

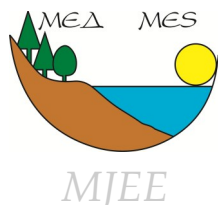
New data on the taxonomy, distribution and ecology of the genus *Peniophora* Cooke (Basidiomycota, Fungi) in the Republic of Macedonia

Нови податци за таксономијата, дистрибуцијата и екологијата на родот *Peniophora* Cooke (Basidiomycota, Fungi) во Република Македонија

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This is the first systematic research of genus *Peniophora* in the Republic of Macedonia. Out of the total number of 36 species of this genus known in Europe, within the investigations in the Republic of Macedonia, the following 22 species have been recorded: *Peniophora cinerea*, *P. erikssonii*, *P. incarnata*, *P. junipericola*, *P. laeta*, *P. lilacea*, *P. limitata*, *P. lycii*, *P. meridionalis*, *P. nuda*, *P. piceae*, *P. pini*, *P. pithya*, *P. proxima*, *P. quercina*, *P. rufomarginata*, *P. tamaricicola*, *P. violaceolivida*. Four species: *P. polygonia*, *P. pseudoversicolor*, *P. versicolor* и *P. versiformis* has been recorded for the first time for mycobiota of Macedonia. This review considers aspects of the taxonomy, distribution and ecological features of *Peniophora* species in the Republic of Macedonia.

Key words: *Peniophora*, distribution, ecology, Macedonia.

Во студијата се дадени првите податоци од систематските истражувања на родот *Peniophora* во Република Македонија. Од вкупно 36 вида регистрирани во Европа со истражувањата во Македонија се регистрирани следниве 22 вида: *Peniophora cinerea*, *P. erikssonii*, *P. incarnata*, *P. junipericola*, *P. laeta*, *P. lilacea*, *P. limitata*, *P. lycii*, *P. meridionalis*, *P. nuda*, *P. piceae*, *P. pini*, *P. pithya*, *P. proxima*, *P. quercina*, *P. rufomarginata*, *P. tamaricicola*, *P. violaceolivida*. Четири вида за првпат се наведуваат за фунгијата на Македонија: *P. polygonia*, *P. pseudoversicolor*, *P. versicolor* и *P. versiformis*. Во овој труд се дадени податоци за таксономијата, распространувањето и еколошките карактеристики на видовите од родот *Peniophora* во Македонија.

Клучни зборови: *Peniophora*, распространување, екологија, Македонија.

Introduction

Systematic research on the genus *Peniophora* Cooke (1879) in Macedonia has not been conducted until now, and there are relatively few mycological papers concerning only particular species of this genus. Publications referring to the individual species of the genus *Peniophora* are as follows: *Peniophora cinerea* (Pers.) Cooke (Pilát & Lindtner 1938; Tortić & Karadelev 1986; Tortić 1988; Karadelev 1989, 1993, 1994, 1998, 2000a; Karadelev et al. 2002a; Bernicchia & Gorjón 2010), *Peniophora erikssonii* Boidin (Karadelev 1993), *Peniophora incarnata* (Pers.) P. Karst. (Pilát 1937; Pilát & Lindtner 1938; Tortić & Cekova 1975; Tortić & Karadelev 1986; Tortić 1988; Ka-

radelev 1993, 1994, 1995a; Karadelev et al. 2002a, 2008; Karadelev & Rusevska 2004; Bernicchia & Gorjón 2010), *Peniophora junipericola* J. Erikss. (Karadelev 1993, 1994, 1995b, 1998, 1999, 2000a, b, c, d; Karadelev & Rusevska 2004, Bernicchia & Gorjón 2010), *Peniophora laeta* (Fr.) Donk (Pilát & Lindtner 1938; Tortić 1988; Karadelev 1993, 1994; Bernicchia & Gorjón 2010), *Peniophora lilacea* Bourdot & Galzin (Bernicchia & Gorjón 2010), *Peniophora limitata* (Chaillet ex Fr.) Cooke (Karadelev 1993, 1994; Bernicchia & Gorjón 2010), *Peniophora lycii* (Pers.) Höhn. & Litsch. (Pilát 1937; Tortić & Karadelev 1986; Tortić 1988; Karadelev 1993, 2000c; Rusevska & Karadelev 2004; Bernicchia & Gorjón 2010), *Peniophora meridionalis* Boidin (Tortić & Karadelev 1986; Tortić 1988; Karadelev 1988, 1993, 1994; Bernicchia & Gorjón 2010), *Peniophora nuda* (Fr.) Bres. (Pilát & Lindtner 1938; Tortić 1988; Karadelev 2000c, d; Rusevska & Karadelev 2004; Bernicchia & Gorjón 2010), *Peniophora piceae* (Pers.) J. Erikss. (Tortić 1988; Karadelev 1993, 1994, 1995a; Karadelev et

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al. 2002c, 2003; Bernicchia & Gorjón 2010), *Peniophora pini* (Schleich.) Boidin (Tortić & Karadelev 1986; Tortić 1988; Karadelev 1993, 1994; Karadelev et al. 2002a; Rusevska & Karadelev 2004; Bernicchia & Gorjón 2010), *Peniophora pithya* (Pers.) J. Erikss. (Karadelev 1993, 1995b, 1999, 2000b, c; Karadelev et al. 2003; Bernicchia & Gorjón 2010), *Peniophora proxima* Bres. (Pilát 1937; Pilát & Lindtner 1938; Tortić 1988), *Peniophora quercina* (Pers.) Cooke (Tortić & Karadelev 1986; Tortić 1988; Karadelev 1989, 1993, 1994, 1998; Karadelev et al. 2002a, b, c, 2008; Karadelev & Rusevska 2004; Bernicchia & Gorjón 2010), *Peniophora rufomarginata* (Pers.) Bourdot & Galzin (Bernicchia & Gorjón 2010), *Peniophora tamaricicola* Boidin & Malençon (Karadelev 1999, 2000a, b), *Peniophora violaceolivida* (Sommerf.) Massee (Bernicchia & Gorjón 2010).

The genus *Peniophora* is generally regarded as a member of the family Corticiaceae sensu lato (Basidiomycota). Eriksson et al. (1978) in the publication about North European corticioid fungi accepted the subdivision of the genus into subgenera *Gloeopeniophora* Höhn. & Litsch. (with *P. incarnata*-group: *P. aurantiaca*, *P. erikssonii*, *P. incarnata*, *P. laeta*, *P. laurentii*) and *Peniophora* (with *P. cinerea*-group: *P. cinerea*, *P. junipericola*, *P. limitata*, *P. nuda*, *P. piceae*, *P. pithya*, *P. quercina*, *P. rufa*, *P. rufomarginata*, *P. septentrionalis*, *P. suecica*, *P. violaceolivida* without dendrophydia, and *P. lycii*-group: *P. lilacea*, *P. lycii*, *P. polygonia*, having dendrophydia). Adreasen & Hallenberg (2009) published a taxonomic study of the Peniophoraceae with brief diagnoses for 70 species of *Peniophora* sensu stricto, and compiled keys to species, which were divided in 8 species groups.

Peniophora species are developing exclusively as saprotrophs mainly on fallen branches and twigs, but also on rotten trees, roots, logs, etc. Among them there are cosmopolites and rare species, as well. The important characteristics of this large and cosmopolitan genus are the following: Basidiome usually resupinate, having smooth or slightly tuberculate (as exception warted, scattered-hydroid, meruloid) hymenophore of usually violaceous-grey closely adnate to broadly loose, uplifted and turned up, exposing dark lower surface. Hyphal system monomitic, hyphae hyaline to brown, thin-to-thick-walled with clamps in most species, few with simple-septate hyphae. Dendrophydia, gloecystidia and lamprocystidia present in most species. Spores generally allantoids but in some species ellipsoid, in all species smooth, non-amyloid, non-cyanophilous, spore-print pinkish to reddish. *Peniophora* is a good example of ecological adaptation to dry and exposed environments. Many species with a protective dendrophydia layer or more or less coloured hyphae to avoid dehydration or solar radiation can be found, but also large basidiospores to aid the first steps of the germination in dry substrata (Bernicchia & Gorjón, 2010).

