
Cantharellus betularum

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Cantharellus betularum Voitk & Thorn, *sp. nov.*

Etymology. *Betularum* (Latin: of birches) refers to the tree associates of the species.

Classification — *Hydnaceae, Cantharellales, Agaricomycetes*.

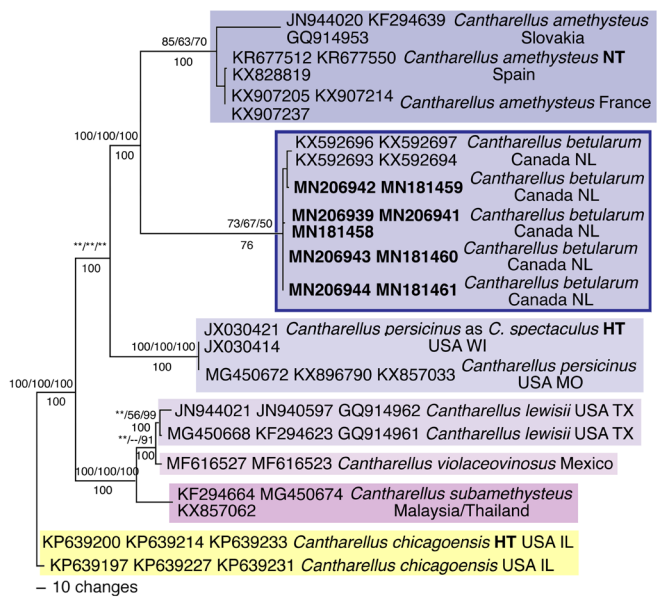
Pileus 20–70 mm diam, margins inrolled, becoming plane, then funnel-shaped and irregularly wavy, opaque, yellow-gold, with thin amethyst coating that breaks up into small scales, becoming violet brown, then brown; scales often absent and amethyst colour not common. *Hymenium* folds moderately spaced, wide, blunt, sinuous, forked, cross-veined and anastomosing, deeply decurrent to almost absent; pale yellow to almost white. *Stipe* 5–25 × 30–65 mm, enlarging upwards, solid, yellow. *Context* whitish yellow; *odour* sweet and fruity. All tissues stain reddish brown with injury or prolonged exposure. Aberrant forms in exposed habitats vary from solitary pegs to fused multicephalic basidiomes. *Basidiospores* (two observers, five collections, seven sporocarps, 131 spores) (7.7–)8.7–14.3 × (3.9–)4.6–7.1(–7.7) µm (av. 10.4 × 5.6 µm), av. Q = 1.9; elliptical-oblong, usually narrower at the apex, slightly bent, with an asymmetric constriction; content homogeneous. *Basidia* 65–90 × 7.7–11.6 µm; 4–6-spored; clavate. No *cystidia*. *Clamp connections* in all tissues. Wide range in micromorphology between individual basidiomes and collections.

Habitat & Distribution — Solitary or gregarious in leaf litter of *Betula*, hitherto known from three sites in the Bay of Islands region of western Newfoundland.

Typus. Canada, Newfoundland and Labrador, Humber Village, trail to Barry's Lookout, 48.988, -057.792, 159 m a.s.l., in leaf litter under *Betula papyrifera*, *B. cordifolia* and *B. alleghaniensis* (*Betulaceae*), 14 Sept. 2013, *Andrus Voitk 13.09.14.av01* (holotype DAOM 721702, isotype DAOM 734027, nrLSU sequences GenBank KX592700–KX592701, MycoBank MB836965).

