

УДК 582.284 (477.5)

M. G. Kholodny Institute of Botany, the National Academy of Sciences of Ukraine, Kyiv, Ukraine
M. Shevchenko, PhD student, I. Dudka, DSc

GENUS *SKOLETOUTIS* (POLYPORACEAE) IN THE UKRAINIAN LEFT BANK FOREST STEPPE

Upon review of the reference data and the author's herbarium specimens were recorded five species of the *Skeletocutis* genus in the Ukrainian Left Bank Forest Steppe. One species, *S. brevispora*, is a new record for Ukraine, another one, *S. carneogrisea*, was found for the first time in the Ukrainian Left Bank Forest Steppe. For other two species, *S. nivea*, *S. subincarnata*, new localities were found within the studied region.

Key words: genus, *Skeletocutis brevispora*, distribution, Ichnia National Natural Park, Ukraine.

Introduction. *Skeletocutis* Kotl. et Pouzar is a genus of apylophoroid fungi with poroid hymenophore belonging to Polyporaceae Fr. ex Corda family. The genus was described in 1958 by Czech mycologists using the type species *Skeletocutis amorpha* (Fr.) Kotl. & Pouzar [15]. In 1982 A. David referred several species to this genus (*S. azorica* (D.A. Reid) Jülich, *S. jelicii* Tortiç & A. David, *S. portcrossensis* A. David and *S. subsphaerospora* A. David) with incrustated generative hyphae and monomitic hyphal system [12]. However, reference of such species to *Skeletocutis* genus has been deemed arguable. Thus, L. Ryvarden, R. Gilbertson [20] and A. Bernicchia [7] treated the species with monomitic hyphal systems as a part of *Ceriporiopsis* Domański genus and delimited *Skeletocutis* based on its dimitic system and encrustation of the hyphae at dissepiment edges.

The molecular and phylogenetic studies completed in the early XXI century demonstrated that the hyphal system's type is not a diagnostic feature for *Skeletocutis* genus [18, 23]. Relying on the foregoing data it was found out that the genus also comprises the species with monomitic hyphal system [18, 23].

Two species, *Skeletocutis lenis* (P. Karst.) Niemelä and *S. vulgaris* (Fr.) Niemelä & Y.C. Dai, were transferred to a new genus *Sidera* Miettinen & K.H. Larss. (Hymenochaetales Oberw.) based on ITS (internal transcribed spacer) and LSU (large subunit) nuclear ribosomal DNA (nrDNA) sequence analyses [18]. The main morphological difference between the two genera is that *Skeletocutis* usually has hyphae encrusted by fine crystals on the tube mouths, whereas in *Sidera* the dissepiment edge hyphae are smooth or covered with a few faceted crystal clusters [18, 19].

Genus *Skeletocutis* comprises the species with annual and perennial basidiocarps. Basidiocarps resupinate or pileate; normally white or occasionally grey, pink or purple colored [21]. The most of this species have a dense cartilaginous zone above the tube layer [21]. According to the contemporary concept, the genus comprises the species with monomitic, dimitic and trimitic hyphal system [18, 23]. This genus's inherent feature is generative hyphae encrustation at dissepiment edges by crystals resembling rose thorns. The generative hyphae with clamps, the skeletal hyphae hyaline, thin to slightly thick-walled, occasionally branched. Cystidia absent, however, conical

or fusoid cystidioles are observed in most of the species. Basidia four-spored, short clavate or barrel-shaped. Spores hyaline, cylindrical or ellipsoid, in most species they are somewhat curved [20, 22, 25].

Both in Ukraine and globally, most of *Skeletocutis* species are saprotrophes on the dead wood of various conifers and broadleaved trees. Such species cause white rot. Some of them are able to develop on basidiocarps of the other polypores [21, 22].

According to the data base Index Fungorum (request, dated April 24, 2017), *Skeletocutis* genus comprises 43 species. Fungi of this genus are widely distributed in the Northern Hemisphere. Twenty of them are known in Europe [7, 21] and only six species have been recorded in Ukraine [2-6]. According to the reference data, prior to our research there had been three species known for the Left Bank Forest Steppe: *Skeletocutis nivea* (Jungh.) Jean Keller, *S. odora* (Peck ex Saccardo) Ginns, *S. subincarnata* (Peck) Jean Keller. All of them were found in Kharkiv Oblast [4-6].