Materials and methods

The studied material were the exsiccates deposited in the Macedonian Collection of Fungi (MCF) at the Institute of Biology, Faculty of Natural Science, Ss. Cyril and Methodius University in Skopje, as well as papers published by the present authors. A data input were made in specially prepared database software called MACFUNGI. The identification of fungi was done using a microscope

and reagents (Melzer's reagent, 5% KOH, sulphovanillin, etc.) which changed the color of the tissue, determining the size and shape of spores, their wall, determining of the type, size, number and shape of the sterigma (stem of basidiospore) of basidia, determining of position and type of the ornamentation of cystidia, as well as the presence and absence of clamps.

The identification of the species of *Peniophora* has been done according to Eriksson et al. (1978), Jülich (1984), Breitenbach & Kränzlin (1986), Domański (1991), Hansen & Knudsen (1997), Bernicchia & Gorjón (2010) and Yurchenko (2010). The species are reported alphabetically. Under each fungal species data of geographical distribution, altitude, forest association, substrate, data source and previous publications are provided.

Abbreviations used

* new species for Macedonia

Ref. - references

MCF - Macedonian Collection of Fungi

Results

In total, 22 *Peniophora* species have been registered in Macedonia:

1. *Peniophora cinerea* (Pers.) Cooke

Ref.: Pilát & Lindtner 1938; Tortić & Karadelev 1986; Tortić 1988; Karadelev 1989, 1993, 1994, 1998, 2000c; Karadelev et al. 2002a; Bernicchia & Gorjón 2010.

Collections: MCF.

Belasica Mt.: 400-500 m, oak forest, deciduous tree (fallen branch), 08.2004, exs. MCF 04/329; Bistra Mt.: Galichnik vill., above Neda hotel, *Pinus* plantings, ?*Pinus* (living tree), 29.08.2009, exs. MCF 09/11565; Lopushnik, above the barracks, *Fagus* forest, *Fagus* (rotten wood), 07.08.2003, exs. MCF 03/9126; Dobra Voda Mt.: Popovjani vill., 860 m, *Quercetum frainetto-cerris*, *Corylus* (fallen branch), 20.12.2007; Galichica Mt.: Volko Legalo, 1600 m, *Abieti-Fagetum*, *Fagus* (fallen branch), 15.09.2006, exs. MCF 06/7273; Karadzica Mt.: r. Kadina Reka, 1100-1200 m, *Festuco heterophyllae-Fagetum*, *Fagus* (fallen branch), 11.10.2001, exs. MCF 01/724; Mumdzhica, *Fagus* (fallen branch), 24.04.1997, exs. MCF 97/4486; Maleshevski Planini Mt.: Ratevsko Ezero artificial lake, *Fago-Pinetum sylvestris*, *Fagus* (fallen branches), 18.09.2001, exs. MCF 01/918; Pelister Mt.: Slivnica vill., 1000 m, oak forest, *Quercus frainetto* (fallen branch), 20.06.2003, exs. MCF 03/9808; r. Brajchinska Reka, 1600 m, *Calamintho grandiflorae-Fagetum*, *Fagus*, 01.05.2007, exs. MCF 07/6844; Prespa Lake (Galichica Mt.): Golem Grad Island, 900 m, *Pruno webbii-Juniperetum excelsae*, *Hedera helix*, 25.07.1997, exs. MCF 97/4717; Shar Planina Mt.: Ljuboten mountain house (below), *Fagus* forest, *Fagus* (rotten wood), 18.09.2005, exs. MCF 05/9109; Shtip: Vrteshka, 1000 m, *Festuco heterophyllae-Fagetum*, *Fagus* (rotten wood), 08.04.1989, exs. MCF 89/1116; Skopje and vicinity: Katlanovo, 250 m, *Quercus-Carpinetum orientalis*, *Pyrus amygdaliformis* (fallen branches), 14.06.1994, exs. MCF 94/1265; Gazi Baba, above Faculty of Natural Sciences and Mathematics, 250 m, plantings (*Robinia*, *Quercus*), deciduous tree (fallen branch), 13.10.2009, exs. MCF 09/11335; Matka, near monastery St. Andrea, 250 m, azonal vegetation,

deciduous tree (fallen branch), 09.11.2003, exs. MCF 03/13530.

2. *Peniophora erikssonii* Boidin

Ref.: Karadelev 1993 (Kozhuf Mountain).

Collections: MCF.

3. *Peniophora incarnata* (Pers.) P. Karst.

Ref.: Pilát 1937; Pilát & Lindtner 1938; Tortić & Cekova 1975; Tortić & Karadelev 1986; Tortić 1988; Karadelev 1993, 1994, 1995b; Karadelev et al. 2002a, 2008; Karadelev & Rusevska 2004; Bernicchia & Gorjón 2010.

Collections: MCF.

Belasica Mt.: Koleshino vill. (above), along r. Baba, 450 m, 20.04.1991, *Castanea sativa* (fallen branches), exs. MCF 99/2056 and *Juglans* (dry branches), exs. MCF 99/2049; BANSKO vill. (above), *Tilia* sp., (fallen branches), 01.05.2000, exs. MCF 00/9193; Bistra Mt.: Skudrinje vill., 900 m, *Castanea*, 17.07.2003, exs. MCF 03/13820; Lazaropole, St. Tanas, 1400 m, beech forest, *Fagus* (fallen branch), 27.09.2003; Bogdanci: Paljurci, 150 m, *Coccifero-Carpinetum orientalis* with planted *Pinus* and *Cupressus*, *Pyrus amygdaliformis* (bark), 26.12.2009, exs. MCF 09/11525; Bolovan, 150 m, *Quercus-Carpinetum orientalis*, *Quercus frainetto* (branches), 17.05.2003; Galichica Mt.: Volko Legalo, 1600 m, *Abieti-Fagetum*, *Fagus* (fallen branch), 15.09.2006, exs. MCF 06/7287; Karadzica Mt.: Shashkovic, 1500 m, *Calamintho grandiflorae-Fagetum*, *Populus tremula* (rotten wood), 29.07.1997, exs. MCF 97/4467; Kitka Mt.: between Gorno Kolichani vill. and Preslap, 950 m, *Fagus* forest, (branches of broadleaf tree), 03.05.2007, exs. MCF 07/6793; Kochani: dam Gratche, (above artificial lake Kochansko Ezero), r. Velika Reka, 500 m, *Salicetum*, *Salix* (fallen branch), 22.04.2007; Kozhuf Mt.: between Visoka Chuka and Konjari vill., *Ilex aquifolium* (rotten wood), 10.05.1997, exs. MCF 97/4726; Kozjak HE: deciduous forest (*Quercus ceris*, *Pinus nigra*, *Populus tremula*), *Acer monspessulanum*, (branch), 08.12.2009, exs. MCF 09/13831; Mariovo (Prilep): between Gradeshnica vill. and Vitolishte vill., r. Satoka, oak forest, (rotten wood), 15.05.2005; Mavrovo NP: Star Vrben (above), 1456 m, *Fago-Abietetum meridionale*, *Abies* (fallen branch), 19.06.2010, exs. MCF 10/11784; Skopje (vicinity): Vodno Mt., Krushopek vill. (vicinity), 600-800 m, deciduous forest, *Robinia pseudo-acacia*, 10.11.2009, exs. MCF 09/11725; exs. MCF 09/11731; Matka, near St. Andrea monastery, azonal vegetation, *Buxus sempervirens* (fallen branches), 16.04.2004, exs. MCF 04/13827; Markova Reka, around Markov Manastir, 400 m, *Quercus-Carpinetum orientalis*, *Quercus* sp., (branch), 14.04.2003; Skopska Crna Gora Mt.: Ljubanci vill., above St. Nikola monastery, 800-900 m, oak forest (*Quercus frainetto*, *Q. petraea*, *Castanea*, *Carpinus*), *Quercus* sp., (fallen branch), 11.10.2008, exs. MCF 08/10410; close to Chucher Sandevo vill., in arable land, deciduous tree (fallen branch), 14.04.2004, exs. MCF 04/13826.

4. *Peniophora junipericola* J. Erikss.

Ref.: Karadelev 1993, 1994, 1995a, 1998, 1999, 2000a, b, c, e; Karadelev & Rusevska 2004, Bernicchia & Gorjón 2010.

Collections: MCF.

