

Roselliniella lecideae sp. nov. and other interesting lichenicolous fungi from the Northern Black Sea region (Ukraine)

Valeriy V. DARMOSTUK^{1,2,*}, Alexander Ye. KHODOSOVTSSEV¹, Ganna O. NAUMOVICH^{1,2}, Nadiia V. KHARECHKO¹

¹Kherson State University, Kherson, Ukraine

²Nizhnedneprovskiy National Nature Park, Kherson, Ukraine

Received: 04.09.2017 • Accepted/Published Online: 30.12.2017 • Final Version: 03.05.2018

Abstract: The lichenicolous fungus *Roselliniella lecideae* sp. nov. on *Lecidea fuscoatra* is described from Ukraine. It is characterized by globose ostiolate perithecia, 2–3 septate hyaline periphyses, unitunicate 8-spored asci, and unicellular ellipsoid brown ascospores. This species, close to *Roselliniella microthelia*, has shorter periphyses, smaller asci, and ascospores, and its hosts. *Brackelia lunkei*, *Henfellra muriformis*, *Lichenocodium aeruginosum*, *Lichenohendersonia squamarinae*, *Lichenostigma dimelaenae*, *Sphaerellothecium atryneae*, *Stigmidium epistigmellum*, *S. stygnospilum*, *Pronectria xanthoriae*, *Refractohilum achromaticum*, and *Zwackhiomyces lithoicae* are reported for the first time from Ukraine. Two species are new for the plains of Ukraine, three are new to the steppe zone of Ukraine, and one species is new to Crimea. A key to the known *Roselliniella* species is provided.

Key words: *Brackelia*, *Henfellra*, *Lichenohendersonia*, *Refractohilum*, *Stigmidium*

1. Introduction

With this article, we continue the series of papers on lichenicolous fungi from Ukraine (Braun et al., 2016; Khodosovtsev et al., 2012, 2016; Khodosovtsev and Darmostuk, 2016a, 2016b, 2017), and now we have focused on the studied material collected in the lowlands of the Northern Black Sea region. We hereby present a description of the new species *Roselliniella lecideae* found on the thalli of *Lecidea fuscoatra*, and we report the discovery of twenty other interesting lichenicolous species, amongst which eleven are new for Ukraine, including the recently described *Brackelia lunkei* and *Henfellra muriformis* (Hawksworth et al., 2016; Zhurbenko and Pino-Bodas, 2017).

2. Materials and methods

The specimens were examined by standard microscope techniques using LOMO microscopes MBS-1 and MICROMED-2. Microscopical examination was done in water, 10% KOH (K), and Lugol's iodine, directly (I) or after a KOH pretreatment (K/I) or Brilliant Cresyl Blue (BCr). The measurements were made in water with an accuracy of 0.2 µm for ascospores, asci, conidia, conidiogenous cells, conidiophores, and ascomatal and pycnidial wall cells, and 5 µm for ascomata and pycnidia. The measurements are given as (min-)x-SD - x+SD(-max), where x is the average

and SD is the standard deviation. The photographs were taken with a Levenhuk C510 NG camera. All the examined specimens are deposited in the lichenological herbarium of Kherson State University (KHER).

3. Results and discussion

Arthonia molendoi (Heufl. ex Frauenf.) R. Sant.

Specimen examined. Ukraine. Zaporizhzhia region, Chernihiv district, near river Yushanly, 47°03'14.01"N, 35°51'55"E, alt. 61 m, on *Xanthocarpia crenulatella* (apothecia), on granite outcrops, 8 August 2010, A. Khodosovtsev & T. Zavyalova (KHER 6298).

In Ukraine, this species was known from the Crimean Peninsula (Darmostuk and Khodosovtsev, 2017). *Intralichen baccisporus* D. Hawksw. & M.S. Cole was found in the apothecia of *Arthonia molendoi*. New to the steppe zone of Ukraine.

Brackelia lunkei Zhurb.

Specimen examined. Ukraine. Kherson region, Velykooleksandrivskiy district, near village Bilohorka, right bank of river Ingulets, 47°12'21.41"N, 33°08'03.81"E, alt. 41 m, on *Cladonia rangiformis* (podetia), on soil, 2 May 2017, G. Naumovych (KHER 10695).

This species was recently described from the United States and Russia (Zhurbenko and Pino-Bodas, 2017). Our specimen fits well the concept of *Brackelia lunkei* and

* Correspondence: valeriy_d@i.ua

is characterized by a dark brown apothecia (40–)55–85(–90) μm ($n = 20$), a brownish orange hymenium, 8-spored asci, and 0(–1)-septate hyaline ellipsoid ascospores (5.5–)6.0–8.0(–9.5) \times (1.8–)2.0–2.5(–3.0) μm ($n = 35$), and it was associated with the blackened parts on the podetia of *Cladonia rangiformis*. However, the type material of *B. lunkei* was found in the apothecia of *C. amaurocraea*. *C. rangiformis* is a new host species. The genus is new to Ukraine and Europe.

Clypeococcum cladonema (Wedd.) D. Hawksw.

Specimens examined. Ukraine. Kherson region, Golopristskiy district, Black Sea Biosphere Reserve, Solonoozerny, 46°27'31.80"N, 31°58'23.13"E, alt. 3 m, on *Xanthoparmelia pokorny* (thallus), on sand, 5 May 2017, A. Khodosovtsev & V. Darmostuk (KHER 10696); Mykolaiv region, Ochakivskiy district, near Vasylivka village, 46°29'46.10"N, 31°50'44.13"E, alt. 2 m, on *Xanthoparmelia pokorny* (thallus), on sand, 6 May 2017, A. Khodosovtsev & V. Darmostuk (KHER 10697).

In Ukraine previously known only from the Kyiv region (exact location unknown) (Darmostuk and Khodosovtsev, 2017). New to the steppe zone of Ukraine.

