., adj.), growing in autumn.

Basidiocarps annual, pileate or effused-reflexed, single or imbricate, rarely resupinate, orbicular, often fusing together, 2–7 mm thick, effused 15–70 mm along substrate, reflexed part 3–10 mm wide. Pileal surface cream-yellowish to pale ochraceous, smooth or finely pubescent, firstly azonate, later with few dirty-brown indistinct zones. Pileal margin initially sharp and straight, sterile, cream to pale yellow or ochraceous, then down-curved, fertile, agglutinated and brownish; margin of resupinate parts sterile, clearly delimited from substrate, pubescent, cream or ochraceous to brownish. Pore surface pale cream-coloured to pale ochraceous, later reddish or brownish, even or nodulose (on sloping substrates); pores firstly round, regular, then lacerate to partly sinuous, (4–)5–7 per mm, finally merging together to larger ones (up to 2 per mm); dissepiment edges entire to serrate or slightly irpicoid. Section: context well visible, white to pale cream-coloured, densely coriaceous, radially fibrillose, indistinctly zonate, 1–5 mm thick; tube layer cream-coloured to pale ochraceous, coriaceous, then moderately agglutinated, 1.5–2 mm thick. Odour pungent, taste slightly acidic or mild. Hyphal structure dimitic. Upper surface and context consisting of branching sklerified generative hyphae and thick-walled skeletals, 3.2–4.8 µm wide, bearing encrusted, thick-walled cystidia, 4.5–8.2 µm wide. Hyphae in tube trama subparallel; skeletal hyphae dominating, thick-walled to subsolid, sometimes collapsing, with occasional secondary septa, 2.5–4.5 µm wide; generative hyphae thin-walled, rarely sklerified, clamped, 2.1–4.2 µm wide. Dissepiment edges consisting of generative hyphae, 2.2–3.8 µm wide, intermixed with skeletals, 3.5–4.7 µm wide. Subhymenium indistinct. Pseudocystidia arising from tramal skeletals, thick-walled, heavily encrusted, with rounded apices, (60–)80–150(–180) × 5.3–8.6 µm (encrusted part up to 135 µm long). Basidia clavate, four-spored, clamped, 11.2–14.8 × 4.9–6.1 µm. Basidiospores broadly ellipsoid (ventral side convex), thin-walled, (2.9–)3.1–4.1(–4.2) × (2.0–)2.1–3.0(–3.1) µm, with occasional oil-drops and prominent apiculus, IKI–, contents faintly CB+. Causes a white rot.

Junghuhnia autumnale was discussed as a possible species by Spirin and Zmitrovich (2003: p. 76, in discussion of *Irpex semisupiniformis*). It resembles some other *Junghuhnia* species, i.e. *J. semisupiniformis* and *J. nitida*. *Junghuhnia semisupiniformis* differs from *J. autumnale* by its thinner (1–2 mm thick) strongly agglutinated basidiocarps with striate and tomentose upper surface, duplex context and tiny pores 8–10 per mm. Spores are mostly subglobose and smaller in *J. semisupiniformis*, 2.5–3.2 × 2.1–2.5 µm (*see* also the holotype descriptions in Lowe 1975 & Ginns 1980).

The identity of the species described as *J. semisupiniformis* by Ginns and Bernicchia (1984) and Pieri and Rivoire (1996), deserves a much closer study. Evidently, the Mediterranean '*J. semisupiniformis*' is neither *J. semisupiniformis sensu typi* (= *Tyromyces pseudohoehnelii*, *see* Spirin & Zmitrovich 2003), nor *J. autumnale*, and may represent an unnamed taxon (*see*

also the colour picture in Bernicchia 2005). It shares thin tomentose basidiocarps with the first one, and has pores and spores of the same size as *J. autumnale*.

Resupinate specimens of *J. autumnale* may be confused with *J. nitida*. The latter has constantly prostrate fruitbodies with even pore surface and fimbriate margin, while resupinate basidiocarps of *J. autumnale* are characterized by nodulose hymenophore surface and rounded edge. Spores of *J. nitida* are distinctly longer, 4–4.7 × 2.3–2.9 μm.

Ecology. The species was collected on still corticated fallen aspen logs in old broad-leaved forests on rich calcareous soils. The grass cover consists mostly of hemiboreal species as *Asarum europaeum*, *Carex pilosa*, *Aegopodium podagraria*, *Actaea erythrocarpa*, and some ferns. It fruits in August–October. In most cases, *J. autumnale* was observed together with corticioid fungus *Mutatoderma mutatum*, which is common on aspen wood in this forest type; probably, their co-occurrence is accidental.