Bistra Mt.: Lazaropole vill., footpath to Jaorska Voda, 1300 m, *Fagus* forest, *Juniperus* (dry branch), 18.08.2007, exs. MCF 07/13832; Galichica Mt.: Velgoshti

vill. 800 m, pure *Juniperus foetidissima* forest, *Juniperus foetidissima*, 01.05.2010; Mavrovo NP: Vrben vill. (above), 1350 m, *Fago-Abietetum meridionale*, *Juniperus communis*, 13.05.2010, exs. MCF 10/11907; Pelister Mt.: around St. Atanas church, 1150-1200 m, *Juniperus communis* (fallen branches), 13.07.2001, exs. MCF 01/444; the confluence of the rivers Pchinja and Vardar: St. Bogorodica church, 200 m, *Pruno webbii-Juniperetum excelsae*, *Juniperus excelsa* (fallen branches), 25.03.2001, exs. MCF 01/2092.

5. *Peniophora laeta* (Fr.) Donk

Ref.: Pilát & Lindtner 1938; Tortić 1988; Karadelev 1993, 1994; Bernicchia & Gorjón 2010.

Collections: MCF.

Karadzica Mt.: r. Kadina Reka, *Carpinus betulus* (fallen branch), 24.06.1994, exs. MCF 94/4262.

6. *Peniophora lilacea* Bourdot & Galzin

Ref.: Bernicchia & Gorjón 2010.

Collections: MCF.

Bogdanci: Pogana, r. Poganska Reka, 300 m, oak forest (*Quercus frainetto* - domination, *Q. coccifera*, *Q. pubescens*, *Carpinus orientalis*), deciduous tree (fallen branch), 08.05.2011, exs. MCF 11/12868; Skopje: Gazi Baba, Botanical Garden (PMF), 250 m, park, *Gleditsia triacanthos* (fallen branch), 22.05.2007, exs. MCF 07/6912; the confluence of the rivers Pchinja and Vardar: exs. MCF 13833.

7. *Peniophora limitata* (Chaillet ex Fr.) Cooke

Ref.: Karadelev 1993, 1994; Bernicchia & Gorjón 2010.

Collections: MCF.

Belasica Mt.: Koleshino vill. (vicinity), along r. Baba, above waterfall, 500-600 m, refuge with domination of *Corylus avellana*, (unknown substrate, rotting branches), 13.10.2001, exs. MCF 01/255; Bogdanci: *Jasminum fruticans* or *Ligustrum vulgare*, 01.04.1992, exs. MCF 92/9241; Galichica Mt.: Gradishte, 700 m, *Quercus-Carpinetum orientalis*, *Acer monspessulanum*, 28.07.1998, exs. MCF 98/2239; Jakupica Mt.: Cheples, 1250-1450 m, *Festuco heterophyllae-Fagetum*, *Fagus* (fallen branches), 10.07.1999, exs. MCF 99/2036; Kumanovo (vicinity): Bislim Canyon, *Quercus-Carpinetum orientalis*, *Syringa vulgaris* (dry branches of living tree), 17.04.2011, exs. MCF 11/12743; Mavrovo NP: the confluence of rivers Mavrovska Reka and Radika, 930 m, azonal vegetation, *Acer campestre* (dry branch of living tree), 14.05.2010, exs. MCF 10/12482; Star Vrben (above); 1456 m, *Fago-Abietetum meridionale*, deciduous tree (fallen branch), 19.06.2010, exs. MCF 10/11778; Pelister Mt.: near r. Brajcinska Reka, 1400 m, *Abies* and *Betula* forest, *Acer pseudoplatanus* (fallen branches), 21.04.2002; Kurbinovo vill., St. Georgij church, near the stream, 1000 m, hazel forest, *Corylus avellana* (rotten wood), 20.09.2006, exs. MCF 06/9706; Shar Planina Mt.: Sharski Vodi mountain house (around), 1400-1500 m, *Calamintho grandiflorae-Fagetum*, *Acer pseudoplatanus* (fallen branches), 08.07.1998, exs. MCF 98/1758; exs. MCF 98/1777; Staroselski Bachila, 1600 m, *Calamintho grandiflorae-Fagetum*, *Fagus* (rotten wood), 10.07.1997, exs. MCF 97/1250; Skopje (vicinity): Katlanovo, r. Pchinja, 200 m, *Quercus-Carpinetum orientalis*, *Syringa vulgaris* (fallen branch), 25.05.1993; Stogovo Mt.: Gari vill., 900 m, *Ostrya* (fallen branch), exs. MCF 99/3911,

Gari vill., 900 m, *Ostrya* (fallen branches), 26.07.1999, exs. MCF 99/8828.

8. *Peniophora lycii*

Ref.: Pilát 1937; Tortić & Karadelev 1986; Tortić 1988; Karadelev 1993, 2000c; Rusevska & Karadelev 2004; Bernicchia & Gorjón 2010.

Collections: MCF.

Bogdanci (vicinity): Bolovan, 150 m, *Ulmus minor*, 11.03.2001, exs. MCF 01/10422; Bolovan, *Phillyrea*, 27.03.1994, exs. MCF 94/9234; Bolovan, *Coronilla emeroides* (branch), 07.1994, exs. MCF 94/9346; Pogana, r. Poganska Reka, 300 m, oak forest (*Quercus frainetto*, *Q. coccifera*, *Q. pubescens*, *Carpinus orientalis*), deciduous tree (fallen branch), 08.05.2011, exs. MCF 11/12867; Strelishte, *Coccifero-Carpinetum orientalis*, *Cystus villosus* (dry branches), 22.01.2007, exs. MCF 07/13496; Gabroska Reka, *Phillyrea media*, 12.03.2012, exs. MCF 12/13847; Border zone, Bogorodica: Flamingo casino (above), meadow/pasture, *Pyrus* sp., 30.03.2011, exs. MCF 11/12877; Demir Kapija: r. Chelovecka Reka, *Juglans-Platanetum orientalis*, *Rhus coriaria*, 14.08.1998, exs. MCF 98/10349; 100 m, tamarisk shrubland, 25.08.1998, exs. MAK 98/4531; Dobra Voda Mt.: Oslemej, *Quercetum frainetto-cerris*, deciduous tree (fallen branch), 30.05.2012, exs. MCF 12/13849; Gevgelija: Toplik, *Pyrus amygdaliformis* (rotten wood), 07.02.1988, exs. MCF 88/4689; Karabalija: 17.05.2003; Kavadarci: vill. Drenovo, 200 m, *Pinus nigra* and *Robinia* plantings, *Ligustrum vulgare* (branches), 26.03.2005, exs. MCF 05/4861; Kitka Mt.: Gorno Kolichane vill. (above), 30.05.1999, exs. MCF 99/3881; Kozhuf Mt.: Nancheva Chesma, 350 m, *Quercus* sp. (fallen branches), 29.04.2002, exs. MCF 02/9828, MCF 02/9826, MCF 02/9829, MCF 02/9830; Selemlija vill., shrub (fallen branch), 12.03.2008, exs. MCF 08/9201; Umida, 800 m, deciduous tree (rotten wood), 29.04.2002, exs. MCF 02/9519; Kumanovo (vicinity): Rankovce vill., above primary school, black locust plantings, *Robinia pseudoacacia*, fallen branch, 22.06.2010, exs. MCF 10/11850; Dragomance vill., 338 m, azonal *Salix* and *Populus* forest, deciduous tree (fallen branch), 17.04.2011, exs. MCF 11/12729; Bislím Canyon, *Quercus-Carpinetum orientalis*, deciduous tree (fallen branch), 17.04.2011, exs. MCF 11/12759; Pchinja railway station: between St. Ilija monastery and St. Bogorodica, azonal vegetation (*Buxus*, *Phillyrea*, *Quercus*, *Carpinus*), *Cornus mas*, 21.04.2012, exs. MCF 12/13995 and deciduous tree (fallen branch), 21.04.2012, exs. MCF 12/13989; r. Pchinja: St. Bogorodica monastery, azonal vegetation (*Salix alba*, *Populus tremula*, *Robinia pseudoacacia*, *Acer negundo*, *Alnus glutinosa*), deciduous tree (fallen branch), 15.05.2008, exs. MCF 08/9385; St. Bogorodica monastery, 200 m, *Pruno webbii-Juniperetum excelsae*, *Paliurus spina-christi* (fallen branches), 25.03.2001, exs. MCF 01/2091; Kozhle vill. (below), *Juniperus excelsa* forest, *Pyrus amygdaliformis* (fallen branch), 19.10.2007, exs. MCF 07/8060; St. Bogorodica Monastery, 200 m, *Quercus-Carpinetum orientalis*, *Paliurus spina-christi* (branches), 23.10.2002, exs. MCF 02/4200; Skopje (vicinity): Vodno, between the Childrens' resort and the top, 600-1000 m, mixed plantings, *Tilia* sp. (fallen branch), 25.08.2009, exs. MCF 09/11065; Matka, footpath to St. Nikola Šiševski monastery, 300-400 m, deciduous forest (*Quercus*, *Carpinus*, *Buxus*), *Buxus* (fallen branch), 26.10.2005, exs. MCF 05/8805; Vodno, 500-800 m, mixed forest, *Fraxinus ornus* (bark of fallen