Cornutispora lichenicola D. Hawksw. & B. Sutton

Specimen examined. Ukraine. Kherson region, Velykooleksandrivskiy district, near Mala Oleksandrivka village, Popova balka, 47°17'31.82"N, 33°14'20.38"E, alt. 25 m, on *Flavoparmelia caperata* (thallus), on *Acer*, 30 April 2017, V. Darmostuk (KHER 10653).

In Ukraine previously known only from the Carpathian Mts. (Darmostuk and Khodosovtsev, 2017). New for the plains of Ukraine.

Dactylospora parasitica (Flörke) Arnold

Specimen examined. Ukraine. Autonomous Republic of Crimea, Nikita Botanical Garden, 44°30'37.05"N, 34°13'55.12"E, alt. 121 m, on *Lepra albescens* (thallus), on *Quercus pubescens*, 1 February 2005, A. Khodosovtsev & Yu. Khodosovtseva (KHER 1298).

In Ukraine the species was known from the Carpathian Mts. (Kondratyuk et al., 2003) and here is reported as new for the Crimean Peninsula.

Endococcus macrosporus (Hepp ex Arnold) Nyl.

Specimen examined. Ukraine. Mykolaiv region, Voznesenskiy district, near village Trykraty, Buzky Gard National Nature Park, Aktovskiy Canyon, 47°42'24.9"N, 31°25'56.9"E, alt. 42 m, on *Rhizocarpon geographicum* (thallus), on granite outcrops, 30 April 2017, A. Khodosovtsev (KHER 10704).

In Ukraine, this species was known from the Crimea Peninsula (Darmostuk and Khodosovtsev, 2017). New for the plains of Ukraine.

Henfellra muriformis Halıcı, D. Hawksw., Z. Kocak. & M. Kocak.

Specimens examined. Ukraine. Kherson, Arctychna Street, 46°38'48.89"N, 32°35'22.53"E, alt. 44 m, on

Myriolecis hagenii (apothecia), on *Populus tremula*, 31 October 2015, V. Volobueva (KHER 10652); Strytenska Street, 46°39'00.54"N, 32°35'34.47"E, alt. 46 m, on *M. hagenii* (apothecia), on *P. tremula*, 11 April 2017, V. Darmostuk (KHER 10651).

This species was recently described from Turkey (Hawksworth et al., 2016) on apothecia of *Candelariella antennaria*. Our specimens have erumpent globose pycnidia (95–)110–140(–155) μm , elongate enteroblastic conidiogenous cells (8.2–)10.5–12(–12.5) \times (2.2–)2.8–3(–3.8) μm , and ellipsoid hyaline muriform conidia (15.7–)17.5–19.0(–21.5) \times (6.0–)6.5–8.0(–8.2) μm . Our specimens fit well the protologue of *Henfellra muriformis*, differing only by host species. *Myriolecis hagenii* is a new host. This is the second locality worldwide of the species.

Lichenocodium aeruginosum Diederich, M. Brand, van den Boom & Lawrey

Specimen examined. Ukraine. Zaporizhzhia region, Melitopol district, Terpinna village, Geological Reserve "Kamiana mogyla", 46°57'02.11"N, 35°28'11.37"E, alt. 26 m, on *Cladonia* sp. (squamules), on sandstone, 27 April 2017, V. Darmostuk (KHER 10699).

The material examined is characterized by black superficial pycnidia with a bluish gray pycnidial wall in the upper part, becoming aeruginose in KOH, subcylindrical phialidic conidiogenous cells (8.0–)9.2–10.2(–11.8) \times (3.0–)4.2–5.6(–6.8) μm ($n = 25$), pale brown ellipsoid to obpyriform verruculose conidia, and forming brownish patch with darker brownish rim in the host thallus. In the specimen studied, the conidia were markedly bigger than given in the protologue: (4.6–)5.2–6.2(–6.8) \times (3.5–)3.8–4.8(–5.8) μm ($n = 50$) vs. (3.4–)3.8–4.6(–5.4) \times (3.0–)3.4–3.8(–4.3) μm (Lawrey et al., 2011). The species was reported from France, Luxembourg, the Netherlands, Spain, and Turkey (Lawrey et al., 2011; Kocakaya et al., 2016; Zhurbenko and Pino-Bodas, 2017). New to Ukraine.

Lichenohendersonia squamarinae Calat. & Etayo

Specimen examined. Ukraine. Kherson region, Bilozerskiy district, near village Shyroka Balka, 46°34'54.04"N, 32°10'42.91"E, alt. 18 m, on *Squamarina lentigera* (thallus), on loess outcrops, 1 April 2017, V. Darmostuk (KHER 10657).

Until now the species was known only from the type locality in Spain (Calatayud and Etayo, 2001). The Ukrainian specimen fits well the protologue of *Lichenohendersonia squamarinae*: it has globose conidiomata 90–110 μm diam., hyaline ampulliform conidiogenous cells, and pale brown ellipsoid 3-septate, rarely 1- or 2-septate conidia (10.8–)11.2–14.2(–16.2) \times (4.8–)5.0–5.5(–6.7) μm ($n = 20$). New to Ukraine.

Lichenostigma dimelaenae Calat. & Hafellner

Specimen examined. Ukraine. Mykolayiv region, Voznesenskiy district, near village Aktove, Buzky Gard National Nature Park Aktovskiy Canyon, 47°42'24.9"N,

31°25'56.9"E, alt. 42 m, on *Dimelaena oreina* (thallus), on granite outcrops, 27 May 2017, A. Khodosovtsev & V. Darmostuk (KHER 10701).

The species is characterized by dense groups of ascomata not connected to the superficial hyphal strands, 8-spored asci and 1-septate brown ascospores (12.7–)13.2–14.2(–15.8) × (7.0–)7.8–8.5(–9.2) μm (n = 20). This lichenicolous fungus has been reported from Turkey (Halıcı et al., 2010) and the United States (Calatayud et al., 2004). New to Ukraine.

