

New Estonian records: Lichenized fungi

Polina Degtjarenko^{1,2}, Inga Jüriado¹ &
Piret Lõhmus¹

¹Department of Botany, Institute of Ecology and Earth Sciences, University of Tartu, Lai 40, 51005, Tartu, Estonia
E-mails: polina.degtjarenko@ut.ee, inga.juriado@ut.ee, piret.lohmus@ut.ee

²Biodiversity and Conservation Biology Research Unit, Swiss Federal Research Institute WSL, Zürcherstrasse 111, 8903, Birmensdorf, Switzerland

The lichenized fungi *Cetrelia monachorum*, *Peltigera castanea* and *P. occidentalis* are reported as new to Estonia after revision of herbarium samples; one further species, *Peltigera frippi* Holt.-Hartw., must be excluded from the list of Estonian lichens as a misidentification. *Cetrelia* specimens were investigated for lichen substances by thin layer chromatography (TLC; solvent A) (Orange et al., 2001), and the identity of *P. occidentalis* was confirmed using fungal ITS sequences. The abbreviations are used as follows: (1) for the country regions: NE – northeastern part, SE – southeastern part, SW – southwestern part; (2) for frequency classes (Freq.): rr – very rare, 1–2 localities, r – rare, 3–5 localities, according to Randlane & Saag (1999). Cited specimens are kept in the lichenological herbarium of the University of Tartu Natural History Museum and Botanic Garden (TU) and in the herbarium of the Tallinn Botanic Garden (TALL).

CETRELIA MONACHORUM (Zahlbr.) W.L. Culb. & C.F. Culb.

NE: Jõgeva Co., Puurmani comm., Alam – Pedja Nature Reserve, in old swamp forest with black alders (*Alnus glutinosa*) in the tree layer (58.5242°N 26.2683°E), on a fallen bark of *Salix caprea*; leg. P. Lõhmus 28 March 2003, det. P. Degtjarenko 7 July 2018, previously determined as *C. olivetorum* (Nyl.) W.L. Culb. & C.F. Culb. (TU29049); – SE: Tartu Co., Kastre comm., Järvelja Nature Reserve, in old-growth forest (58.2791°N 27.3239°E), on a fallen *Fraxinus excelsior*; leg. P. Lõhmus 18 July 2004, det. P. Degtjarenko 7 July 2018, previously determined as *C. cetrarioides* Delise W.L. Culb. & C.F. Culb.

(TU26953); – SW: Pärnu Co., Häädemeeste comm., Nigula Nature Reserve, in old mixed forest with *A. glutinosa*, *F. excelsior* and *Tilia cordata* in the tree layer (58.0460°N 24.7072°E), on *S. caprea* bark; leg. P. Lõhmus 24 April 2001, det. P. Degtjarenko 7 July 2018, previously determined as *C. cetrarioides* (TU17257). Freq.: r. – Until now, only two species, *C. olivetorum* and *C. cetrarioides*, were known in Estonia. *Cetrelia monachorum* is sorediate and morphologically similar to *C. cetrarioides* and *C. olivetorum*, but it contains imbricatic acid as the major medullary compound, and additionally perlatolic, 4-O-demethylimbricatic and anziaic acids in minor or trace amounts in the medulla (Figs. 1 and 2; Obermayer & Mayrhofer, 2007; Kukwa & Motiejūnaitė, 2012). *C. cetrarioides* contains perlatolic acid as the major and imbricatic acid as minor medullary substance (Figs. 1 and 2; Kukwa & Motiejūnaitė, 2012). Furthermore, all *Cetrelia* species contain atranorin in the cortex. Spot test reactions of *C. cetrarioides* and *C. monachorum* are not sufficient to distinguish between the two species (e.g., Obermayer & Mayrhofer, 2007; Kukwa & Motiejūnaitė, 2012), while TLC proved reliable to distinguish between these taxa. *C. olivetorum* could be distinguished from morphologically similar *C. cetrarioides* and *C. monachorum* by the strong sanguineous/red reaction with C which is caused by the presence of olivetoric acid in medulla (Figs. 1 and 2; Obermayer & Mayrhofer, 2007; Golubkov et al., 2015). The new species to Estonia, *C. monachorum*, is recorded in other Baltic countries, Latvia (Moisejevs & Degtjarenko, in prep.) and Lithuania (Kukwa & Motiejūnaitė, 2012), but also in more distant areas, such as Norway (Obermayer & Mayrhofer, 2007), Poland (Kukwa et al., 2012) and the European part of Russia (Tver Oblast) (Stepanchikova et al., 2011).