branch), 12.05.2001, exs. MCF 01/4076; Vodno, above the police, mixed forest (*Buxus sempervirens*, *Cornus mas*, *Pyrus* sp.) with *Pinus* plantings, deciduous tree? (bark), 06.06.2008, exs. MCF 08/9407; Vodno, 750-1000 m, (deciduous tree), 16.10.2002, exs. MCF 02/6594; Vodno Mt., Krushopek vill. (vicinity), 600-800 m, deciduous forest, *Robinia pseudoacacia*, 10.11.2009, exs. MCF 09/11727; Katlanovo, 250 m, 14.06.1994, *Quercus-Carpinetum orientalis*, *Cornus mas* (fallen branch), exs. MCF 94/3921 and *Acer campestre* (fallen branch), exs. MCF 94/4512; Gazi Baba, 300 m, plantings, dry branches of living tree, 17.09.1999, exs. MCF 99/686; Matka, near the cave, azonal vegetation, *Buxus sempervirens* (fallen branch), 04.02.2001, exs. MCF 01/9211; Matka, above mountain house, *Quercus* sp., (fallen branch), 01.04.2000, exs. MCF 00/8740; "Ilinden" military buildings, dry branches of schrub, 11.03.2000, exs. MCF 00/13842; Matka, near St. Andrea monastery, azonal vegetation, *Buxus sempervirens* (fallen branches), 16.04.2004, exs. MCF 04/13828; Matka, near monastery St. Andrea, 250 m, unknown substrate (fallen branch), 09.11.2003; Skopska Crna Gora Mt.: Kuchevishte vill., above St. Arhangel monastery, 700 m, *Quercus-Carpinetum orientalis*, deciduous tree (fallen branch), 26.05.2011, exs. MCF 11/12937; Chucher Sandevo vill., deciduous forest, deciduous tree (stump), 14.04.2002, exs. MCF 02/13848; Valandovo: Bajrambos, *Quercus pubescens* or *Q. coccifera* (dry branches), 05.03.1994, exs. MCF 94/9347.

9. *Peniophora meridionalis* Boidin

Ref.: Tortić & Karadelev 1986; Tortić 1988; Karadelev 1988, 1993, 1994; Bernicchia & Gorjón 2010.

Collections: MCF.

Belasica Mt.: Koleshino vill. (above), along r. Baba, 450 m, *Castanea* (bark), 20.04.1991, exs. MCF 91/9212; Demir Kapija: Samarot (below), 550 m, *Quercus-Carpinetum orientalis*, *Carpinus* (fallen branch), 21.05.2005, exs. MCF 05/4918; Galichica Mt.: Kale, 1100 m, mixed forest (*Juniperus excelsa* and *Quercus trojana*), *Quercus trojana*, 21.06.2003; Gevgelija: near Negorci vill., 80-200 m, *Quercus cocciferae-Carpinetum orientalis*, *Quercus cocciferae* (fallen branch), 09.04.2005, exs. MCF 05/4837; Karabalija, 17.05.2003; Malesevski Mt.: r. Dvoriska Reka, along the stream, 1000 m, *Festruco heterophyllae-Fagetum*, *Carpinus betulus* (fallen branch), 15.07.2000, exs. MCF 00/1593; r. Babuna: between Teovo and Omorani vill., 300-350 m, deciduous forest (*Quercus*, *Acer*, *Carpinus*), *Quercus frainetto* (fallen branches), 17.05.2003, exs. MCF 03/3100; Skopje (vicinity): Katlanovo, 250 m, *Pyrus amygdaliformis*, 14.06.1994, exs. MCF 94/9222; Katlanovo, 250 m, *Quercus-Carpinetum orientalis*, *Cornus mas* (fallen branches), 14.06.1994, exs. MCF 94/9221; Zelenikovo vill., deciduous forest (*Carpinus*, *Cornus mas*), deciduous tree (fallen branch), 16.05.2010, exs. MCF 10/11715; Butel, Rashtanski Lozja, 230 m, *Quercus* forest with *Carpinus*, deciduous tree (fallen branch), exs. MCF 9200.

10. *Peniophora nuda* (Fr.) Bres.

Ref.: Pilát & Lindtner 1938; Tortić 1988; Karadelev 2000c, e; Rusevska & Karadelev 2004; Bernicchia & Gorjón 2010.

Collections: MCF.

Belasica Mt.: Vasileva Cheshma, 1400 m, (deciduous wood), 16.04.1995, exs. MCF 95/5632; BANSKO vill.

(above), *Cornus mas* (rotten wood), 01.05.2000, exs. MCF 00/9177; Bistra Mt.: r. Tresonechka Reka, near Tresonche vill., 1300 m, mixed forest (*Fagus*, *Corylus*, *Carpinus*, *Quercus*), *Carpinus betulus* (fallen branch), 06.10.2001, exs. MCF 01/1332; Bogdanci: Gjavato, *Populus alba*, 01.06.1984, exs. MCF 84/9207; Kuchalat (vicinity), 200-300 m, *Quercus cocciferae-Carpinetum orientalis*, *Pyrus amygdaliformis* (branch), 02.01.2003, exs. MCF 03/4748; Paljurci, 150-200 m, *Juglans-Platanetum orientalis*, *Platanus orientalis* (bark), 16.04.2009, exs. MCF 09/10563; Bolovan, 150 m, azonal vegetation, (branch of living deciduous tree), 25.10.2007, exs. MCF 07/8257; Dobra Voda Mt.: Jagol vill., 800 m, 21.12.2007, *Quercetum frainetto-cerris*, (fallen branch), exs. MCF 07/13224; *Quercus*, exs. MCF 13852 and *Crataegus*, exs. MCF 13853; Dojran: Vladaja, 197 m, *Quercus cocciferae-Carpinetum orientalis*, *Cornus*?, 18.02.2009, exs. MCF 09/13851; Liscic Mt.: *Fagus* forest, *Fagus* (rotten wood), 16.05.2007, exs. MCF 07/8545; Mariovo (Prilep): road to Vitolishte vill., 11.10.2005, exs. MCF 05/9205; Ograzhden Mt.: Dzami Tepe, 1250 m, 13.07.2000, mixed forest (*Fagus*, *Pinus sylvestris*, *P. nigra*), *Rosa* sp., exs. MCF 00/1547 and unknown substrate, exs. MCF 00/1524; Pelister Mt.: Malovishte vill., St. Ana Monastery, *Festuco heterophyllae-Fagetum*, *Fagus* (rotten wood), 07.04.2001, exs. MCF 01/2083; Slivnica vill., 1000 m, oak forest, *Quercus frainetto* (fallen branch), 20.06.2003, exs. MCF 03/9807; Shar Planina Mt.: Pechkovo vill. (above), 1100 m, oak forest, *Corylus avellana* (rotten wood), 13.07.1998, exs. MCF 98/1674; r. Chaushica, 1200 m, *Sambucus nigra* (fallen branches), 17.07.1996, exs. MCF 96/569; Vratnica vill., 750 m, 17.07.1997, *Castaneum sativae macedonicum*, *Castanea sativa* (rotting branches), exs. MCF 97/1656 and oak forest, *Loranthus europaeus*, exs. MCF 97/2987; Skopje (vicinity): Krushopek vill. (vicinity), 600-800 m, deciduous forest, *Carpinus* sp., 10.11.2009, exs. MCF 09/11732; Katlanovo, r. Pchinja, along the river, *Salicetum-albae fragilis*, (fallen branch of living tree), 25.05.1993, exs. MCF 93/1609; Strumica: Raborci vill., (fallen branch), 02.08.1996, exs. MCF 96/4703.