Materials and Methods. Among materials applied for this article there were species of apylophoroid fungi collected in June-October, 2016 at the forestlands of Ichnia National Natural Park (Ichnia Rayon, Chernihiv Oblast). The Natural Park's area in terms of mycofloristic zoning of Ukraine belongs to the Left Bank Forest Steppe [1].

The micromorphological structures of the specimens were examined in a 5 % aqueous potassium hydroxide solution and Melzer's reagent. The nomenclature of the species follows the "Mycobank" database [<http://www.mycobank.org/quicksearch.aspx>].

Results and Discussion. Upon review of the herbarium specimens collected over the specified area, we have reported 4 species belonging to *Skeletocutis* genus. Among them, one species (*Skeletocutis brevispora* Niemelä) is new for Ukraine, another one (*Skeletocutis carneogrisea* A. David) was found rare for our country and the new one for the Forest Steppe, for two species (*Skeletocutis nivea* (Jungh.) Jean Keller, *Skeletocutis subincarnata* (Peck) Jean Keller) the new locations were found in the Left Bank Forest Steppe. Generally, according to the reference data and the author's own gatherings, as of the date, five species of fungi belonging to this genus have been known for the Left Bank Forest Steppe. The comparative features of these species are shown in table.

Table. Comparative Features of *Skeletocutis* known for Ukrainian Left Bank Forest Steppe

Species	Spores dimensions, μm	Number of pores per 1 mm	Substrate
<i>Skeletocutis brevispora</i> Niemelä	3,1(3,4)–4,1(4,6) × 1,1(1,2)–1,6	6–8(9)	On basidiocarps only <i>Phellinidium ferrugineofusum</i> (P. Karst.) Fiasson & Niemelä
<i>Skeletocutis carneogrisea</i> A. David	(2,7)3–3,6(4,2) × 1–1,1(1,2)	4–6	On basidiocarps and wood of conifer species affected by <i>Trichaptum</i> sp.
<i>Skeletocutis nivea</i> (Jungh.) Jean Keller	2,8–3,3(3,7) × 0,6–0,8	8–10	On dead wood of broadleaved trees
<i>Skeletocutis odora</i> (Peck ex Saccardo) Ginns	(3,4)3,9–5,2(5,7) × (0,8)0,9–1,4(1,6)	4–6	Most often on <i>Picea abies</i> (L.) H. Karst. and <i>Populus tremula</i> L.
<i>Skeletocutis subincarnata</i> (Peck) Jean Keller	(3,2)3,5–5,5 × (1,1)1,3–1,8	5–7	On dead wood of conifers (more rarely on broadleaved trees)

Find below the generalizing list of *Skeletocutis* species for the Left Bank Forest Steppe. For *S. brevispora*, listed for Ukraine's territory for the first time, we have submitted description of the macro- and micromorphological structures of the examined sample and the general global distribution. For the rest of the species collected by the author, we have provided details of the collecting date and localities, substrate specialization and distribution in Ukraine.

Basidiomycota Bold ex R.T. Moore
Agaricomycotina R. Bauer, Begerow, J.P. Samp.,
M. Weiss et Oberw.

Agaricomycetes Matheny, Hibbett et Binder

Polyporales Gäm.

Polyporaceae Fr. ex Corda

Skeletocutis brevispora Niemelä,

Acta bot. fenn. 161: 10 (1998)

Basidiocarps annual, resupinate, 1–2 mm thick, waxy when fresh and firm-ceraceous after drying. Pore surface at first white, later straw- to lemon-yellowish, pores angular at first 6–9 per mm. Margin initially pruinose-bysoid, white, later lacking or very narrow. Subiculum very thin, whitish. Hyphal system dimitic: skeletal hyphae slightly thick-walled, dominating in all parts of basidiocarps, 3–4 µm wide, swelling up to 5–5.5 µm wide in KOH (but not dissolving); generative hyphae thin-walled, with clamps, 3–3.5 µm wide, at the dissepiment edges slightly encrusted. Cystidia none, bottle-shaped cystidioles with sharp apices present in the hymenium, 10–13×4–5.5 µm. Basidia short-clavate 10–12×4–4.5 µm, with a basal clamp. Basidiospores 3.4–4.1×1.2–1.5 µm, cylindrical to slightly allantoid tapering towards the apiculus, without guttules.