PELTIGERA CASTANEA Goward, Goffinet & Miadlikowska

NE: IdaVirumaa Co., Toila comm., upper edge of Päite clint, open alvar community (59.4375°N, 27.053611°E), on mosses, with *Abietinella abietina* (Hedw.) M. Fleisch., *Bryum argentatum* Hedw., *Ceratodon purpureus* (Hedw.) Brid. and *Tortula ruralis* (Hedw.) F. Weber & D. Mohr. as associated bryophytes; leg. Leiti Kannukene (no. 32099) 6 Apr 2004, det. I. Jüriado 25 May 2018 (TALL L004908), previously determined as *P. frippii* (Suija et al., 2010). Freq.: rr. – *Peltigera*

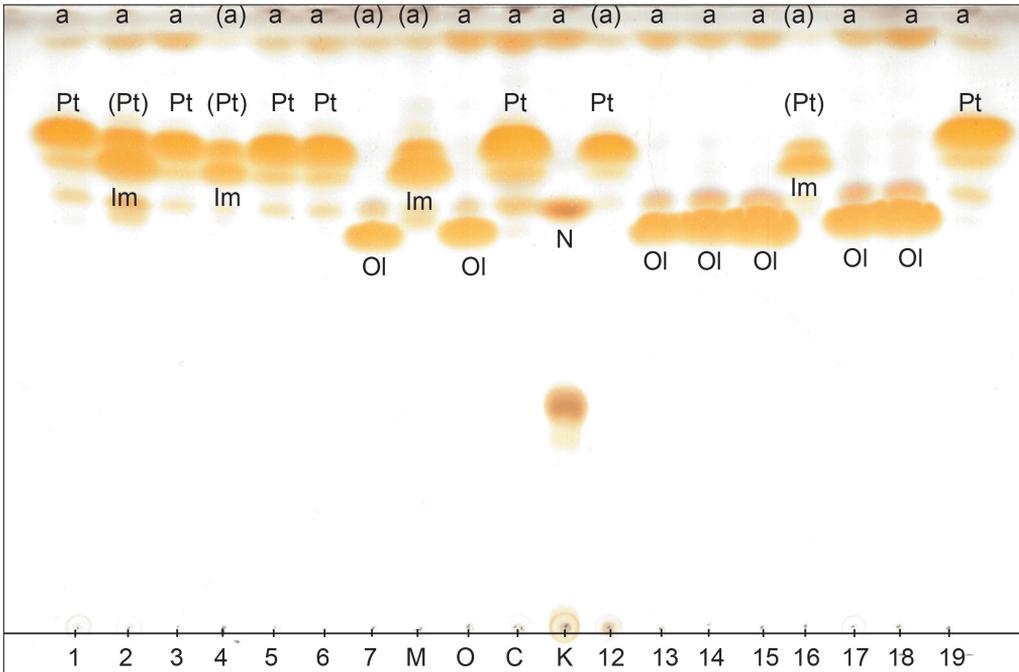


Fig. 1. Thin layer chromatography (TLC) plate of *Cetrelia* species in Estonia (after development with 10% sulphuric acid): *Cetrelia cetrarioides* (tracks 1, 3, 5, 6, 12, 19), *C. monachorum* (tracks 2, 4, 16), *C. olivetorum* (tracks 7, 13, 14, 15, 17, 18); M, control of *C. monachorum*; O, control of *C. olivetorum*; C, control of *C. cetrarioides*; K, control of norstictic acid and atranorin. Spots of separated compounds: a, atranorin; Im, imbricatic acid; N, norstictic acid; Ol, olivetoric acid; Pt, perlatolic acid. Brackets point to minor amounts of compounds.

castanea was described quite recently from North America (Canada) and belongs to *Peltigera didactyla* complex (Goffinet et al., 2003). This taxon is confirmed to be a well-delimited species occurring also in Eurasia (Russia, Krasnoyarsk Territory) (Magain et al., 2018). *Peltigera castanea* thallus is foliose, small, to 6–8 cm across; lobes to 1.0–1.5 cm wide, with a smooth, shiny, chestnut brown, mostly non-tomentose upper cortex. The veins in underside of thallus are slightly darkening and rhizines are flocculent, often tufted and hedgerow forming (Goffinet et al., 2003). Marginal pycnidia and soredia are common, however, our specimen is esorediate (Fig. 3). *Peltigera castanea* occurs in (oro)boreal forests and alpine heaths, where it grows in open sites, on xerophytic moss mats (Goffinet et al., 2003). Also, in Estonia the species was found on xerophytic moss mats in open alvar grassland what is characteristic habitat for several rare terricolous lichens with arcto-alpine distribution (Leppik et al., 2015).

