

Cortinarius caesioarmeniacus Kytov., Niskanen & Liimat., sp.nov.**IF550855**

Type: Canada, Newfoundland, West coast, Gros Morne National Park, W side of Lomond River, hiking trail to Stuckless Pond. Mesic to damp coniferous forest (*Abies balsamea*, *Picea*) with some *Betula*, on calcareous ground, Lat Lon 4925N 5744E, 20 Sept 2007, coll. Kare Liimatainen & Tuula Niskanen, T. Niskanen F07-240a, H7000901 (H, holotype; NY, isotype), GenBank No. KP137498. Diagnosis: Pileus 40-75 mm, hemispherical, then broadly convex to almost plane with an umbo, brown to strong brown, hygrophanous. Lamellae moderately spaced to almost crowded, at first pale brown to strong brown with a white edge, later brown to strong brown. Stipe 45-70 mm long, 7-13 mm thick at apex, clavate, at first whitish silky fibrillose, with a bluish tint at the apex, later pale brown. Universal veil rather sparse, white. Basal mycelium white. Context in the pileus brown, in the stipe white to very pale brown, with a bluish tint at the apex. Odor of lamellae indistinct. Basidiospores 8.2-10.2 x 5.2-6.1 μm , $av. = 8.6-9.7 \times 5.4-5.7 \mu\text{m}$, $Q = 1.46-1.80$, $Q_{av.} = 1.54-1.72$, (120 spores, 6 specimens), ellipsoid to amygdaloid-fusoid with a shallow suprahilar depression, somewhat thick-walled, fairly finely to moderately verrucose, fairly strongly to strongly dextrinoid. Lamellar trama hyphae olive yellowish to yellow brownish in MLZ, smooth to somewhat encrusted with small spots. Lamellar edge almost sterile with clavate cells. ITS sequence (GenBank KP137498, holotype) distinct from the other species of *Cortinarius* section Firmiores. Deviating from the other species of the section in the ITS region by more than nine substitutions and indel positions. Ecology and distribution: In mesic coniferous forests. Producing basidiomata in late summer and autumn. Wide spread, to date known from Europe to Eastern North America. Additional specimens: Finland, Satakunta, Aetsa, Kiikan-Illo, Hoipo, mesic spruce forest with some *Betula* and *Populus*, Grid 27E 679:328, 7 Aug 2000, I. Kytovuori 00-033 (H), GenBank No. KP137499. Finland, Pohjois-Hame, Virrat, Hauhuu, SE side of the lake Hauhuunvesi, Sikosaari, Salmela, 2 Aug 2004, coll. I. Kytovuori, T. Niskanen 04-036, H6029884 (H), GenBank No. KP137500. Finland, Kainuu, Kuhmo, Kalliojoki, Riihivaara, mesic old spruce forest, Grid 27E 7127:3654, 29 Aug 1999, I. Kytovuori 99-718 (H), GenBank No. KP137501. Finland, Kainuu, Puolanka, Paljakka, Pirunkirkko, mesic spruce forest, Grid 27E 7179:3545, 16 Aug 2002, I. Kytovuori 02-031 (H), GenBank No. KP137502. Canada, Newfoundland, Avalon Peninsula, Butter Pot Provincial Park, mesic to damp *Picea* dominated forest with some *Abies*, *Larix* and *Betula*, 29 Sept 2007, leg. anonymous, T. Niskanen 07-340, H7001154 (H), GenBank No. KP137503. Canada, Quebec, Saint-Donat foray, coniferous forest (*Tsuga*, *Abies*, some *Picea*), 5 Sept 2010, K. Liimatainen & T. Niskanen 10-070 (H), GenBank No. KP137504. Canada, Newfoundland, Trail to Stuckless Pond, mesic to damp conifer dominated forest, 19 Sept 2010, K. Liimatainen & T. Niskanen 10-097 (H), GenBank No. KP137505 and 10-099 (H), GenBank No. KP137506. Etymology: The name refers to the bluish tints in the basidiomata and affinity with *C. armeniicus*.

Holotype T. Niskanen F07-240a, H7000901 (H).