Pronectria xanthoriae Lowen & Diederich

Specimen examined. Ukraine. Mykolaiv region, Ochakivskiy district, Pokrovka village, 46°30'09.20"N, 31°44'15.13"E, alt. 5 m, on *Xanthoria parietina* (apothecia), on *Populus tremula*, 6 May 2017, A. Khodosovtsev & V. Darmostuk (KHER 10698).

It is a widespread species in Europe (e.g., Roux, 2012; Motiejūnaitė et al., 2016), and Asia: Turkey (Halıcı et al., 2009). New to Ukraine.

Refractohilum achromaticum (B. Sutton) D. Hawksw.

Specimen examined. Ukraine. Kherson region, Oleshkivskiy district, near village Burkut, 46°23'38.6"N, 32°48'35.7"E, alt. 13 m, on crustose lichen with *Trentepohlia*, on *Quercus robur*, 18 November 2016, A. Khodosovtsev & V. Darmostuk (KHER 10656).

The specimen is characterized by erect hyaline conidiophores (29.5–)35.5–42.2(–47.0) × (4.0–)4.2–4.8(–5.2) μm (n = 25) and mostly 2–3-septate conidia (10.2–)13.2–16.0(–17.3) × (3.5–)4.2–4.8(–5.5) μm (n = 25). *Refractohilum intermedium* Cl. Roux & Etayo, which was also reported from Ukraine (Khodosovtsev and Darmostuk, 2017a), differs by narrower conidiogenous cells and the frequency of 3–4(–5)-septate conidia. Previously, this lichenicolous species was reported from a few localities in Austria (Hafellner, 2003), the British Isles (Hitch, 2007), and Canada (Sutton, 1973; Hawksworth, 1977; Roux et al., 1997). New to Ukraine.

Roselliniella lecideae Darmostuk, Khodos. & Naumovich sp. nov.

Figure 1A–1K

Mycobank MB 823881

Type. Ukraine. Dnipropetrovsk region, Kryvyi Rig, right bank of river Demurina, 47°56'22.4"N, 33°24'02.5"E, alt. 44 m, on thallus of *Lecidea fuscoatra*, on granite outcrops, 17 October 2007, A. Khodosovtsev, G. Naumovich (Holotype – KHER 10706; Isotype – KHER 10707).

Diagnosis. Morphologically similar to *Roselliniella microthelia*, but differing in shorter periphyses (14.0–)16.3–19.8(–21.8) × (1.3–)2.3–2.5(–3.0) μm, smaller asci (45–)55–75(–85) × (10–)12–13(–14) μm, and ascospores (10.5–)11.8–12.5(–13.5) × (5.0–)6.8–8.3(–9.0) μm, and in the different host (*Lecidea* vs. *Trapelia*).

Description. Vegetative hyphae immersed in the host thallus, abundant, branched, smooth-walled, medium brown, septate, single cells (6.0–)7.3–9.8(–11.8) × (2.0–)2.8–4.8(–6.5) μm (n = 25). Ascomata perithecia globose to subglobose, ostiolate, black, without distinct subiculum, 150–200 μm wide and 200–250 μm high, completely immersed at first to semiimmersed at maturity, scattered or in groups of 4–6 perithecia on the host areoles. Perithecial wall composed of 6–8 layers of cells, (25–)30–35(–40) μm (n = 25) thick, outer part medium brown to dark brown consisting of 2–3 layers of isodiametric cells (5.0–)6.8–7.5(–9.0) μm (n = 25), inner part hyaline and consisting of 4–5 layers of elongate cells (6.0–)7.3–9.8(–11.8) × (2.0–)2.8–4.8(–6.5) μm (n = 25) μm, brown pigment K–. Paraphyses septate and branched, with numerous oil droplets, not thickened at the apex, (2.8–)3.3–3.8(–4.0) μm (n = 25) wide, up to 80 μm long. Periphyses present, hyaline, 2–3-septate, not branched, (14.0–)16.3–19.8(–21.8) × (1.3–)2.3–2.5(–3.0) μm (n = 25). Asci unitunicate, cylindrical to slightly clavate, 8-spored, thin-walled, with a long foot, without a visible apical structure, (45–)55–75(–85) × (10–)12–13(–14) μm (n = 25), I–, K/I–. Ascospores uniseriate, unicellular, ovate to narrowly ellipsoid, smooth-walled, at first colorless, then medium brown and K+ olive, usually with numerous small guttules, without visible halo, (10.5–)11.8–12.5(–13.5) × (5.0–)6.8–8.3(–9.0) μm, l/b ratio (1.3–)1.7–2.2(–2.7) (n = 50). Conidiomata not observed.

Ecology and distribution. The new species is known only from the type locality, where it grows on the thalli of *Lecidea fuscoatra* on siliceous outcrops. The infection does not induce gall formation, but causes a discoloration of the host thallus.

Discussion. The genus *Roselliniella* comprises 18 species of lichenicolous fungi from different genera of lichenized fungi (Lawrey and Diederich, 2017). Previously, only *Roselliniella cladoniae* (Anzi) Matzer & Hafellner was reported from Ukraine (Darmostuk and Khodosovtsev, 2017). Almost all species of the genus *Roselliniella* seem to be specialized on a single host genus (Aptroot et al., 1997; Lawrey and Diederich 2017). The new species fits well the concept of the genus *Roselliniella*, since it has subglobose ascomata without a distinct subiculum, branched interascal filaments, 8-spored unitunicate asci without distinct apical structures, and brown, simple, and smooth-walled ascospores (Matzer and Hafellner, 1990; Hafellner, 2004). *Roselliniella lecideae* is separated from other species by a combination of smaller ascomata and ascospores, and by a different lichen host. Few species of the genus have similarly small ascospores. *R. microthelia* differs from the new species by longer asci (100–110 vs. 45–85 μm width in *R. lecideae*) and periphyses (up to 30 μm long vs. 15–21 μm in *R. lecideae*), and hosts of the genus *Trapelia* (Hoffman