Other specimens examined: *Junghuhnia autumnale* (paratypes). **Russia**. Type locality, 14.VIII.2006 *Spirin 2523*, 19.VIII.2006 *Spirin 2616* (both H, LE). Nizhny Novgorod Reg., Lukoyanov Dist., Razino, *Populus tremula*, with *Mutatoderma mutatum*, 24.IX.2000, 6.X.2001, 8–9.VIII.2005 *Spirin* (LE 210099, LE 211383, H, KUO, W.S.); Sredniy, *P. tremula*, with *Mutatoderma mutatum*, 12.VIII.2005 *Spirin 2396, 2397, 2398, 2399* (H, LE); Perevoz Dist., Ichalkovsky Bor Nat. Res., *P. tremula*, with *Trametes versicolor* and *Postia lactea*, 16.VIII.2005 *Spirin 2440* (H, LE, W.S.) [the duplicates in KUO were tentatively labeled as *Junghuhnia semisupiniformis*]. Samara Reg., Stavropol' Dist., Zhiguli Nat. Res., *P. tremula*, 17.IX.2006 *V. Malysheva* (LE). — *Junghuhnia nitida*. **Russia**. Nizhny Novgorod Reg., Lukoyanov Dist., Razino, *Populus tremula*, 1.VIII.2004 and 8.VIII.2005 *Spirin 2009, 2022, 2363* (H, W.S.). — *Junghuhnia semisupiniformis*. **Belarus**. Gomel' Reg., Turov Dist., *Populus tremula*, 28.VIII.1958 *Komarova* (holotype of *Tyromyces pseudohoehnelii* — MSK 3636, isotypes LE, H).

Junghuhnia imbricata Spirin, *sp. nova* (Fig. 2)

Basidiomata annua, pileata, substipitata, imbricata, cremea. Porae laceratae, parvae, 7–8 per mm. Systema hypharum dimiticum; pseudocystidia adsunt. Sporae ellipsoideae, 3.1–3.6 × 2.0–2.5 μm.

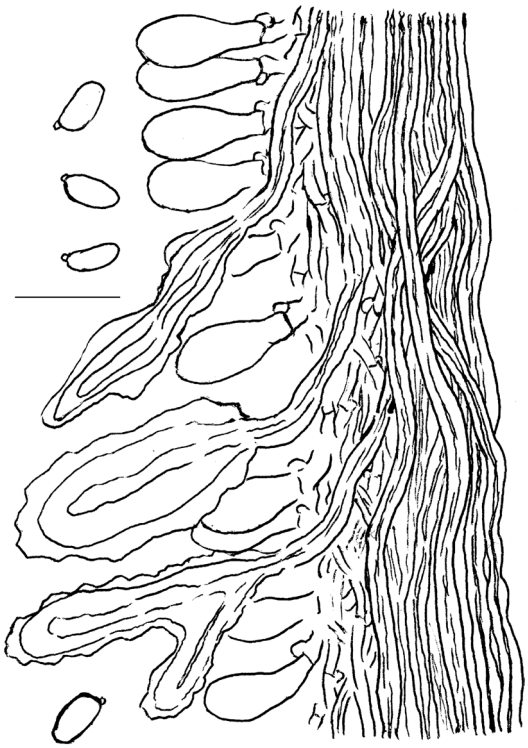

Fig. 2. *Junghuhnia imbricata* (from holotype). Trama, hymenium and basidiospores. Scale bar = 10 μm.

Holotype: Russia. Nizhny Novgorod Reg., Lukoyanov Dist., Sanki, *Populus tremula*, 12.VIII.2005 *Spirin 2393* (H; isotype LE).

Etymology: *imbricatus* (Latin, adj.), growing in imbricate clusters.

Basidiocarps annual, flabelliform to floriform, substipitate, very hard in fresh and dry condition, growing in imbricate clusters, 1–4 mm thick, 5–10 mm wide and 10–20 mm long. Pileal surface firstly pale cream-coloured, later with two–three hazel or ochraceous narrow zones, radially fibrillose (not hairy!) or striate. Pileal margin sharp, juvenile irregularly lacerate, fertile, cream-coloured, later more or less even, hazel or bright-ochraceous, down-curved when dry. Pore surface at first whitish to pale cream-coloured, later with pale ochraceous tint deep in tubes; pores angular to lacerate, (6–)7–8(–9) per mm; dissepiment edges thin, even or minutely dentate. Section: context white, dense, duplex with dark-grayish or ochraceous zone above tubes, 0.5–1.5 mm thick; tube layer cream to