PELTIGERA OCCIDENTALIS (E. Dahl) Kristinsson

SE: Valgamaa Co., Valga comm., Taheva forest district (comp. 3, subcomp. 22), old swamp forest with black alder (*Alnus glutinosa*) and Norway spruce (*Picea abies*) in the tree layer (57.70983°N, 26.214°E), on mosses, leg. I. Jüriado (no. 48) 14 July 1998, det. I. Jüriado 31 May 2018, previously determined as *P. neopolydactyla* (Gyeln.) Gyeln. (TU29725). Freq.: rr. – This species was tentatively recognized in Vitikainen (2007: 125), but is now confirmed to be well-delimited by molecular analyses (Magain et al., 2017). According to methods presented in Jüriado et al. (2017), the rDNA ITS sequence was obtained (I. Jüriado, No.637) from the herbarium specimen and on the basis of BLAST searches in the NCBI GenBank (<http://blast.ncbi.nlm.nih.gov/Blast.cgi>) the closest matches were with MG811764 and MG811762 (*Peltigera occidentalis* vouchers, 100% identity). *Peltigera occidentalis* differs from *P. neopolydactyla* by thicker, rigid and often emerald green thallus when wet

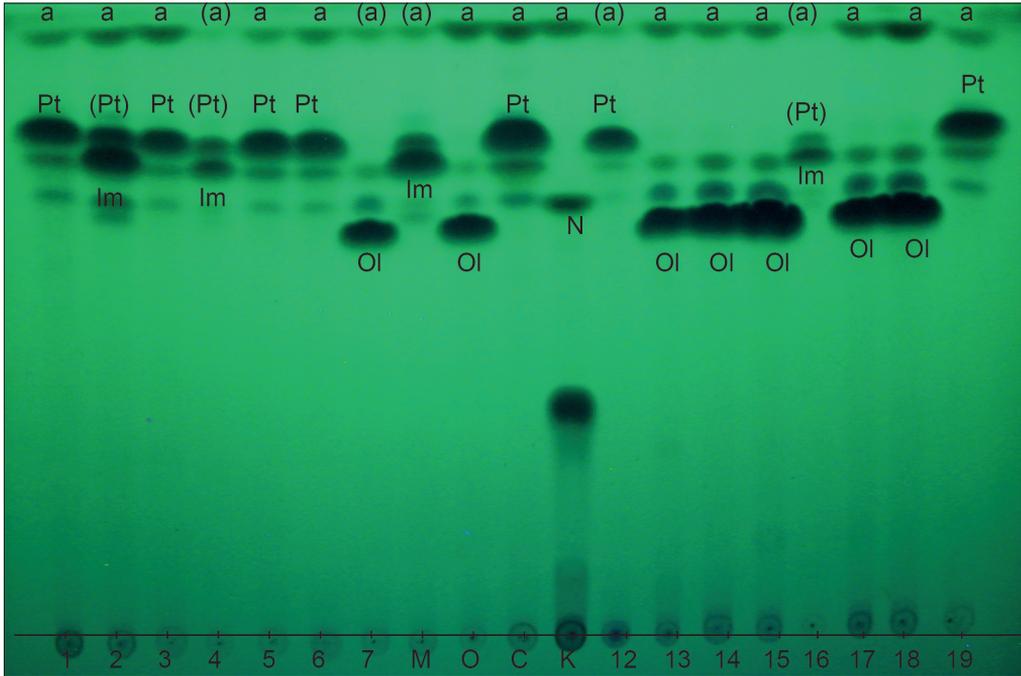


Fig. 2. Thin layer chromatography (TLC) plate of *Cetrelia* species in Estonia (after running, photographed under UV-light, 254 nm): *Cetrelia cetrarioides* (tracks 1, 3, 5, 6, 12, 19), *C. monachorum* (tracks 2, 4, 16), *C. olivetorum* (tracks 7, 13, 14, 15, 17, 18). See Figure 1 for abbreviations of compounds.



Fig. 3. *Peltigera castanea* (TALL L004908). Photo Andres Saag.

(Vitikainen, 2007). In underside of thallus the veins are brown to black in the center, rhizines are tufted, branched, and usually not over 5 mm long. *Peltigera neopolydactyla* has usually paler veins, rhizines are slender, little branched, and often over 7 mm long. *Peltigera occidentalis*

is widespread in oligotrophic and mesic forests in boreal zone and in subalpine heaths and meadows (Vitikainen, 2007).

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