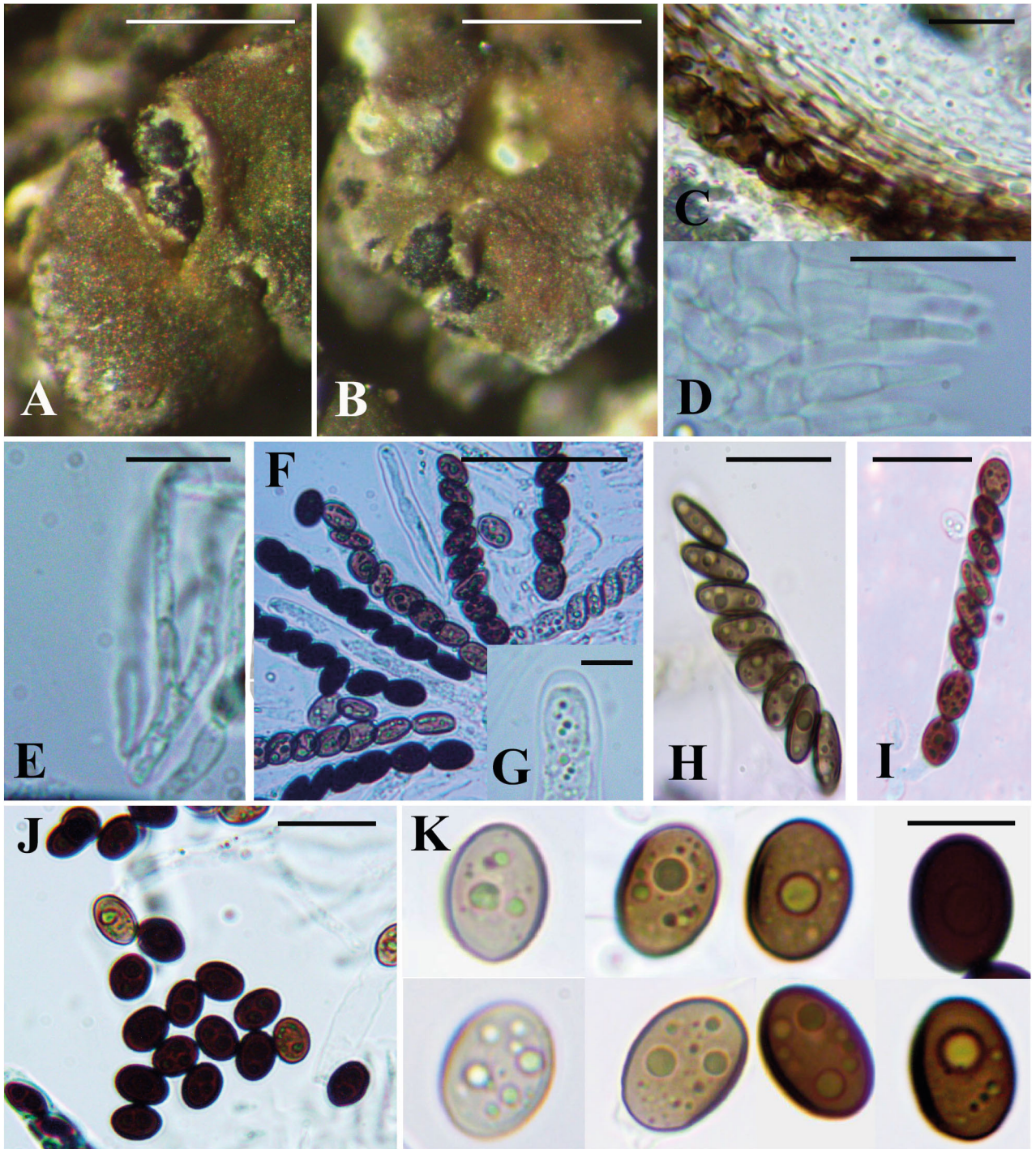


Figure 1. *Roselliniella lecideae* (holotype): A, B- ascomata in areoles of *Lecidea fuscoatra*; C- cross-section of the ascumatal wall (in water); D- periphyses (in water); E- paraphyses (in water); F- asci (in water); G- ascus apex (in K/I); H- ascus (in K/I); I- ascus (in water); J, K- ascospores (in water). Scale bars: A, B- 0.5 mm; C, D- 20 μ m; E, G- 10 μ m; F- 50 μ m; H, I, J- 25 μ m; K- 10 μ m.

and Hafellner, 2000). Morphologically, *R. lecideae* is similar to *R. stictae*, which differs in 4-spored asci (vs. 8-spored in *R. lecideae*) and growth on *Sticta weigelia* (Etayo, 2002). *R. epiphylla* is distinguished from the new

species by the ascospores constricted in the middle part and growth on foliicolous *Sporopodium* species (Matzer and Hafellner, 1990). *R. coccocarpiae*, growing on *Degelia* species, differs from the new species in bigger ascomata

(200–400 µm diam. vs. 200–250 µm in *R. lecideae*), longer asci (80–105 µm in length vs. 45–80 µm in *R. lecideae*), and wider ascospores (9–11 µm wide vs. 5–9 µm in *R. lecideae*) (Matzer and Hafellner, 1990). *R. oxyspora* also has similar asci and ascospores, but forms bigger ascomata (200–450 µm diam. vs. 200–250 µm in *R. lecideae*), ellipsoid ascospores with pointed apices, and grows on foliicolous *Coccocarpia* species (Matzer and Hafellner, 1990).