11. *Peniophora piceae* (Pers.) J. Erikss.

Ref.: Tortić 1988; Karadelev 1993, 1994, 1995b; Karadelev et al. 2002d, 2003; Bernicchia & Gorjón 2010.

Collections: MCF.

Galichica Mt.: Volko Legalo, 1600 m, *Abieti-Fagetum*, *Abies* (dry branch), 15.09.2006, MCF 06/7285; Jakupica Mt.: Babina Rupa, 1900-2000 m, *Abieti-Fagetum*, *Abies* (branches), 13.07.1999, exs. MCF 99/2376; Mavrovo NP: Adzhina Reka, *Abieti-Picetum scardicum*, *Abies* (dry branches of living tree), 19.06.2010, exs. MCF 10/11815 and 01.07.2010, exs. MCF 10/12413; Vrben vill. (above), 1350 m, *Fago-Abietetum meridionale*, *Abies*, dry branch of living tree, 13.05.2010, exs. MCF 10/11914; Pelister Mt.: around mountain house Kopanki, 1600 m, *Digitali viridiflorae-Pinetum peuces*, living *Abies* (dry branches), 02.05.2007, exs. MCF 07/6828.

12. *Peniophora pini* (Schleich.) Boidin

Ref.: Tortić & Karadelev 1986; Tortić 1988; Karadelev 1993, 1994; Karadelev et al. 2002b; Rusevska & Karadelev 2004; Bernicchia & Gorjón 2010.

Collections: MCF.

Ohrid: Samoil's Fortress (vicinity), *Pinus* plantings, *Pinus* sp., 01.05.2001, exs. MCF 01/3988; Pelister Mt.: r. Ro-

tinska Reka, 1500-1600 m, *Digitali viridiflorae-Pinetum peuces*, *Pinus peuce?* (fallen branches), 11.07.2001, MCF 01/413.

13. *Peniophora pithya* (Pers.) J. Erikss.

Ref.: Karadelev 1993, 1995b, 1999, 2000b, c; Karadelev et al. 2003; Bernicchia & Gorjón 2010.

Collections: MCF.

Skopska Crna Gora Mt.: Kuchevishte vill., St. Arhangel monastery, 700 m, (roof construction, old guest house), 10.06.2005.

14. **Peniophora polygonia* (Pers.) Bourdot & Galzin

Collections: MCF.

Galichica Mt.: Karov Kamen, 1600 m, *Fagus*, 26.07.1988, exs. MCF 88/9216, Katlanovo: Katlanovska Banja, *Buxus*, 29.05.1993; Shar Planina Mt.: Gorno Jelovce vill., 1350 m, *Calamintho grandiflorae-Fagetum*, *Fagus*, (rotten wood), 09.07.1998, exs. MCF 98/1710.

15. *Peniophora proxima* Bres.

Ref.: Pilát 1937; Pilát & Lindtner 1938; Tortić 1988.

Collections: MCF.

Demir Kapija: r. Drenska Reka, vill. Dren, 255 m, mixed forest (*Quercus coccifera*, *Buxus sempervirens*, *Phillyrea media*, *Platanus orientalis*), *Buxus* (fallen branches), 21.05.2005, exs. MCF 05/4914; Jasen: Kolomot, *Buxus* (fallen branch), 07.04.2012, exs. MCF 12/13822; Pchinja railway station: St. Bogorodica (vicinity), azonal vegetation (*Buxus*, *Phillyrea*, *Quercus*, *Carpinus*), *Buxus* (dry branch), 21.04.2012, exs. MCF 12/14031; Skopje (vicinity): Matka, near monastery St. Andrea, 250 m, azonal vegetation, *Buxus* (branch), 09.11.2003, exs. MCF 03/13529, MCF 03/13821; Matka, above mountain house, *Buxus* (fallen branch), 01.04.2000, exs. MCF 00/8741, MCF 00/8744; Matka, near the cave, azonal vegetation, *Buxus* (fallen branch), 04.02.2001, exs. MCF 01/13248; Matka, 250-300 m, *Quercus-Carpinetum orientalis*, 25.10.1998; Vodno, Sredno Vodno, 500 m, planted forest, *Buxus* (fallen branch), 24.05.2000, exs. MCF 06/6382.

16. **Peniophora pseudoversicolor* Boidin

Collections: MCF.

Galichica Mt.: Oteshevo, 900 m, *Quercus trojana* (branch), 19.01.1988, exs. MCF 88/9213; Pljuska, 1000 m, *Quercetum frainetto-cerris*, *Quercus frainetto* (rotten wood), 21.01.1988, exs. MCF 88/4798; Gevgelija: Toplik, *Quercus pubescens* (dry branch), 07.02.1988, exs. MCF 88/4711; Valandovo: Marvinci vill., *Quercus cocciferae-Carpinetum orientalis*, *Quercus coccifera* (fallen branch), 04.12.1989, exs. MCF 89/4731.

17. *Peniophora quercina* (Pers.) Cooke

Ref.: Tortić & Karadelev 1986; Tortić 1988; Karadelev 1989, 1993, 1994, 1998; Karadelev et al. 2002a, b, c, 2008; Karadelev & Rusevska 2004; Bernicchia & Gorjón 2010.

Collections: MCF.

Bistra Mt.: Mavrovo dam, 1100-1300 m, *Abieti-Fagetum*, *Fagus*, 24.10.2000, exs. MCF 02/3780; along r. Tresonechka Reka, 900-1100 m, azonal vegetation, *Quercus* sp., 06.03.1999; Bogdanci: Bolovan, 150 m, *Quercus pubescens*, 11.03.2001, notes M. Karadelev; Pogana, *Quercus* sp., 12.1995, exs. MCF 95/13825; Demir Hisar: Novo Selo vill., 783 m, *Quercetum frainetto-cerris*, *Quer-*

cus sp., (rotten wood), 15.10.2011; Dobra Voda Mt.: Jagol vill., Shumjak, *Quercetum frainetto-cerris*, 30.05.2012, exs. MCF 12/13838; Galichica Mt.: Leskoec vill. (above), 1185 m, oak forest (*Quercus cerris*, *Q. frainetto*, *Q. trojana*), *Quercus trojana* (fallen branch) 05.06.2008, exs. MCF 08/9833; Kale, 1100 m, mixed forest (*Juniperus excelsa* and *Quercus trojana*), *Quercus trojana*, 21.06.2003; Oteshevo, oak forest, *Quercus* sp., 10.2008, Ilinska Planina Mt.: Staro Selo, 1200 m, *Quercetum frainetto-cerris*, *Quercus cerris*, 22.07.2008; Jasen protected area: Crn Vrv, 923 m, *Pinus* and *Quercus* forest, *Quercus*, 15.10.2010; Kichevo (vicinity): Krushino, 550-600 m, oak forest, *Quercus* sp., (fallen branch) 05.11.2006; Kitka Mt.: Preslap, 1000 m, *Quercus cerris* (fallen branch), 24.06.1994, exs. MCF 94/4243; Kochani: dam Gratche, (above artificial lake Kochansko Ezero), r. Velika Reka, 500 m, *Quercus-Carpinetum orientalis*, *Quercus pubescens* (fallen branch), 22.04.2007; Kozhuf Mt.: footpath between rivers Oreovica and Doshnica, 1000 m, *Orno-Quercetum petraeae*, *Quercus petraea*, 11.07.1996; Mavrovo NP: Krakornica vill., 1442 m, oak forest, *Quercus petraea* (fallen branch), 19.06.2010, exs. MCF 10/11799; Ograzhden Mt.: Ezhovo Brdo, 1100-1300 m, mixed forest (*Fagus*, *Pinus sylvestris*, *P. nigra*), 12.07.2000; Osogovski Planini Mt.: Sasa vill. (vicinity), 685 m, oak forest, *Quercus frainetto* (fallen branch), 09.04.2008; between Probishtip and Kratovo, 880 m, oak forest, *Quercus frainetto* (fallen branches), 09.04.2008, exs. MCF 08/10465; Pelister Mt.: Kazhani vill., 1000 m, *Pinus nigra* plantings with *Quercus cerris* and *Q. frainetto*, living *Quercus cerris* (dry branch), 19.04.2002; Slivnica vill., 1000 m, oak forest, *Quercus* sp., (fallen branch) 20.06.2003, exs. MCF 03/9811; Prilep (vicinity): Pletvar, 1100 m, beech forest, *Fagus* (fallen branch), 08.04.2001, exs. MCF 01/9530; Shar Planina Mt.: Ljuboten mountain house (below), *Fagus* forest, (rotten wood), 18.09.2005, exs. MCF 05/9105; Smrdesh Mt.: Dedino vill., 600-700 m, oak forest, *Quercus* sp., (branch), 02.05.2010, exs. MCF 10/13143; Skopje (vicinity): Matka, near monastery St. Andrea, azonal vegetation, *Carpinus* (fallen branch), 16.04.2004, exs. MCF 04/13841; Vodno, Sredno Vodno, 500 m, unknown substrate, 24.05.2000; Strumica: Cham Chiflik, 300-350 m, *Quercus* sp., (fallen branch); the confluence of the rivers Pchinja and Vardar: Kozhle vill. (below), *Juniperus excelsa* forest, living tree of *Quercus frainetto* (branch), 09.05.2008 and *Quercus pubescens* (fallen branch), 19.10.2007; Valandovo: Kurtamzali vill., 450 m, oak forest, *Quercus pubescens*, 19.02.1995, exs. MCF 95/5640.