Specimens examined: Ichnia National Natural Park, Ichnia, Ichnia Rayon, Chernihiv Oblast, Ukraine, southwestern outskirts of Ichnia, pine forest, over the dead last year basidiocarp of *Phellinidium ferrugineofuscum* (P. Karst.) Fiasson & Niemelä on the wood of the fallen trunk *Pinus sylvestris* L., July 16, 2016, KW-M 70851.

Ecological peculiarities: It develops over basidiocarps of *Phellinidium ferrugineofuscum* (P. Karst.) Fiasson & Niemelä. T. Niemelä in the species description specifies that it develops on such substrate so often that such feature may be applied for the species identification [19]. According to L. Ryvarden and I. Melo, *S. brevispora* is able to develop on the wood of conifer species affected by *Ph. ferrugineofuscum* [21].

S. brevispora is deemed a rare species, however, locally it may be found rather often [19, 22]. Globally, it is known in certain countries of Europe (Norway, Sweden, Finland [21], Poland [14], in the European part of Russia [16, 22] and in China [11].

It is new for Ukraine.

Skeletocutis carneogrisea A. David, Naturaliste Can. 109(2): 245 (1982)

Specimens examined: Ichnia National Natural Park, Ichnia, Ichnia Rayon, Chernihiv Oblast, Ukraine, Budy village, standing pine forest, over basidiocarps of *Trichaptum fuscoviolaceum* (Ehrenb.) Ryvarden on the wood of the fallen trunk *Pinus sylvestris* L., July 17, 2016, August 06, 2016, September 15, 2016.

Ecological peculiarities: Inherent to the wood of conifer species affected by *Trichaptum* Murrill genus's fungi. According to the reference data and the author's observations it is able to develop both on the wood affected by *Trichaptum* and the basidiocarps of these polypores.

Distribution in Ukraine: The Left Bank Gramineous-Meadow Steppe [2, 3]. It was found for the first time in

Ukrainian Left Bank Forest Steppe and the Forest-Steppe Zone in general.

Skeletocutis nivea (Jungh.) Jean Keller, *Persoonia* 10(3): 353 (1979)

Specimens examined: Ichnia National Natural Park, Ichnia, Ichnia Rayon, Chernihiv Oblast, Ukraine, southern outskirts of Ichnia, mixed forest, June 24, 2016, September 16, 2016, Avhustivka village, alder forest, on the fallen branches of *Acer platanoides* L., *Alnus glutinosa* (L.) Gaertn., *Robinia pseudoacacia* L., July 16, 2016, August 06, 2016, September 16, 2016.

Ecological peculiarities: It develops on the dead wood of broadleaved trees.

Distribution in Ukraine: The Left Bank Polissia, Transcarpathia, Carpathian Mountains, the Right Bank and the Left Bank Forest Steppe, the Left Bank Gramineous and Meadow Steppe, Crimea [6].

Skeletocutis odora (Peck ex Saccardo) Ginns, *Mycotaxon* 21: 332 (1984)

We failed to support this finding with own gatherings. We explain it by the fact that this species is rare both in Ukraine and in the world. It is confirmed by the fact that it is Red Listed in many European Countries (Estonia [13], Poland [9], Slovakia and Czech Republic [8]) and is a candidate to the list of species protected by Bern Convention [10].

Ecological peculiarities: It develops on dead hardwoods and conifers (most often on *Picea abies* (L.) H. Karst. and *Populus tremula* L.)

Distribution in Ukraine: Transcarpathia, Carpathian Mountains [6], the Left Bank Forest Steppe [5].

Skeletocutis subincarnata (Peck) Jean Keller, *Persoonia* 10(3): 535 (1979)

Specimens examined: Ichnia National Natural Park, Ichnia, Ichnia Rayon, Chernihiv Oblast, Ukraine, southern outskirts of Ichnia, mixed forest, on the fallen branches of *Acer platanoides* L., June 25, 2016.

Ecological peculiarities: It develops on conifers (more rarely on hardwoods).

Distribution in Ukraine: Transcarpathia, Carpathian Mountains, the Right Bank and the Left Bank Forest Steppe, the Left Bank Gramineous-Meadow Steppe [6].

Acknowledgments. The author would like to thank kindly the directorate members of Ichnia National Natural Park for facilitation to the filed surveys.