Key to the known *Roselliniella* species

- 1 Mature ascospores 8–16 µm in length 2
 – Mature ascospores 16–50 µm in length 8
 2(1) Asci 4-spored, on *Sticta* (Etayo, 2002)
 *R. stictae* Etayo
 – Asci 8-spored 3
 3(2) Ascospores constricted in the middle part, on
Sporopodium (Matzer and Hafellner, 1990)
 *R. epiphylla* Matzer & Hafellner
 – Ascospores not constricted in the middle part 4
 4(3) Ascospores roundish to widely ellipsoid, 9–15 ×
 8–12, on *Erioderma* (Matzer and Hafellner, 1990)
 *R. eriodermicola* Matzer & R. Sant.
 – Ascospores ellipsoid, not roundish, 10–16 × 5–9 µm
 5
 5(4) Perithecia 150–200 µm wide, on foliaceous
Coccocarpia 6
 – Perithecia 200–400 µm wide, on saxicolous lichens ...
 7
 6(5) Asci 55–80 in length, ascospores 5–7 µm in width
 with pointed apices (Matzer and Hafellner, 1990)
 *R. oxyspora* Matzer & R. Sant.
 – Asci 80–105 µm in length, ascospores 6–11 µm in
 width with rounded apices (Matzer and Hafellner, 1990)
 *R. coccocarpiae* (Pat.) Matzer & R. Sant.
 7(5) Asci 45–85 µm in length, ascospores 10.5–13.5
 × 5–9 µm, periphyses up to 20 µm in length, up to 3 µm
 thick, on *Lecidea* (present paper) *R. lecideae*
 – Asci 100–110 µm in length, ascospores (10–)10.8–
 15.9(–20) × (7–)7.7–9.3(–12) µm, periphyses up to 30 µm
 in length, on *Trapelia* (Hoffman and Hafellner, 2000; Coste
 and Montavont, 2007; Kocourková, 2007)
 *R. microthelia* (Wallr.) Nik. Hoffm. & Hafellner
 8(1) Perithecia with conspicuous dark vegetative
 hyphae 9
 – Perithecia without vegetative hyphae 10
 9(8) Asci 8-spored, on *Cladonia* (Zhurbenko and Pino-
 Bodas, 2017) *R. cladoniae* (Anzi) Matzer & Hafellner
 – Asci 4-spored, on *Stereocaulon* (Zhurbenko et al.,
 2009) *R. stereocaulorum* Zhurb., Kukwa & Oset
 10(8) Ascospores halonate 11
 – Ascospores without a distinct halo 15
 11(10) Ascospores 40–53 × 14–20 µm, on *Usnea*
 (Aptroot et al., 1997) *R. africana* Diederich

- Ascospores less 40 µm in length and 15 µm in width ..
 12
 12(11) Ascospores 6–9 µm in width, on *Lobaria* (Etayo,
 2002) *R. ramirezii* Etayo
 – Ascospores more 9–15 µm in width, not on *Lobaria*
 13
 13(12) Asci 50–95 µm in length, on *Parmelia*
 (Hawksworth et al., 2010)
 *R. euparmeliicola* Millanes & D. Hawksw.
 – Asci 100–150 µm in length, not on *Parmelia* 14
 14(13) Perithecia 150–350 µm in width, ascospores 20–
 26 × 9–13 µm, on *Xanthoparmelia* (Matzer and Hafellner,
 1990) *R. atlantica* Matzer & Hafellner
 – Perithecia 300–500 µm in width, ascospores 21–30 ×
 10.5–15 µm, on *Usnea* (Aptroot et al., 1997)
 *R. papuana* Diederich
 15(10) Perithecia 400–700 µm in width, on *Nephroma*
 (Matzer and Hafellner, 1990)
 *R. nephromatis* (Crouan) Matzer & Hafellner
 – Perithecia 150–400 µm in width, not on *Nephroma*
 16
 16(15) Ascospores with pointed apices, on *Cladia*
 (Matzer and Hafellner, 1990)
 *R. heterodeae* Matzer & Hafellner
 – Ascospores with rounded apices, not on *Cladia* 17
 17(16) Ascospores 20–25 × 10–15 µm, on
Protoparmeliopsis (van den Boom, 2015)
 *R. muralis* van den Boom
 – Ascospores 14–23 × 6–10 µm, on *Pannaria* (Matzer
 and Hafellner, 1990) *R. pannariae* Matzer & Hafellner
Rosellinula frustulosa (Vouaux) R. Sant.

Specimen examined. Ukraine. Mykolaiv region, Voznesenskiy district, village Trykraty, Buzky Gard National Nature Park, Arbutynskiy canyon, 47°42'24.9"N, 31°25'56.9"E, alt. 25 m, on *Lecanora argopholis* (thallus and apothecia), on granite outcrops, 27 May 2017, A. Khodosovtsev & V. Darmostuk (KHER 10705).

This lichenicolous fungus was described on *Lecanora frustulosa* (thallus) from Simferopol, Crimea (Hafellner, 1985). New to the plains of Ukraine.

Sphaerellothecium cf. atryneae (Arnold) Roux & Triebel

Specimen examined. Ukraine. Mykolaiv region, Voznesenskiy district, village Trykraty, Buzky Gard National Nature Park, Arbutynskiy canyon, 47°42'24.9"N, 31°25'56.9"E, alt. 25 m, on *Lecanora polytropha* s. lat. (apothecia), on granite outcrops, 27 May 2017, A. Khodosovtsev & V. Darmostuk (KHER 10703).