Cortinarius ferrugineovelatus Kytov. Liimat. & Niskanen, sp.nov.**IF550857**

Type: Sweden, Narke, Orebro, Garphyttan's National Parl, herb-rich *Picea abies* forest with *Corylus*, *Populus*, *Betula* and *Quercus*, 26 Sept 2004, coll. I. Kytovuori, K. Liimatainen & T. Niskanen, T. Niskanen 04-947, H7017995 (H, holotype; NY, isotype), GenBank No. KP137508. Diagnosis: Pileus 5-20 mm, at first conical to somewhat hemispherical, then broadly convex to almost plane with a small and almost acute umbo, dark brown to blackish brown, hygrophanous. Lamellae moderately spaced, dark reddish brown. Stipe 25-50 mm long, 2-4 mm thick at apex, cylindrical, white fibrillose, with a bluish tint at the apex. Universal veil at first white, becoming vinaceous to rusty red. Basal mycelium white. Context in the pileus dark brown, in the apex of the stipe brown with a bluish tint, dark brown toward the base. Odor of lamellae indistinct. Basidiospores 6.6-7.9 x 4.5-5.2 μm , $av. = 7.2 \times 4.8 \mu\text{m}$, $Q = 1.40-1.62$, $Q_{av.} = 1.50$ (60 spores, 1 specimen), ovoidly ellipsoid to weakly lacrymoid, fairly finely to moderately, somewhat sharply verrucose, most strongly at apex, moderately dextrinoid. Lamellar trama hyphae yellow in MLZ, smooth. ITS sequence (GenBank KP137508, holotype) distinct from the other members of *Cortinarius* subgenus *Telamonia*. With a sister relationship to *C. umbrinobellus* (GenBank KP137507) and deviating from it in the ITS regions by six substitutions and indel positions. Ecology and distribution: In Fennoscandia producing basidiomata in hemiboreal to boreal *Picea* dominated forests on calcareous soil. Also known from Iran and Western North America, Canada. Additional specimens: Canada, British Columbia, O. Ceska 69, F17141 (UBC), GenBank No. GQ159884. Estonia, from the roots of *Pyrola rotundifolia*, GenBank No. EU668911. Finland, Kainuu, Suomussalmi, Naljanka, Lohivaara, NE sloping spruce forest with fairly rich grass-herb depressions, *Pinus*, *Betula*, *Populus tremula* and *Salix*, Grid 27E 7240:3558-9, 13 Sept 1997, I. Kytovuori 97-1345, H6033576 (H). Iran, *Betula*, UNITE No. UDB005658. U.S.A., Oregon, *Pinus ponderosa*, old-growth forest UNITE No. UDB007427. Etymology: The name refers to the rusty red universal veil.

Holotype T. Niskanen 04-947, H7017995 (H).

Cortinarius furvoumbrinus Liimat., Niskanen & Kytov., sp.nov.**IF550858**

Type: Sweden, Oland, Vickleby, approx. 3 km N from St. Fro, Naturresevat, deciduous forest (*Quercus*, *Tilia*, *Corylus*, *Fraxinus*, and some *Betula*) on mull soil, 9 Sept 2003, coll. I. Kytovuori, K. Liimatainen & T. Niskanen, T. Niskanen 03-1288, H7018141 (H, holotype; NY, isotype), GenBank No. KP137509. Diagnosis: Pileus 10-20 mm, at first conical, then broadly conical to almost plane with a small and almost acute umbo, dark brown, hygrophanous. Lamellae moderately spaced to almost distant, emarginated, brown to dark brown. Stipe 30-50 mm long, 2-3 mm thick at apex, cylindrical, at first brown and partly covered with greyish white fibrils, later brown. Universal veil very sparse, white. Basal mycelium white. Context in the pileus dark brown, in the apex of the stipe pale brown, brown toward the base. Odor of lamellae slightly raphanoid. Exsiccata dark sordid brown. Basidiospores 7.5-8.8 x 5.0-5.7 μm , $av. = 8.2 \times 5.3$, $Q = 1.46-1.65$, $Q_{av.} = 1.56$ (60 spores, 1 specimen), ovoidly ellipsoid to

narrowly lacrymoid, with a suprahilar depression, very strongly verrucose, most strongly at apex, dark-colored, strongly dextrinoid. Lamellar trama hyphae olive yellow in MLZ, fairly strongly encrusted and with olive brown spots. ITS sequence (GenBank KP137509, holotype) distinct from the other species of *Cortinarius* subgenus *Telamonia*. Deviating from the closest known species, *C. subtilior*, in the ITS regions by 16 substitutions and indel positions. Ecology and distribution: In hemiboreal to temperate deciduous forest (*Quercus*, *Tilia*, *Corylus*) on mull soil. Producing basidiomata in late summer and autumn. Known from Sweden, Oland. Etymology: The name refers to the color of the pileus.