18. *Peniophora rufomarginata* (Pers.) Bourd. & Galz.

Ref.: Bernicchia & Gorjón 2010.

Collections: MCF

Skopje: park, living *Tilia argentea* (dry branches), 11.09.1999, exs. MCF 99/1987.

19. *Peniophora tamaricicola* Boidin & Malençon

Ref.: Karadelev 1999, 2000a, b.

Collections: MCF.

Kumanovo (vicinity): Klechevce vill., near r. Pchinja, 305 m, *Salicetum albae-fragilis*, *Tamarix tetrandra* (branch), 13.05.2011, exs. MCF 11/12885.

20. **Peniophora versicolor* (Bres.) Sacc. & P. Syd.

Collections: MCF.

Galichica Mt.: Gradishte autokamp, 750 m, *Rosmarinus officinalis* (dry branches), 11.10.1988, exs. MCF 88/4566; Jasen protected area: Nova Breznica vill. (above), 903 m, *Quercus-Carpinetum orientalis* with *Juniperus*, *Rosa* sp., 04.04.2012, exs. MCF 12/13845; Kichevo: Jagol vill., 850-900 m, oak forest, *Quercus* sp., (fallen branch), exs. MCF 07/6557.

21. **Peniophora versiformis* (Berk. & M.A. Curtis)

Bourdot & Galzin

= *Dendrophora versiformis* (Berk. & M.A. Curtis) Chamuris

Collections: MCF.

Belasica Mt.: BANSKO vill. (vicinity), G'rliva Cheshma, 300 m, *Periploco-Alnetum glutinosae*, *Alnus glutinosa* (rotting branches), 14.10.2001, exs. MCF 01/274; Dobra Voda Mt.: Jagol vill., 750-800 m, *Quercetum frainetto-cerris*, deciduous tree (branch), 20.10.2008, exs. MCF 02/13846; Shar Planina Mt.: Vratnica vill. 750 m, *Castaneum sativae*, *Castanea sativa* (rotten branches), 17.07.1997, exs. MCF 97/1657; Strumica: Monospitovsko Blato, 250 m, *Periploko graece-Alnetum glutinosae*, *Alnus glutinosa*, 30.03.1991, exs. MCF 91/675.

22. *Peniophora violaceolivida* (Sommerf.) Masee

Ref.: Bernicchia & Gorjón 2010.

Collections: MCF.

Galichica Mt.: Pljuska, 900 m, *Quercetum frainetto-cerris*, *Salix* sp., (dry branches), 18.06.1987, exs. MCF 87/1285; Gevgelija: Negoski Banji, 100 m, ash forest, *Fraxinus angustifolia*, (fallen branch), 27.10.2007, exs. MCF 07/8277; Bolovan, *Acer* sp., 05.06.1989.

Discussion and conclusion

Out of the total number of 36 species of the genus *Peniophora* known in Europe, with the investigations in the Republic of Macedonia, the following 22 species have been recorded: *Peniophora cinerea*, *P. erikssonii*, *P. incarnata*, *P. junipericola*, *P. laeta*, *P. lilacea*, *P. limitata*, *P. lycii*, *P. meridionalis*, *P. nuda*, *P. piceae*, *P. pini*, *P. pithya*, *P. proxima*, *P. quercina*, *P. rufomarginata*, *P. suecica* and *P. tamaricicola*. Following four species: *Peniophora polygonia*, *P. pseudoversicolor*, *P. versicolor* and *P. versiformis* have been recorded for the first time for mycobiota of Macedonia and their distribution is presented on the map (Fig. 1).

Peniophora cinerea is one of the most plurivorous species in the genus (Yurchenko 2010). It is very common and widespread species in Europe, that occurs mostly on deciduous wood of *Fagus sylvatica*, *Alnus viridis*, *Genista corsica*, *Corylus avellana*, *Quercus ilex*, *Q. robur*, *Q. pubescens*, *Prunus armeniaca*, *Populus alba* and few times on coniferous wood of *Pinus sylvestris* and *Cupressus sempervirens* (Bernicchia & Gorjón 2010). It has been found on fallen branches of deciduous trees, less often on dead, hanging branches or fallen logs, in deciduous forests (Eriksson et al. 1978). In Macedonia it was found mostly on deciduous wood, in more than 15 localities, from which 8 are new for the country (Golem Grad Island, vicinity of the town of Shtip and mountains Belasica, Bistra, Dobra Voda, Karadzica, Maleshevski Planini and Pelister).

Peniophora erikssonii is a north European species found on dead hanging branches of *Alnus* spp. (Eriksson et al. 1978), which represent the single host of this spe-