Список використаних джерел:

1. Гелюта В. П. Флора грибов Украины. Мучнисторосяные грибы / В. П. Гелюта. — К.: Наук. думка, 1989.
2. Ординец О. В. Афілофороїдні гриби відділення "Крейдова флора" Українського степового природного заповідника / О. В. Ординец, О. Ю. Акулов // Біологічні студії. — 2011. — № 5(3). — С. 109–124.
3. Ординец О. В. Афілофороїдні гриби Станично-Луганського відділення Луганського природного заповідника / О. В. Ординец, О. Ю. Акулов, Г. В. Шиян-Глотова // Заповідна справа в Україні. — 2011. — № 17(1–2). — С. 28–33.
4. Усиченко А. С. Афіллофоровые грибы Харьковской области / А. С. Усиченко // Вісн. Харк. нац. ун-ту ім. В. Н. Каразіна. — 2002. — № 551(2). — С. 222–227.
5. Усиченко А. С. Афілофороїдні гриби Харківського Лісостепу: автореф. дис. ... канд. біол. наук / А. С. Усиченко. — К., 2009.
6. Annotated checklist of aphylloroid fungi of Ukraine / A. Yu. Akulov, A. S. Usichenko, D. V. Leontyev et al. // Mycena. — 2003. — Vol. 2, № 2. — P. 1–76.
7. Berniccia A. Polyporaceae s.l. Fungi Europaei. 10 / A. Berniccia. — Alassio, Italy: Candusso. — 2005.
8. Červený seznam hub (makromycetů) České republiky [Red list of fungi (macromycetes) of the Czech Republic] / J. Holec, M. Beran. — Praha: Příroda, vol. 24, 2006. — 282 p.