Collection and sequence data of 14 paratypes: All same site as holotype (Canada, Newfoundland and Labrador, Humber Village, trail to Barry's Lookout, 48.988, -057.792, 159 m a.s.l.) and collector (A. Voitk) except where noted below, 24 Aug. 2008, *09.08.24.av04* (DAOM 72173), Tef1: MN181459, ITS-LSU: MN206942; 25 Aug. 2010, *10.08.25.av02* (DAOM 734021), Tef1: MN181461, ITS-LSU: MN206944, MN206945; 12 Aug. 2011, *11.08.12.av01* (DAOM 734022), Tef1: MN181460, ITS-LSU: MN206943; 10 Aug. 2012, *12.08.10.av01* (DAOM 734016); 2 Sept. 2012, *12.09.02.av11* (DAOM 734024), Tef1: KX592690, LSU: KX592691, KX592692; 3 Oct. 2012, 12.10.03.av01 (DAOM 734025), Tef1: KX592693, ITS: KX592696, KX592697, LSU: KX592694, KX592695; 11 Aug. 2013, *13.08.11.av01* (DAOM 734017); 30 Sept. 2013, *13.09.30.av04* (DAOM 734018), 1 Oct. 2013, *13.10.01.av02* (DAOM 734019), 30 Sept. 2017, *M. Voitk, 17.09.30.av01* (DAOM 984767), Tef1: MN181458, ITS: MN206939, LSU: MN206940, MN206941; 2 Sept. 2018, *18.09.02.av01* (DAOM 984768); Humber Village, trail to Weldon's, 48.99, -057.76, 30 Aug. 2011, *A. Voitk, 11.08.30.av02* (DAOM 734023), LSU: KX592688, KX592689; same locale, 21 Aug. 2013, *M. Voitk, 13.08.21.av01* (DAOM 734026), LSU: KX592698, KX592699; near Frenchman's Cove, 49.046, -058.185, *E. Humber, 14.09.01.av01* (DAOM 734020).

Notes — Using LSU sequence data, we previously reported this species as *Cantharellus amethysteus* (Thorn et al. 2017), but ITS, LSU and *tef*1 are all required to differentiate these two taxa phylogenetically. *Cantharellus betularum* differs from *C. amethysteus* by growing on a different continent (impediment to continued genetic mixing), in a region about 10 °C colder, on average, and with birch, not the oak (*Quercus*) or beech (*Fagus*; both *Fagaceae* and not native to Newfoundland) most commonly recorded with *C. amethysteus*. We have not seen *C. amethysteus*, but the description by Buyck (2000) suggests that its amethyst scales are more consistent and prominent than those of *C. betularum*, which are often absent, and its spores are broader (av. 6.5 vs 5.6 µm). Other North American vinaceous-violaceous species are not found in Newfoundland (Buyck & Hofstetter 2011, Herrera et al. 2018), and *C. betularum* has not been reported outside the Island. Amethyst scales, longer spores, association with birch, and sequence data separate it from *C. camphoratus* and *C. enelensis*, the two other golden chanterelles in Newfoundland (Thorn et al. 2017).



One of 119 equally most parsimonious trees based on sequences of nrITS, nrLSU, and *tef1*, with node support above branches from Bayesian inference (BI: MrBayes v. 3.2.6, Ronquist et al. 2012), 1 000 bootstrap replicates in maximum likelihood (ML; MEGA X, Kumar et al. 2018, Stecher et al. 2020), and 100 bootstrap replicates in maximum parsimony (MP; PAUP v. 4.0b10, Swofford 2003), and percent consensus among the 119 equally most parsimonious MP trees below. Branches with less than 50 % support are marked with dashes (--) and those that collapsed in a particular analysis are marked with asterisks (**). New sequences are indicated in **bold**, and sequences from types are indicated as HT (holotype) or NT (neotype).

Colour illustrations. Canada, Newfoundland, Humber Village, near trail to Barry's Lookout, a mixed forest dominated by *Betula papyrifera*, *B. cordifolia* and *B. alleghaniensis*, where the holotype was collected. Left: typical appearance of *C. betularum*, with stipitate basidiomata, one fused multicephalic specimen and two peg-like specimens. Note the lighter, blunted hymenial folds, almost absent on the peg form, and brownish orange staining. Centre: close-up of pileus, showing lavender scales, when present. Right: basidiospores, original magnification × 1 000 (modified from Thorn et al. 2017: f. 2B, with permission). Scale bars = 1 cm (basidiomes) and 10 µm (basidiospores).

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