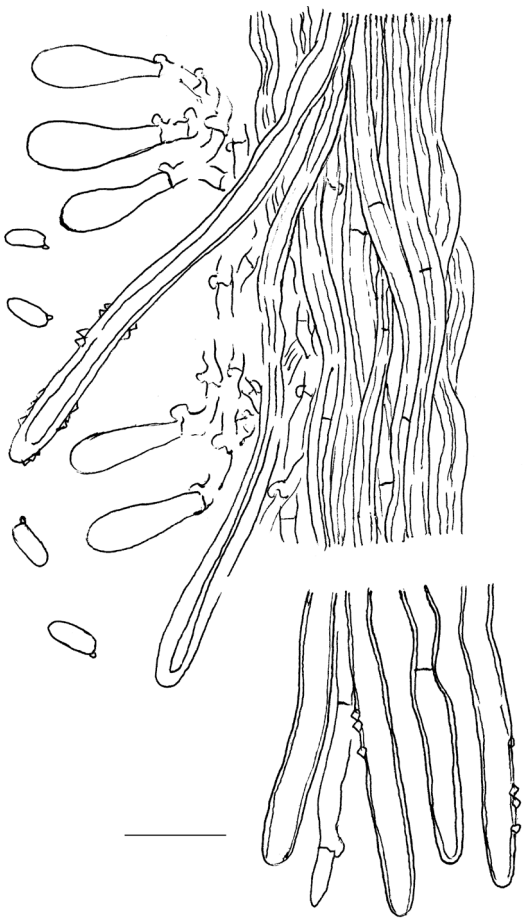

Fig. 3. *Junghuhnia micropora* (from holotype). Trama, hymenium and basidiospores (above), hyphae from dissepiment edge (below). Scale bar = 10 µm.

pale-ochraceous, partly agglutinated, more or less fragile, 0.5–3 mm thick. No distinct odour, taste mild. Hyphal structure dimitic. Upper surface and context consisting of very thick-walled yellowish, mostly acyanophilous skeletal hyphae, 3–6.2 μm wide, arranged in dense bundles. Hyphae in tube trama subparallel; skeletal hyphae dominating, very densely arranged, partly glued together, narrow, subsolid with capillary lumen, yellowish in CB, very faintly amyloid, 1.1–2 μm wide; generative hyphae very rare, thin-walled, clamped, 1.5–2 μm wide. Dissepiment edges consisting of round-tipped skeletal hyphae and pseudocystidia. Subhymenium indistinct. Pseudocystidia abundant, very irregular in shape — clavate, carrot-shaped or rarely dichotomously branched, robustly thick-walled, often with dense solid crystalline encrustation, 30–100 × 5–12 μm (encrusted part up to 80 μm). Basidia clavate, four-spored, clamped, 9–14.2 × 5–6 μm. Basidiospores ellipsoid (ventral side flat or slightly convex), thin-walled, (3.0–)3.1–3.6 (–3.8) × (1.9–)2.0–2.5(–2.6) μm, with rare oil-drops and prominent apiculus, IKI–, contents faintly CB+. Causes a white rot.

Superficially *J. imbricata* is almost identical to pileate specimens of *Antrodiella faginea* and *A. pallescens*. The common features are substipitate growth, cream colour, and tiny pores; however, the *Antrodiella* species are characterized by a quite different microstructure. In microscope *J. imbricata* strongly resembles *J. autumnale*, but differs by its narrower spores and another hyphal construction. Skeletal hyphae of *J. autumnale* are distinctly wider, sometimes collapsed, and not so densely arranged as in *J. imbricata*. Context of *J. autumnale* is homogeneous, and basidiocarps are mostly thicker, with a strong tendency to effused growth. Cystidia of *J. autumnale* are more regular in their shape and they are less densely encrusted. *J. semisupiniformis* has much smaller spores; its basidiocarps are tomentose and not so hard.

Ecology. The species was collected only once from a decorticated thick aspen trunk; no other macromycetes were noted. The habitat was an old-growth broad-leaved shadowy forest, dominated by *Acer platanoides*, *Quercus robur* and *Tilia cordata*.

Junghuhnia micropora Spirin, Zmitr. & V. Malysheva, *sp. nova* (Fig. 3)

Basidiomata annua, resupinata, dura. Porae minutae, (7–)8–10 per mm. Systema hypharum dimiticum; pseudocystidia adsunt. Sporae cylindriceae, 2.9–4.0 × 1.7–1.9 µm.

Holotype: Russia. Nizhny Novgorod Reg., Lukoyanov Dist., Razino, *Populus tremula*, 22.VII.1999 *Spirin* (H; isotype LE 210084).

Etymology: *micropora* (Greek, adj.), having small pores.