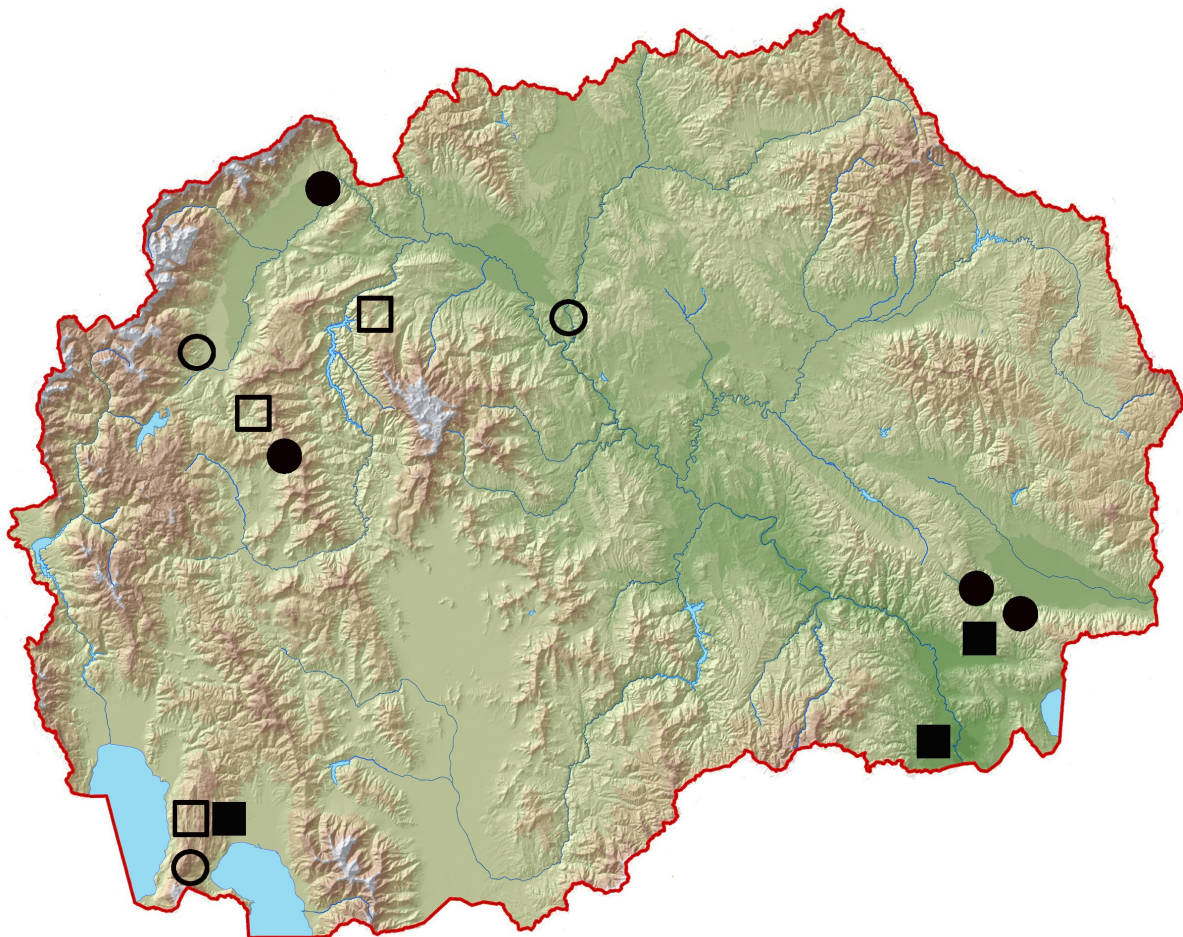


Figure 1. Distribution map of the new species of genus *Peniophora* in Macedonia
 ○ *P. polygonia* ■ *P. pseudoversicolor* □ *P. versicolor* ● *P. versiformis*

cies (Ginns & Lefebvre 1993 and Boidin 1994). In Macedonia it is known only from one locality of the southern part of the country (Kozhuf Mt.) on *Alnus glutinosa* (Karadelev 1993).

Peniophora incarnata is very common and widely distributed species all over Europe. In North Europe it was found on all sorts of wood, most frequently on deciduous trees, fallen or still attached branches, lying trunks and stumps, rarer on coniferous wood. Besides in forests it is very often seen in gardens and parks (Eriksson et al. 1978). In Belarus it is a ubiquitous species, occurring very often in various ecosystem types: natural forest and bush communities, ornamental and protective plantations, orchards (Yurchenko 2010). In Italy it occurs on deciduous wood of *Robinia pseudoacacia*, *Quercus petraea*, *Q. ilex*, *Rubus aculeatus*, *Corylus avellana*, *Fagus sylvatica*, *Cistus salvifolius*, *Fraxinus ornus*, *Hedera helix*, *Castanea sativa*, *Laburnum anagyroides*, *Carpinus betulus*, *Populus alba* etc. (Bernicchia & Gorjón 2010). In Macedonia grows on deciduous wood. It is found in more than 20 localities, nine of them are new (Mavrovo NP, Mariovo, vicinity of Kozjak, Kochani, Skopje and mountains Belasica, Bistra, Karadzica and Kitka).

Peniophora junipericola is usually easy to recognize by its growth almost always on juniper. According to Bernicchia & Gorjón 2010 it grows on *Juniperus communis*, *J. oxycedrus*, *J. macrocarpa* and *J. phoenicea* and is uncommon in Italy. In North Europe it is found on

dead, still attached branches or dead trunks of *Juniperus communis* (Eriksson et al. 1978). In Macedonia is known from six localities, three of them are new (Mavrovo NP, Pelister Mt. and Pchinja River). It has been registered on different *Juniperus* species (*Juniperus oxycedrus*, *J. excelsa*, *J. foetidissima* and *J. communis*). This species is included in the Preliminary Red List of macromycetes in the Republic of Macedonia (Karadelev 2000).

Peniophora laeta is easy to recognize by its growth habit – under detaching bark and hydroid to raduloid hymenophore and microscopically by the presence of hyphal pegs with a deviating type of hyphae. *Carpinus betulus* is the single host in North Europe and Belarus (Eriksson et al. 1978, Yurchenko 2010). In South Europe (Italy) it occurs on *Castanea sativa*, *Quercus cerris* and *Ostrya carpinifolia* (Bernicchia & Gorjón 2010). In Macedonia is known from two localities (Pilát & Lindtner 1938; Karadelev 1993, 1994) and Karadzica Mt. is a new one. It is recorded on *Ostrya carpinifolia*, *Carpinus betulus* and *Carpinus* sp.

Peniophora lilacea is characterized by the large ellipsoid basidiospores, the presence of sulfocystidia and the lack of encrusted cystidia. In Nordic countries it typically grows on *Ulmus carpinifolia* (Eriksson et al. 1978). In Belarus it was found only on *Ulmus minor* (Yurchenko 2010). It is in the category of endangered species in the Red list of threatened macrofungi of Poland (Wojewoda & Ławrynowicz 1992). In Macedonia it is found in three

Figure 2. *Peniophora polygonia*Figure 4. *Peniophora versicolor*Figure 3. *Peniophora pseudoversicolor*Figure 5. *Peniophora versiformis*

localities (Bogdanci, Skopje, Pchinja River), on different deciduous trees.

Peniophora limitata is characterized by its dark, brownish violaceous hymenophore with blackish abrupt margin. The species is included in the Red list of threatened macrofungi in Poland (Wojewoda & Ławrynowicz 1992). *Fraxinus excelsior* is mentioned as a single substrate for Belarus (Yurchenko 2010). In Italy it is very rare, recorded only on *Rosa* (Bernicchia & Gorjón 2010). It is a common species in continental Europe. In North Europe it was found on dead branches often of *Oleaceae* such as *Fraxinus*, *Syringa* and *Ligustrum* (Eriksson et al. 1978). Beside above mentioned substrate (except *Rosa*) in Macedonia it is also recorded on *Fagus*, *Acer obtusatum*, *A. campestre*, *A. monspessulanum*, *A. pseudoplatanus* and *Corylus avellana*. It was known only from Galichica Mountain (Karadelev 1993, 1994) and in this article 9 new localities are added (Mavrovo NP, vicinity of Bogdanci, Kumanovo, Skopje and mountains Belasica, Jakupica, Pelister, Shar Planina and Stogovo).

Peniophora lycii is easy to recognize by very wide, rounded encrusted cystidia and presence of dendrohyphidia. The species is reported as common secondary colonizer of attached oak branches in their terminal regions (Boddy 2001). It is a common species and widely distributed in all European countries (Bernicchia & Gorjón

2010) as well as in southern regions, especially Mediterranean zone (Crimea, Black Sea, Caucasus) and it has the widest host range among *Peniophora* species, along with *P. cinerea* (Yurchenko 2010). In Macedonia *P. lycii* is a very common species, growing on more than twenty different deciduous hosts.

Peniophora meridionalis is characterized by presence of three kinds of cystidia (gloeocystidia, lamprocystidia and dendrohyphidia). In Italy it is frequent in Central-Southern part, preferring macquis forests and it seems to have a southern distribution in Europe (Bernicchia & Gorjón 2010). According to the published data (Tortić & Karadelev 1986; Tortić 1988; Karadelev 1988, 1993, 1994) this species was known only from the southern part of Macedonia. With our studies localities from other parts of the country are provided: central (r. Babuna), northern (Katlanovo), eastern (Maleshevski Planini Mt.) and southern (Belasica Mt., Demir Kapija). It grows on different substrates mostly on deciduous trees.