Our specimen is characterized by brown superficial vegetative mycelium, semiimmersed globose ascomata (46–)55–70(–90) µm (n = 10), asci clavate 8-spored (18.8–)22.4–23.6(–24.8) × (12.2–)13.6–14.4(15.0) µm (n = 10), wall BC⁺, ascospore 1-septate, ellipsoid, hyaline, strongly

constricted at the septum, (9.4–)11.0–12.6(–14.4) × (4.2–)4.6–5.0(5.4) μm (n = 25). The type specimen of *S. atryneae* has longer asci BC⁺ (violet), not constricted at the septum ascospore, and other host species (*L. cenisia* and *L. swartzii*) (Roux and Triebel, 1994). This species was reported from Europe (e.g., Roux and Triebel, 1994; Etayo, 2010; Roux, 2012; Schiefelbein et al., 2017), Asia (Joshi et al., 2016), and North America (Hafellner et al., 2002). New to Ukraine.

Stigmatidium epistigmellum (Nyl. ex Vouaux) Kocourk. & K. Knudsen

Specimen examined. Ukraine. Autonomous Republic of Crimea, Karadag Mountains, 44°56'16.14"N, 35°14'02.51"E, alt. 300 m, on *Caloplaca* cf. *communis* (thallus), on diorite outcrops in the supralittoral zone, 28 September 2000, A. Khodosovtsev (KHER 10654).

This lichenicolous fungus was recently reported from maritime *Caloplaca* in the British Isles (Hitch, 2015), Spain (van den Boom, Etayo, 2017), and North America (Kocourková and Knudsen, 2009). There are five *Stigmatidium* species known to grow on *Caloplaca* s. lat.: *S. californicum* K. Knudsen & Kocourk. (on *Caloplaca stanfordensis*); *S. cerinae* Cl. Roux & Triebel (on *C. stillicidiorum*); *S. epistigmellum* (Vouaux) Kocourk. & K. Knudsen (on *C. bolacina*, *C. luteominia*, *C. ludificans*, and *C. rosei*); *S. hesperium* Kocourk., K. Knudsen & Diederich (on *C. coralloides*); and *S. johnii* Halıcı & D. Hawksw. (on *Caloplaca* sp.) (Kocourková and Knudsen, 2009; Lawrey and Diederich, 2017). Our material fits well the concept of *S. epistigmellum* and is characterized by half-immersed perithecioid ascomata, 90–100 μm diam., pseudoparaphyses of “b” type sensu Roux and Triebel (1994), 1-septate, hyaline ascospores not constricted at the septum, (13.8–)14.5–17.0(–17.8) × (3.2–)3.5–4.5 (4.8) μm (n = 25), and a maritime habitat. New to Eastern Europe.

Stigmatidium stygnospilum (Minks) R. Sant.

Specimen examined. Ukraine. Mykolaiv region, Voznesenskiy district, village Trykraty, Buzky Gard National Nature Park, Arbuzyanskiy canyon, 47°42'24.9"N, 31°25'56.9"E, alt. 25 m, on *Dermatocarpon miniatum* (thallus), on granite outcrops, 27 May 2017, A. Khodosovtsev & V. Darmostuk (KHER 10702).

This species was reported from a few localities in Europe (e.g., Alstrup and Santesson, 1960; Hawksworth, 1990; Zhurbenko, 2009). New to Ukraine.

Sistotrema brinkmannii (Bres.) J. Erikss.

Specimen examined. Ukraine. Kherson region, Oleshkiy district, near village Burkuty, 46°23'38.6"N, 32°48'35.7"E, alt. 13 m, on *Xanthoria parietina*, on *P. tremula*, 18 November 2016, A. Khodosovtsev & N. Kharechko (KHER 10358).

It has a monomitic hyphal system, thin, white to cream resupinate basidiocarps, subhymenial hyphae 3–6 μm in width, cystidia absent, basidia utriform, 15–20 × 4–6 μm with 6–8 sterigmata, basidiospores suballantoid, thin-walled, smooth, 4–5 × 2–2.5 μm, I/KI–. This saprotrophic fungus is here reported for the first time as a facultative lichenicolous fungus; it is known to parasitize green algae in the laboratory (Oberwinkler, 1970).

Taeniolella delicata M.S. Christ. & D. Hawksw.

Specimen examined. Ukraine. Kherson region, Golopristanskiy district, Black Sea Biosphere Reserve, Solonoozerna, 46°27'31.80"N, 31°58'23.13"E, alt. 3 m, on *Lecanora carpinea* (apothecia), on *Q. robur*, 5 May 2017, A. Khodosovtsev & V. Darmostuk (KHER 10700).

In Ukraine this species was known from the Ternopil region (Darmostuk and Khodosovtsev, 2017). New to the steppe zone of Ukraine.

Trichothecium roseum (Pers.) Link

Specimens examined. Ukraine. Kherson region, Velykooleksandrivskiy district, Mala Oleksandrivka village, 47°17'30.1"N, 33°16'39.6"E, alt. 53 m, on *X. parietina*, on *Juglans regia*, 13 January 2017, V. Darmostuk (KHER 10708); Kherson, park in Kherson State Agrarian University, 46°38'48.89"N, 32°35'22.53"E, alt. 44 m, on *X. parietina*, on *Q. robur*, 29 October 2015, V. Volobuyeva (KHER 9525).

This saprophytic fungus is widespread on different dead plant substrates and lichens, and is here newly reported on *Xanthoria parietina* (Braun et al., 2016; Tsurukau and Etayo, 2017).

Zwackhiomyces lithoiceae (B. de Lesd.) Hafellner & V. John

Specimen examined. Ukraine. Kherson region, Novovorontsovsky district, near Stara Osokorivka village, 47°27'31.20"N, 33°51'27.83"E, alt. 41 m, on *Verrucaria* sp., on limestone, 3 June 2017, A. Khodosovtsev & V. Darmostuk (KHER 10695).

This lichenicolous fungus has been reported from Europe (e.g., Ertz et al., 2008) and Asia (Hafellner and John, 2006). New to Ukraine.