Holotype T. Niskanen 03-1288, H7018141 (H).

Cortinarius furvus Liimat., Niskanen & Kytov., sp.nov.

IF550854

Type: Finland, Åland, Jomala commune, Onningby, N of Sodervik, mesic (to moist) spruce (*Picea abies*) forest with some *Pinus sylvestris* and *Betula* on calcareous ground, 27 Oct 2006, coll. T. Niskanen & K. Liimatainen, T. Niskanen 06-320 (H, holotype; NY, isotype). GenBank No. KP137497. Diagnosis: Pileus 4-7 cm, dark brown, hygrophanous. Lamellae pale brown when young, later dark brown. Stipe 6-11 cm long, 0.7-1 cm thick at apex, cylindrical, often tapering downwards, white, silky-fibrillose. Universal veil white, very sparse. Context in the pileus brown, in the stipe pale brown to almost white. Basidiospores 8.4-10.4 x 5.4-6.3 µm, $av. = 9.3 \times 6.0$, $Q = 1.44-1.73$, $Q_{av.} = 1.56$ (60 spores, 1 specimen), ovoidly ellipsoid to ovoid, thick-walled, moderately to strongly verrucose, somewhat more strongly at apex, very strongly dextrinoid. Lamellar trama hyphae olive yellowish to brownish in MLZ, fairly strongly encrusted with small olive spots. ITS sequence (GenBank KP137497, holotype) distinct from the other species of *Cortinarius* subgenus *Telamonia*. With an isolated position and deviating from the other members of the subgenus in the ITS region by more than 22 substitutions and indel positions. Ecology and distribution: In *Picea abies* dominated forests on calcareous ground. Etymology: The name refers to the color of the pileus.

Holotype T. Niskanen 06-320 (H).

Cortinarius fuscoumbrinus Liimat., Niskanen & Kytov., sp.nov.

IF550853

Type: Sweden, Västergötland, Gotene, Kinnekulle, Osterplana kyrka, *Corylus* and *Quercus*, alvar, coll. I. Kytovuori, K. Liimatainen & T. Niskanen, T. Niskanen 04-986, H7017989 (H, holotype; NY, isotype). GenBank No. KP137495. Diagnosis: Pileus 20-50 mm, hemispherical, then broadly convex to almost plane with an umbo, dark brown, hygrophanous. Lamellae moderately spaced, brown. Stipe 40-70 mm long, 4-8 mm thick at apex, cylindrical, some clavate at base, at first greyish white fibrillose, later brown. Universal veil very sparse, white. Basal mycelium white, becoming pink. Context in the pileus and upper part of the stipe yellow brown, dark brown toward the base. Odor of lamellae indistinct. UV fluorescence (366 nm): none. Basidiospores 7.5-9.1 x 5.4-6.3 µm, $av. = 8.3-8.5 \times 5.8$ µm, $Q = 1.33-1.56$, $Q_{av.} = 1.43-1.47$, (80 spores, 2 specimens), ellipsoid to obovoid to almost subglobose (obovoidly), somewhat thick-walled, strongly, coarsely verrucose to almost spinose, most strongly verrucose at apex, strongly dextrinoid. Lamellar trama hyphae yellow to brownish in MLZ, smooth to scabrous to small spotted (encrusted). Lamellar edge almost sterile with clavate cells. ITS sequence (GenBank KP137495, holotype) distinct from the other members of *Cortinarius* subgenus *Telamonia*. Deviating from the other species of the subgenus in the ITS region by more than 25 substitutions and indel positions. Ecology and distribution: In temperate and hemiboreal deciduous (*Quercus*, *Corylus*) forests on calcareous soil. Producing basidiomata in autumn. Known from Sweden. Additional specimens: Sweden, Oland, Langlot, Ismantorps borg, *Corylus* and *Quercus*, some *Carpinus*, *Picea* and *Populus*, 15 Sep 2003, I. Kytovuori, K. Liimatainen & T. Niskanen 03-1553 (H), GenBank No. KP137496. Etymology: The name refers to the color of the pileus.