Basidiocarps annual, resupinate, thin (0.3–1 mm thick) and hard, firmly attached to sub-

strate, but partly separable and strongly inrolled when dry. Margin initially indistinct, seen as whitish pruina, later well developed, papery to slightly fibrillose, pale cream-coloured to pale buff, narrow (ca. 0.5–1 mm wide). Pore surface even, on sloping substrate nodulose, pale ochraceous to buff, sometimes with amber tint; pores very small, (7–)8–10 per mm, firstly regular, round, later elongated, sinuous; dissepiment edges entire to slightly lacerate. Section: context poorly visible, seen as very thin pale layer adjacent to substrate, very dense; tubes short, 0.2–0.6 mm long, papery and slightly gelatinous in fresh condition, dense ceraceous and agglutinated when dry, concolorous with pore surface. No distinct odour, taste mild. Hyphal structure dimitic. Skeletal hyphae thick-walled with distinct wide lumina, or subsolid, 3.5–5 μm wide, mostly unbranched, in tube trama subparallel and very densely packed. Generative hyphae thin-walled or slightly thick-walled, clamped, 2.5–4 μm wide. Subhymenium indistinct. Pseudocystidia clavate, with distinct lumina, nude or covered by small cubical crystals, sometimes with secondary septa, (60–)70–100 × 5–7 μm. Basidia clavate, four-spored, clamped, 12–16 × 4–5.5 μm. Basidiospores short-cylindrical (ventral side flat), thin-walled, (2.8–)2.9–4.0(–4.3) × (1.5–)1.7–1.9(–2.0) μm, sometimes with a central oil-drop, IKI–, contents faintly CB+. Causes a white rot.

Superficially *J. micropora* is reminiscent of some *Antrodiella* species (especially *A. romellii*) due to its small pores and strongly agglutinated buff tubes. Other *Junghuhnia* species known in boreal zone have larger pores, except *J. japonica* (Núñez & Ryvarden 1999), which, however, is characterized by thicker basidiocarps and much longer spores. Two tropical species, *J. minuta* and *J. neotropica*, resemble our new species in having tiny pores, but differ in pileate growth and smaller spores (Lindblad & Ryvarden 1999).

Anatomically this new species is close to *A. romellii* with its densely packed hyphae and agglutinated trama. The latter is an acystidiate polypore, having larger spores, 3.4–4 × 2.2–2.8 μm (Spirin 2003). Dissepiment edges are almost monomitic in *A. romellii*, while they are distinctly dimitic, and bear pseudocystidia in *J. micropora*.

Ecology. The above description is based on three specimens, all collected from large (20–40 cm in diam.) hard aspen trunks. One of them (the holotype) was growing on wood adjacent to the ground; the substrate was strongly decomposed by a white-rot polypore *Perenniporia narymica*. The second and third specimen were found on a still corticated fallen tree; the fruitbodies developed within bark gaps, on lateral sides of the log. Evidently, *J. micropora* prefers sheltered microhabitats with constant moisture.

Additional specimens examined. *Junghuhnia micropora* (paratypes). **Russia**. Nizhny Novgorod Reg., Lukoyanov Dist., Panzelka, *P. tremula*, 10.VIII.2005 *Spirin 2372* (H) and 15.VIII.2006 (H, LE).

Junghuhnia aurantilaeta (Corner) Spirin, *comb. nova*

Basionym: *Tyromyces aurantilaetus* Corner, Beih. Nova Hedw. 96: 161. 1989. — *Antrodiella aurantilaeta* (Corner) Hattori & Ryvarden, Trans. Mycol. Soc. Japan 34: 364. 1993.

Junghuhnia vitellina Spirin, Karstenia 45: 105. 2005, *syn. nov*.

Corner (1989) described this species in the genus *Tyromyces*. In original description he mentioned scattered shortly emergent and not encrusted cystidia which are easily overlooked. Spirin (2005) described a new species *Junghuhnia vitellina*; it shares all principal characters with *Tyromyces aurantilaetus*, and differs only in having well-developed cystidia with thickened and scanty encrusted walls. Those species are conspecific. Hattori and Ryvarden (1993) transferred *T. aurantilaetus* to *Antrodiella*, and made the combination *Antrodiella aurantilaeta*. The presence of thick-walled cystidia belies that placement, because it is the only character making *Antrodiella* distinguishable from *Junghuhnia*. Hence, a new combination is proposed.

This species is new to Russia. It is known from Indonesia (Corner 1989), Taiwan, Japan (Hattori & Ryvarden 1993), and China (Núñez & Ryvarden 2002).

Specimens examined. **Russia**. Primorye Terr., Kedrovaya Pad' Nat. Res., *Betula mandshurica* 2.XI.1944 *Vasilieva* (holotype of *J. vitellina*, LE 26533, isotype H); same locality, deciduous wood, 20.VIII.2005 *Psurtseva* (LE).

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