Acknowledgments

We express our gratitude to Paul Diederich for some amendments in the manuscript, Alexaner Ordynets for the identification of *Sistotrema brinkmannii*, and Wolfgang von Brackel, Javier Etayo, Josef Hafellner, and Mikhail Zhurbenko for kindly providing the literature. Yakiv Didukh, Yuliya Khodosovtseva, Irina Kartashova, Olena Maksymenko, and Yevgen Kornienko helped indispensably during the fieldwork on excursions. This study was financially supported by the project of the Ministry of Science and Education of Ukraine N 0116U004735.

References

- Alstrup V, Hawksworth DL (1990). The Lichenicolous Fungi of Greenland. Meddelelser om Gronland. Copenhagen, Denmark: Copenhagen : Commission for Scientific Research in Greenland.
- Aptroot A, Diederich P, Sérusiaux E, Sipman HJM (1997). Lichens and lichenicolous fungi from New Guinea. *Bibliotheca Lichenologica* 64: 1-220.
- Braun U, Khodosovtsev AYe, Darmostuk VV, Diederich P (2016). *Trichoconis hafellneri* sp. nov. on *Xanthoria parietina* and *Athallia pyracea*, a generic discussion of *Trichoconis* and keys to the species of this genus. *Herzogia* 29: 307-314.
- Calatayud V, Etayo J (2001). Five new species of lichenicolous conidial fungi from Spain. *Can J Botany* 79: 223-230.
- Calatayud V, Hafellner J, Navarro-Rosinés P (2004). *Lichenostigma*. In: Nash TH 3rd, Ryan BD, Diederich P, Gries C, Bungartz F, editors. Lichen Flora of the Greater Sonoran Desert Region, Vol. 2. Tempe, AZ, USA: Arizona State University, pp. 586-591.
- Coste C, Montavont JP (2007). *Roselliniella microthelia* (Wallr.) Nik. Hoffm. et Hafellner, un champignon lichénicole non lichénisé répandu en Europe mais non encore signalé en France. *Bulletin de l'Association Française de Lichénologie* 32: 1-4 (in French).
- Darmostuk VV, Khodosovtsev AYe (2017). Lichenicolous fungi of Ukraine: an annotated checklist. *Studies in Fungi* 2: 138-156.
- Ertz D, Diederich P, Brand AM, van den Boom P, Sérusiaux E (2008). New or interesting lichens and lichenicolous fungi from Belgium, Luxembourg and northern France. XI. *Bulletin de la Société des naturalistes luxembourgeois* 109: 35-51.
- Etayo J (2002). Aportacion al conocimiento de los hongos liquenícolas de Colombia. *Bibliotheca Lichenologica* 84: 1-154 (in Spanish).
- Etayo J (2010). Líquenes y hongos liquenícolas de Aragón. *Guineana* 16: 1-501 (in Spanish).
- Hafellner J (1985). Studien über lichenicole Pilze und Flechten III. Die Gattung *Roselliniella* Vainio emend. Haf. (Ascomycotina, Dothideales). *Herzogia* 7: 166-169 (in German).
- Hafellner J (2003). Beiträge zu einem Prodrömus der lichenicolen Pilze Österreichs und angrenzender Gebiete, VI – Erstfunde in den Alpen. *Mitteilungen des Naturwissenschaftlichen Vereines für Steiermark* 133: 81-97 (in German).
- Hafellner J (2004). *Rosellinula*. In: Nash TH 3rd, Ryan BD, Diederich P, Gries C, Bungartz F, editors. Lichen Flora of the Greater Sonoran Desert Region, Vol. 2. Tempe, AZ, USA: Arizona State University, pp. 688-689.
- Hafellner J, John V (2006). Records of lichenicolous non-lichenized fungi from Turkey, including a synopsis of the taxa so far recorded in the country. *Herzogia* 19: 155-176.
- Hafellner J, Triebel D, Ryan BD, Nash TH 3rd (2002). On lichenicolous fungi from North America. II. *Mycotaxon* 84: 293-329.
- Halıcı MG, Akata I, Kocakaya M (2010). New records of lichenicolous and lichenized fungi from Turkey. *Mycotaxon* 114: 311-314.
- Halıcı MG, Candan M, Türk AÖ (2009). Notes on some lichenicolous fungi species from Turkey II. *Turk J Bot* 33: 389-392.
- Hawksworth DL (1977). Three new genera of lichenicolous fungi. *Bot J Linn Soc* 75: 195-209.
- Hawksworth DL, Halıcı MG, Kocakaya Z, Kocakaya M (2016). *Henfellra muriformis* gen. et sp. nov., a new dictyosporous pycnidial fungus on *Candelariella*, with a key to the lichenicolous fungi known from that genus. *Herzogia* 29: 329-336.
- Hawksworth DL, Millanes AM, Wedin M (2010). *Roselliniella* revealed as an overlooked genus of Hypocreales, with the description of a second species on parmelioid lichens. *Persoonia* 24: 12-17.
- Hitch CJB (2007). New, rare and interesting lichens. *British Lichen Society Bulletin* 101: 67-86.
- Hitch CJB (2015). New, rare and interesting lichens. *British Lichen Society Bulletin* 116: 59-73.
- Hoffman N, Hafellner J (2000). Eine Revision der lichenicolen Arten der Sammelgattungen *Guignardia* und *Physalospora*. *Bibliotheca Lichenologica* 77: 1-190 (in German).
- Joshi Y, Falswal A, Tripathi M, Upadhyay S, Bisht A, Chandra K, Bajpai R, Upreti DK (2016). One hundred and five species of lichenicolous biota from India: an updated checklist for the country. *Mycosphere* 7: 268-294.
- Khodosovtsev AYe, Darmostuk VV (2016a). *Pleospora xanthoriae* sp. nov. (Pleosporaceae, Pleosporales), a new lichenicolous fungus on *Xanthoria parietina* from Ukraine, with a key to the known lichenicolous species of *Dacampia* and *Pleospora*. *Opuscula Philolichenum* 15: 6-11.
- Khodosovtsev AYe, Darmostuk VV (2016b). New species of lichenicolous fungi for Ukraine. *Folia Cryptogamica Estonica* 53: 93-99.
- Khodosovtsev AYe, Darmostuk VV (2017). *Zwackhiomyces polischukii* sp. nov., and other noteworthy lichenicolous fungi from Ukraine. *Polish Botanical Journal* 62: 27-35.
- Khodosovtsev AYe, Gavrylenko LM, Klymenko VM (2016). *Katherinomyces cetrariae* gen. et sp. nov. (asexual Ascomycota) and *Sphaerellothecium aculeatae* sp. nov. (Mycosphaerellaceae), new lichenicolous fungi on *Cetraria aculeata* in Ukraine. *Nova Hedwigia* 102: 47-55.
- Khodosovtsev A, Vondrák J, Naumovich A, Kocourková J, Vondrákova O, Motiejūnaitė J (2012). Three new *Pronectria* species in terricolous and saxicolous microlichen communities (Bionectriaceae, Ascomycota). *Nova Hedwigia* 95: 211-220.
- Kocakaya M, Halıcı MG, Pino-Bodas R (2016). New or additional cladoniicolous fungi for Turkey. *Turk J Bot* 40: 308-311.
- Kocourková J (2007). *Roselliniella microthelia*, a new lichenicolous fungus for North America. *Evansia* 24: 113-115.
- Kocourková J, Knudsen K (2009). *Stigmidium epistigmellum* (Mycosphaerellaceae), a lichenicolous fungus from maritime *Caloplaca* in North America. *Bryologist* 112: 578-583.
- Lawrey JD, Diederich P (2017). Lichenicolous Fungi – Worldwide Checklist, Including Isolated Cultures and Sequences Available.