Holotype T. Niskanen 04-986, H7017989 (H).

Cortinarius nodosisporus Kytov., Niskanen & Liimat., sp.nov.

IF550851

Type: Norway, Sogn og Fjordane, Leikanger commune, Hermansverk, 11 Sept 2000, coll. Jacob Heilmann-Clausen, I. Kytovuori 00-032 (H, holotype; NY isotype). GenBank No. KP137493. Diagnosis: Pileus 40-70 mm, hemispherical, then broadly convex to almost plane with an umbo, dark brown, hygrophanous. Lamellae distant, broad, dark brown. Stipe 40-70 mm long, 6-13 mm thick at apex, cylindrical to somewhat clavate, dark brown. Universal veil very sparse, dirty yellowish to greenish brown. Context dark brown. UV fluorescence (366 nm): greyish purple in the upper part of the stipe and lamellae. Basidiospores 8.8-10.0 x 5.9-6.6 µm, $av. = 9.4 \times 6.2$ µm, $Q = 1.40-1.59$, $Q_{av.} = 1.51$ (60 spores, 1 specimen), ovoidly ellipsoid to lacrymoid, sometimes with a shallow suprahilar depression, very strongly verrucose to coarsely echinate, most strongly verrucose at apex, very strongly dextrinoid. Lamellar trama hyphae bright yellow in MLZ, smooth. ITS sequence (GenBank KP137493, holotype) distinct from the other members of *Cortinarius* subgenus *Telamonia*. Deviating from the other species of the subgenus in the ITS region by more than 20 substitutions and indel positions. Ecology and distribution: In hemiboreal and temperate deciduous forests on calcareous soil. Producing basidiomata in autumn. Known from Norway, Sogn og Fjordane. Etymology: The name refers to the very strongly verrucose basidiospores.

Holotype I. Kytovuori 00-032 (H).

Cortinarius nucicolor Liimat., Niskanen & Kytov., sp.nov.

IF550859

Type: Sweden, Oland, Vicklebys, Natur reserve area N of Hagapark, deciduous forest (*Quercus*, *Betula* etc.) on mull soil, 16 Sept 2003, coll. I. Kytovuori, K. Liimatainen & T. Niskanen, T. Niskanen 03-1599, H7018310 (H, holotype; NY, isotype), GenBank No. KP137510. Diagnosis: Pileus 10-20 mm, at first conical, then broadly conical to almost plane with a small umbo, brown, hygrophanous. Lamellae moderately spaced to almost distant, brown. Stipe 30-40 mm long, 2-3 mm thick at apex, cylindrical, at first greyish white fibrillose, later pale brown. Universal veil very sparse, white. Basal mycelium white. Context in the pileus brown, in the stipe brown. Odor of lamellae indistinct. Exsiccata brown. Basidiospores 7.7-9.1 x 5.0-5.7 µm, $av. = 8.3 \times 5.4$ µm, $Q = 1.44-1.63$, $Q_{av.} = 1.54$ (60 spores, 1 specimen), lacrymoid, with a suprahilar depression, strongly verrucose, very strongly at apex, strongly dextrinoid. Lamellar trama hyphae olive yellowish in MLZ, smooth to very weakly encrusted. ITS sequence (GenBank

KP137510, holotype) distinct from the other species of *Cortinarius* subgenus *Telamonia*. Deviating from the closest known species, *C. furvoumbrinus* (GenBank KP137509), in the ITS regions by 17 substitutions and indel positions. Ecology and distribution: In hemiboreal to temperate deciduous forest (*Quercus*, *Betula*) often on damp, mull soil. Producing basidiomata in late summer and autumn. Known from Sweden, Oland. Etymology: The name refers to the color of the pileus.
Holotype T. Niskanen 03-1599, H7018310 (H).

Cortinarius subargyronotus Niskanen, Liimat. & Kytov., sp.nov.