Peniophora nuda is easy to recognize by presence of numerous, rounded sulfocystidia in the basal part of the fruitbody, reddish colour and marked marginal zone. It is found on a great variety of deciduous substrates, only once on a conifer *Juniperus communis* (Eriksson et al. 1978). It is very rare species in Italy, found on *Quercus* (Bernicchia & Gorjón 2010). It is a rare or sporadical

species in Belarus and northwest Russia, but unusual in southwest Russia, found only on living trunks of *Syringa* (Yurchenko 2010). In Macedonia is known from southern part of the country and from the surrounding area of Skopje (Pilát & Lindtner 1938; Tortić 1988; Karadelev 2000c, d; Rusevska & Karadelev 2004.). Within this study ten new localities from different part of Macedonia are added. According to these data it is the most common and widespread species, growing mostly on deciduous trees, rarely on conifers (*Carpinus betulus*, *Carpinus orientalis*, *Castanea sativa*, *Cornus mas*, *Corylus avellana*, *Crataegus* spp., *Euphorbia veneta*, *Fagus sylvatica*, *Fraxinus ornus*, *Juniperus excelsa*, *Laburnum anagyroides*, *Loranthus europaeus*, *Paliurus spina-christi*, *Platanus orientalis*, *Populus alba*, *Prunus laurocerasus*, *Pyrus amygdaliformis*, *Quercus* spp., *Robinia pseudoacacia*, *Rosa* sp., *Sambucus nigra*, *Syringa vulgaris* and *Tamarix parviflora*). *Peniophora piceae* differs from *P. pithya* with the lack of sylvocystidia and in the loosening of the fruitbodies in the margin. It grows on dead, mostly still attached branches or small fallen trunks of *Abies* ssp. (Eriksson et al. 1978). The species is included in the Red list of threatened macrofungi in Poland (Wojewoda & Ławrynowicz 1992). It is uncommon species in Italy, growing on branches of *Picea abies* and *Abies alba* (Bernicchia & Gorjón 2010). In our country it is always found on *Abies*. It is known from three localities (Tortić 1988, Karadelev 1993, 1994, 1995b; Karadelev & Rusevska 2000; Karadelev et al. 2002c, 2003). Jakupica Mountain is a new one.

Peniophora pini is widely distributed species in Europe. According to Davydkina (1980), it is boreal geographical element, distributed only in North Hemisphere, with panboreal type of range. Evidently, *P. pini* is common over the all Belarus, in woodlands dominated by *Pinus sylvestris* (Yurchenko 2010). It also follows pine in North Europe (Eriksson et al. 1978). In Switzerland it is known from *Pinus sylvestris* and *P. mugo* (Breitenbach and Kränzlin 1986). In Italy it is recorded very few times, generally found on dry branches of living *Pinus* spp. (Bernicchia & Gorjón 2010). In Macedonia it also grows on pine and is known from five localities, two of them are new (Ohrid and Pelister Mt.).

Peniophora pithya is characterized by its pinkish grey to violaceous grey basidiomata, with abrupt margin. It is part of the Red list of threatened macrofungi of Poland (Wojewoda & Ławrynowicz 1992). It grows on conifers, mainly on *Picea abies* and *Pinus sylvestris* (Bernicchia & Gorjón 2010), but also on *Abies alba*, *Juniperus communis*, *Larix*, *Taxus* (Yurchenko 2010). *Salix* is only one confirmed deciduous host tree (Eriksson 1950). In Macedonia is published from Pelister Mt. on *Abies* (Karadelev 1993, 1995b, 1999, 2000b, c; Karadelev et al. 2003). New data are from Skopska Crna Gora Mt. on the roof construction in old guest house of St. Arhangel monastery.

Peniophora polygonia (Fig. 2) is easily recognized by the presence of dendrohyphidia and the lack of encrusted cystidia. In North Europe it follows distribution of *Populus tremula* (Eriksson et al. 1978). The same host is reported for Belarus and adjacent countries Yurchenko (2010), as well as for Switzerland (Breitenbach and Kränzlin 1986). In Italy it grows on *Populus alba* and *Fagus sylvatica* (Bernicchia & Gorjón 2010). This is a new species for the mycobiota of Macedonia, with three records, mountains Galichica and Shar Planina, on *Fagus* and Katlanovo on *Buxus*.

Peniophora proxima is well distinguished by the numerous encrusted cystidia and gloeocystidia. It is known only from *Buxus* (Bernicchia & Gorjón 2010), which makes it easy for determination. In our country is also always found on this host. It is known from few localities, following are new: Demir Kapija, Jasen, Pchinja rail way station, Vodno and Matka.

Peniophora pseudoversicolor (Fig. 3) is a rare species with presence in few European countries, growing on *Quercus ilex* (Bernicchia & Gorjón 2010), as well as on *Betula pendula*, *Quercus robur* and *Rubus idaeus* (Yurchenko 2010). This is a new species for the mycobiota of Macedonia. The data came from three localities (Galichica Mt., Gevgelija and Valandovo) on different oak species (*Quercus trojana*, *Q. frainetto*, *Q. pubescens* and *Q. coccifera*).

Peniophora quercina macroscopically is very similar with *P. rufomarginata* from which it differs by the smaller spores and the more pigmented hyphal texture. Boddy & Rayner (1983) working on British material classified this species as a pioneer fungus capable of colonizing living or recently dead wood. In Belarus and in South Scandinavia the fungus population are associated with all areas where *Quercus robur* growth in enough number to its northern limit and there is only one record on *Corylus avellana* (Yurchenko 2010). It is common and widespread species in all European countries and it mainly occurs on *Quercus* spp., but also on *Castanea sativa*, *Ilex aquifolium*, *Pistacia lentiscus*, *Arbutus unedo*, *Populus alba* (Bernicchia & Gorjón 2010). In South Scandinavia it has been registered on hanging or fallen dead branches of *Quercus* and *Fagus* rarely on other substrates (*Betula*, *Carpinus*, *Fraxinus*); it causes an intense white decay and is a potent decomposer of branch wood in the *Quercus* and *Fagus* forests of South Scandinavia (Eriksson et al. 1978). In Macedonia it is found in many localities, mostly on *Quercus*, but also on some other deciduous trees (*Acer obtusatum*, *Carpinus betulus*, *C. orientalis*, *Cionura erecta*, *Cornus mas*, *Corylus avellana*, *Fagus*, *Fraxinus ornus*, *Ostrya carpinifolia*).

Peniophora rufomarginata macroscopically is very similar with *P. quercina*, but differs by the host (*Tilia* sp.). It is rare species in Belarus and it was collected only from *Tilia cordatata* (Yurchenko 2010). In Italy it is uncommon species, recorded only from three localities and it mainly occurs on *Quercus cerris*, *Q. ilex* and *Arbutus unedo* (Bernicchia & Gorjón 2010). In North Europe it was found on branches of *Tilia* spp. (Eriksson et al. 1978). This species is known only from one locality (City Park, Skopje), recorded on dry branches of living *Tilia argentea*.

Peniophora tamaricicola is rare species known from few European countries, always growing on *Tamarix* (Bernicchia & Gorjón 2010). This species is included in the Preliminary Red List of macromycetes in Macedonia (Karadelev 2000). It is known from three localities, from which one is new (Kumanovo). It has been registered on different *Tamarix* species (*T. ramosissima*, *T. parviflora* and *T. tetrandra*).

Peniophora versicolor (Fig. 4) is similar with *P. incarnata*, from which can be distinguished by the colour of the hymenophore, the smaller, numerous encrusted cystidia and the absence of gloeocystidia. It is known from few European countries, on many different deciduous trees (Bernicchia & Gorjón 2010, Yurchenko 2010). In Italy is known only from machia forests, where locally, it can be considered a frequent species (Bernicchia & Gor-

jón 2010). It is a new species for Macedonia and it has been found on *Rosmarinus officinalis*, *Rosa* sp. and *Quercus* sp., on three localities (Galichica Mt, Jasen protected area, and Kichevo).

Peniophora versiformis (Fig. 5) has basidiome with pale yellow brown margin and is associated with a white rot. It is also the type species of the genus *Dendrophora* (Parmasto) Chamuris 1987. It is mentioned like very rare in Italy, growing on *Quercus ilex* (Bernicchia & Gorjón 2010). According to Jülich (1984) it is known from three European countries (Spain, France and Hungary). It is a new record for Macedonia, known only from four localities: Belasica Mt. (*Alnus glutinosa*), Dobra Voda Mt. (deciduous tree), Shar Planina Mt. (*Castanea sativa*) and Strumica (*Alnus glutinosa*).

Peniophora violaceolivida is known from many countries in Europe. In Belarus this fungus displays a preference to the Salicaceae (Yurchenko 2010). It grows on dead attached or fallen branches and smaller trunks of deciduous trees, preferably of *Salix* and *Populus* (Eriksson et al. 1978). According to Bernicchia & Gorjón (2010) it is also known from *Quercus ilex*, *Quercus* sp. and *Thymelaea tartonairae*. Macedonian data for this species are from two localities (Galichica Mt. and Gevgelija), on three hosts (*Acer* sp., *Salix* sp. and *Fraxinus angustifolia*).

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