- Website: <http://www.lichenicolous.net> [accessed 19.08.2017].
- Lowen R, Diederich P (1990). *Pronectria xanthoriae* and *P. terrestris*, two new lichenicolous fungi (Hypocreales). *Mycologia* 82: 788-791.
- Matzer M, Hafellner J (1990). Eine Revision der lichenicolen Arten der Sammelgattung *Rosellinia* (Ascomycetes). *Bibliotheca Lichenologica* 37: 1-138 (in German).
- Motiejūnaitė J, Chesnokov SV, Czarnota P, Gagarina LV, Frolov I, Himelbrant D, Konoreva LA, Kubiak D, Kukwa M, Moisejevs R et al. (2016). Ninety-one species of lichens and allied fungi new to Latvia with a list of additional records from Kurzeme. *Herzogia* 29: 143-163.
- Navarro-Rosinés P, Boqueras M, Llimona X (1994). Primer catàleg dels fongs liquenícoles de Catalunya I zones pròximes (NE de la Península Ibèrica). *Butl Soc Catalana Micol* 16-17: 165-204 (in Catalanian).
- Oberwinkler F (1970). Die Gattungen der Basidiolichenen. *Berichte der Deutschen Botanischen Gesellschaft NF* 4: 139-169 (in German).
- Roux C (2012). Liste des lichens et champignons lichénicoles de France. *Bulletin de la Société Linnéenne de Provence Numéro spécial* 16: 1-220 (in French).
- Roux C, Etayo J, Bricaud O, Coeur D (1997). *Lec Refractohilum* (Hyphomycètes, Moliniacés) à conidies pluriseptés en Europa et au Canada. *Can J Botany* 75: 1592-1600 (in French).
- Roux C, Triebel D (1994). Revision des especes de *Stigmidium* et de *Sphaerellothecium* (champignons lichénicoles non lichenises, Ascomycetes) correspondant a *Pharcidia epicymatia* sensu Keissler ou a *Stigmidium schaeereri* auct. *Bulletin de la Société Linnéenne de Provence* 45: 451-542 (in French).
- Santesson R (1960). Lichenicolous fungi from Northern Spain. *Svensk Botanisk Tidskrift* 54: 499-522.
- Schiefelbein U, von Brackel W, Cezanne R, Czarnota P, Eckstein J, Eichler M, Kison HU, Ungethüm K, Stordeur R (2017). *Trimmatostroma arctoparmeliae* sp. nov. and noteworthy records of lichenized, lichenicolous and allied fungi from the Harz Mountains and surrounding regions. *Herzogia* 30: 80-102.
- Sutton BC (1973). Hyphomycetes from Manitoba and Saskatchewan, Canada. *Mycological Papers* 132: 1-143.
- Tsurykau A, Etayo J (2017). *Capronia suijae* (Herpotrichiellaceae, Eurotiomycetes), a new fungus on *Xanthoria parietina* from Belarus, with a key to the lichenicolous species growing on *Xanthoria* s. str. *Lichenologist* 49: 1-12.
- van den Boom PPG (2015). Lichens and lichenicolous fungi from graveyards of the area of Eindhoven (the Netherlands), with the description of two new species. *Annalen des Naturhistorischen Museums in Wien Serie B für Botanik und Zoologie*: 245-276.
- van den Boom PPG, Etayo J (2017). Further interesting lichens and lichenicolous fungi from Fuerteventura, Canary Islands (Spain), with three new species and notes on *Mixtoconidium*. *Ascomycete.org* 9: 124-134.
- Zhurbenko MP (2009). Lichenicolous fungi and some lichens from the Holarctic. *Opuscula Philolichenum* 6: 87-120.
- Zhurbenko MP, Kukwa M, Oset M (2009). *Roselliniella stereocaulorum* (Sordariales, Ascomycota), a new lichenicolous fungus from the Holarctic. *Mycotaxon* 109: 323-328.
- Zhurbenko MP, Pino-Bodas R (2017). A revision of lichenicolous fungi growing on *Cladonia*, mainly from the Northern Hemisphere, with a worldwide key to the known species. *Opuscula Philolichenum* 16: 188-266.