IF550852

Type: Sweden, Oland, Hogsrums, Haltorp Nature reserve area, at the golf course, deciduous forest (*Carpinus*, some *quercus*, *Ulmus*, *Corylus*, *Fraxinus*, and *Tilia*), on mull soil, 10 Sept 2003, coll. I. Kytovuori, K. Liimatainen & T. Niskanen, T. Niskanen 03-1317, H7018127 (H, holotype; NY, isotype), GenBank No. KP137494. Diagnosis: Pileus 20-55 mm, conical to hemispherical, then low convex, with a low umbo, dark brown, hygrophanous, easily drying to pale honey brown. Lamellae moderately spaced, dark reddish brown, with pale yellow edge, emarginated. Stipe 40-90 mm long, 4-7 mm thick at apex, cylindrical, somewhat rooting, firm, silky-fibrillose, very pale yellow brown. Universal veil very sparse. Basal mycelium white. Context brown. Odor of lamellae slightly raphanoid. UV fluorescence (366 nm): Stipe and especially the universal veil and the mycelium yellow, in the other parts of the fruitbody the fluorescence is weak. Basidiospores 7.9-9.3 x 5.2-5.9 μm , av. = 8.7 x 5.5 μm , Q = 1.46-1.69, Qav. = 1.59 (60 spores, 1 specimen), ovoid to broadly fusoid, sometimes with a shallow suprahilar depression, thick-walled, strongly, somewhat coarsely verrucose, most strongly at apex, strongly dextrinoid. Lamellar trama hyphae pale olive in MLZ, smooth to very finely, densely scabrous. Lamellar edge sterile, with clavate marginal cells appearing as a yellow rim in dry basidiocarps (with a dissecting microscope). ITS sequence (GenBank KP137494, holotype) distinct from other members of section *Colymbadini*. With a sister relationship to *C. argyronotus* and deviating from it in the ITS regions by 7 substitutions and indel positions. Ecology and distribution: In hemiboreal and temperate deciduous forests on mull soil. Producing basidiomata in late summer and autumn. Known from Sweden, Oland. Etymology: The name refers to the affinity with *C. argyronotus*.

Holotype T. Niskanen 03-1317, H7018127 (H).

Cortinarius umbrinobellus Liimat., Niskanen & Kytov., sp.nov.

IF550856

Type: Sweden, Oland, Algutsrum, Notbrunnskarret, mainly *Corylus*, some *Quercus*, *Picea*, *Betula* and *Pinus*, 15 Sept 2003, coll. I. Kytovuori, K. Liimatainen & T. Niskanen, T. Niskanen 03-1556, H7018158 (H, holotype; NY, isotype), GenBank No. KP137507. Diagnosis: Pileus 5-15 mm, at first conical to somewhat hemispherical, then broadly convex to almost plane with an umbo, blackish brown, hygrophanous. Lamellae moderately spaced, dark reddish brown. Stipe 25-45 mm long, 2-4 mm thick at apex, cylindrical, white fibrillose, with a bluish tint at the apex. Universal veil at first white, becoming pinkish to vinaceous red. Basal mycelium white. Context in the pileus dark brown, in the apex of the stipe pale brown, dark brown toward the base. Odor of lamellae indistinct. Basidiospores 7.3-8.8 x 4.8-5.4 μm , av. = 8.0 x 5.2 μm , Q = 1.43-1.65, Qav. = 1.54 (60 spores, 1 specimen), ellipsoid, somewhat thick-walled, moderately to strongly verrucose, most strongly verrucose at apex, moderately to strongly dextrinoid. Lamellar trama hyphae pale yellowish in MLZ, smooth. ITS sequence (GenBank KP137507, holotype) distinct from the other members of *Cortinarius* subgenus *Telamonia*. With a sister relationship to *C. ferrugineovelatus* (GenBank KP137508) and deviating from it in the ITS regions by six substitutions and indel positions. Ecology and distribution: In hemiboreal to temperate deciduous forest on mull soil, presumably associated with *Corylus* or *Quercus*. Producing basidiomata in late summer and autumn. Known from Sweden, Oland. Etymology: The name refers to the color of the pileus and the beautiful appearance of the species.

Holotype T. Niskanen 03-1556, H7018158 (H).