
Camarographium carpini

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Camarographium carpini Melnik, Crous & Verkley, *sp. nov.*

Camarographii koreani simile, sed conidiis majoribus, (50–)54–58(–60) × (19–)20–22(–24) µm, discernitur.

Etymology. Named after the host genus from which it was collected, *Carpinus*.

Conidiomata pycnidial, numerous, separate, dispersed, single, subepidermal, (200–)450–700(–1000) µm diam, unilocular, completely immersed in the bark of the host, globose, rarely slightly depressed, with central, 50–80 µm wide ostiolum, which is almost inconspicuous and has an indistinct pore perforating the bark in a notably raised area; the location of mature pycnidia is not easy to note due to the slimy mass of extruded yellowish brown conidia. *Conidiomatal wall* up to 100 µm thick, composed at the outer layers of thick-walled, dark brown *textura angularis*, and at the inner layers of thin-walled, subhyaline *textura angularis*; the most inner layer gives rise to conidiogenous cells lining the internal chamber of the whole conidioma; mature conidiomata tend to have empty locules. *Paraphyses* intermingled among conidiogenous cells in some conidiomata, hyaline, smooth, subcylindrical with obtuse ends, 1–4-septate, up to 50 µm long, 2–3.5 µm diam, extending above the conidiogenous cells. *Conidiogenous cells* hyaline, discrete, holoblastic, annellidic, with 1–2 percurrent proliferations, broadly ampulliform or doliiform, 8–12 × 8–10 µm. *Conidia* abundant, initially subhyaline, but later becoming yellowish brown in pycnidia, extruding in a slimy mass; young, subhyaline conidia have 3–5 transversal distosepta, whereas in mature conidia the compartments between the septa develop bodies (endoconidia?) that are ellipsoid to subglobose, thick-walled, verruculose, (3–)5–8(–10) × (3–)5–7 µm, at times guttulate, and get released in clusters of 4, in sacks that appear to be the remnants of the conidial compartments. Outer conidial wall smooth, subhyaline, 1 µm thick; conidia oblong-ellipsoidal or slightly clavate, sometimes with light constriction in median point, (50–)54–58(–60) × (19–)20–22(–24) µm, with 3.5–4(–5) µm diam scar at the base.

Culture characteristics — (in the dark, 25 °C, after 2 wk): Colonies erumpent, spreading, with sparse to moderate aerial mycelium, and even, lobate margins; reaching 30 mm diam after 2 wk. On potato-dextrose agar surface and reverse olivaceous grey. On malt extract agar centre pale olivaceous grey, outer region smoke-grey, reverse rust in centre, dirty white in outer region. On oatmeal agar grey olivaceous to olivaceous grey.

Typus. Russia, St. Petersburg, Botanical Garden of the Komarov Botanical Institute, on thin, dried twigs of *Carpinus betulus* (*Betulaceae*), 27 Sept. 2010, *V. Mel'nik*, (holotype LE 226162; paratypes LE 261808, LE 261817; isotypes HAL 2424 F, CBS H-20506), cultures ex-isotype CPC 18919, 18918 = CBS 128781, ITS sequence GenBank JQ044431 and LSU sequence GenBank JQ044450, MycoBank MB560014.

Notes — In September 2010, V. Mel'nik collected an interesting coelomycete on dried twigs of *Carpinus betulus* in the Botanical Garden of the Komarov Botanical Institute (St. Petersburg, Russia). The pycnidial conidiomata, holoblastic annellidic conidiogenous cells and distoseptate, pale coloured conidia provided clues to the fact that this specimen could belong to the *Shearia-Camarosporium-Stegonsporiopsis-Camarographium* group. Verkley et al. (2005) published a detailed survey of these genera. Further investigations revealed this specimen to belong to *Camarographium*. A comparison of the fungus from *Carpinus betulus* with published descriptions revealed this collection to represent a new species of *Camarographium*, most similar to *C. koreanum. Camarographium carpini* can be distinguished from *C. koreanum* in that the conidial exudate of *C. koreanum* remains white (vs yellow-brown), and its conidia are narrower (52–62 × 17–19.5 µm) (Verkley et al. 2005). A megablast search of the NCBIs GenBank nucleotide sequence database using the ITS sequence of *C. carpini* retrieves as closest hits *Preussia africana* (GenBank EU551208; Identities = 435/484 (90 %), Gaps = 14/484 (3 %)) and *Preussia flanaganii* (GenBank AY943061; Identities = 453/506 (90 %), Gaps = 22/506 (4 %)), amongst others. However, the ITS sequence is distant to *Camarographium koreanum* strain CBS 117159 (ITS sequence GenBank JQ044432; Identities = 434/535 (81 %), Gaps = 46/535 (9 %)). A megablast search of the NCBIs GenBank nucleotide sequence database using the LSU sequence of *C. carpini* retrieves as closest hits *Preussia dubia* (GenBank GQ203736; Identities = 922/945 (98 %), Gaps = 6/945 (1 %)), *Sporormiella pulchella* (GenBank GQ203747; Identities = 921/944 (98 %), Gaps = 4/944 (0 %)) and *Sporormia fimetaria* (GenBank GQ203728; Identities = 920/944 (97 %), Gaps = 4/944 (0 %)), amongst others. Similar to the ITS sequence, the LSU sequence is distant to *Camarographium koreanum* strain CBS 117159 (LSU sequence GenBank JQ044451; Identities = 900/948 (95 %), Gaps = 10/948 (1 %)). *Camarographium carpini* is not congeneric with *C. koreanum*, and fresh collections of the type species, *C. stephensii*, would be required to resolve the generic phylogeny.

Key to Camarographium species (adapted from Verkley et al. 2005)

1. Conidiomata in linear stromata, on petioles of *Pteridium aquilinum*, conidia 22–28 µm wide . . . . . *C. stephensii*
1. Conidiomata pycnidial, on other substrata 2
2. Conidia up to 20 µm wide 3
2. Conidia smaller 4
3. Conidia 52–62 × 17–19.5 µm, extruding a white conidial mass, immersed in bark of *Cornus kousa*, microconidia present . . . . . *C. koreanum*
3. Conidia 50–60 × 19–24 µm, extruding a yellowish brown conidial mass, immersed in bark of *Carpinus betulus*, microconidia absent . . . . . *C. carpini*
4. Conidia hyaline, 14.5–16 × 4–7 µm, on leaves of *Atriplex moneta* . . . . . *C. atriplicis*
4. Conidia brown, on other substrata 5
5. Conidia 5.6–7.5 µm wide, on fruits of *Prunus domestica* . . . . . *C. fructicola*
5. Conidia 7–12 µm wide, on spines of *Acacia sphaerocephala* . . . . . *C. indicum*

Colour illustrations. Carpinus betulus growing in the Botanical Garden of the Komarov Botanical Institute, St. Petersburg; transverse section through conidiomata, revealing cavities; conidia, with young conidium attached to conidiogenous cell; broken conidium revealing endoconidia. Scale bars = 10 µm.

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