9. Czerwona lista roślin i grzybów Polski [Red list of plants and fungi in Poland] / Z. Mirek, K. Zarzycki, W. Wojewoda, Z. Szeląg. – Kraków, 2006. – 99 p.
10. Dahlberg A. 33 threatened fungi in Europe. Complementary and revised information on candidates for listing in Appendix I of the Bern Convention / A. Dahlberg, H. Croneborg. – Uppsala: SSIC, 2003. – 82 p.
11. Dai Y. C. A checklist of polypores from Northeast China / Y. C. Dai // Karstenia. – 2000. – Vol. 40. – C. 23–29.
12. David A. Étude monographique du genre *Skeletocutis* (Polyporaceae) / A. David // Le Naturaliste Canadien. – 1982. – Vol. 109. – P. 235–272.
13. Eesti punane raamat [Estonian Red Data Book] / E. Parmasto. – Tallinn: Commission for Nature Protection of the Estonian Academy of Sciences, 1999. – 150 p.
14. Karasiński D. An annotated and illustrated catalogue of Polypores (Agaricomycetes) of the Białowieża Forest (ne Poland) / D. Karasiński, M. Wolkowicki // Polish Botanical Journal. – 2015. – Vol. 60, № 2. – P. 217–292.
15. Kotlába F. Polypori novi vel minus cogniti Cechoslovakiae III / F. Kotlába, Z. Pouzar // Česká Mykologie. – 1958. – Vol. 12, № 2. – P. 95–104.
16. Lindgren M. Polypore (Basidiomycetes) species richness and community structure in natural boreal forests of NW Russian Karelia and adjacent areas in Finland / M. Lindgren // Acta Botanica Fennica. – 2001. – Vol. 170. – P. 1–12.
17. Lizoň P. Red list of fungi of Slovakia. In: Červený zoznam rastlin a živočíchov Slovenska [Red list of plants and animals of Slovakia] / D. Balaž, K. Marhold, P. Urban. – Ochr. Prir. 20 (Suppl.), 2001. – P. 6–13.
18. Miettinen O. *Sidera*, a new genus in Hymenochaetales with poroid and hydroid species / O. Miettinen, K.-H. Larsson // Mycol. Progress. – 2011. – Vol. 10. – P. 131–141.
19. Niemela T. The *Skeletocutis subincarnata* complex (Basidiomycetes), a revision / T. Niemela // Acta Botanica Fennica. – 1998. – Vol. 161. – P. 1–35.
20. Ryvarden L. European polypores / L. Ryvarden, R. Gilbertson // Synopsis Fungorum. – 1994. – Vol. 7, № 2. – P. 388–743.
21. Ryvarden L. Polypoid fungi of Europe / L. Ryvarden, I. Melo // Synopsis Fungorum. – 2014. – Vol. 31. – P. 1–455.
22. Spirin V. Notes on some rare polypores, found in Russia 2. *Junghuhnia vitellina* sp. nova, plus genera *Cinereomyces* and *Skeletocutis* / V. Spirin // Karstenia. – 2005. – Vol. 45. – P. 103–113.
23. Tomšovský M. Phylogenetic relationships in European *Ceriporiopsis* species inferred from nuclear and mitochondrial ribosomal DNA sequences / M. Tomšovský, A. Menkis, R. Vasaitis // Fungal biology. – 2010. – Vol. 114. – P. 350–358.
24. Zhou L.-W. A new species of *Skeletocutis* (Polyporaceae) on bamboo in tropical China / L.-W. Zhou, W.-M. Qin // Mycotaxon. – 2012. – Vol. 119. – P. 345–350.
25. Zibarová L. First record of *Skeletocutis ochroalba* (Polyporales) in the Czech Republic / L. Zibarová, J. Kout // Czech Mycol. – 2014. – Vol. 66, № 1. – P. 61–69.
4. Usychenko A.S. Afilloforovyye griby Kharkovskoi oblasti. Visnyk Kharkivskoho natsionalnoho universytetu im. V. N. Karazina. 2002; 551(2): 222–227.
5. Usichenko A.S. Aphyllophoroid fungi of Kharkiv Forest-steppe [dissertation]. Kyiv: M.G. Kholodny Institute of Botany, the National Academy of Sciences of Ukraine; 2009.
6. Akulov A.Yu., Usichenko A.S., Leontyev D.V., Yurchenko E.O., Prydiuk M.P. Annotated checklist of aphyllophoroid fungi of Ukraine. Mycena. 2003; 2(2): 1–76.
7. Berniccia A. Polyporaceae s.l. Fungi Europaei. 10. Alassio, Italy: Candusso; 2005.
8. Holec J., Beran M., editors. [Red list of fungi (macromycetes) of the Czech Republic]. Praha: Příroda; vol. 24, 2006. 282 p. In Czech with English summary.
9. Mirek Z., Zarzycki K., Wojewoda W., Szeląg Z., editors. Red list of plants and fungi in Poland. Kraków; 2006. 99 p.
10. Dahlberg A., Croneborg H. 33 threatened fungi in Europe. Complementary and revised information on candidates for listing in Appendix I of the Bern Convention. Uppsala: SSIC; 2003. 82 p.
11. Dai Y.C. A checklist of polypores from Northeast China. Karstenia. 2000; 40: 23–29.
12. David A. Étude monographique du genre *Skeletocutis* (Polyporaceae). Le Naturaliste Canadien. 1982; 109: 235–272. In French.
13. Parmasto E., editor. Estonian Red Data Book. Tallinn: Commission for Nature Protection of the Estonian Academy of Sciences; 1999. 150 p.
14. Karasiński D., Wolkowicki M. An annotated and illustrated catalogue of Polypores (Agaricomycetes) of the Białowieża Forest (ne Poland). Polish Botanical Journal. 2015; 60(2): 217–292.
15. Kotlába F.; Pouzar Z. Polypori novi vel minus cogniti Cechoslovakiae III. Česká Mykologie. 1958; 12(2):95–104. In Czech.
16. Lindgren M. Polypore (Basidiomycetes) species richness and community structure in natural boreal forests of NW Russian Karelia and adjacent areas in Finland. Acta Botanica Fennica. 2001; 170: 1–12.
17. Lizoň P. Red list of fungi of Slovakia. In: Balaž D., Marhold K., Urban P., editors. Red list of plants and animals of Slovakia. Ochr. Prir. 20 (Suppl.); 2001. p. 6–13.
18. Miettinen O., Larsson K.-H. *Sidera*, a new genus in Hymenochaetales with poroid and hydroid species. Mycol. Progress. 2011; 10:131–141.
19. Niemela T. The *Skeletocutis subincarnata* complex (Basidiomycetes), a revision. Acta Botanica Fennica. 1998; 161: 1–35.
20. Ryvarden L., Gilbertson R. European polypores. Synopsis Fungorum. 1994; 7(2): 388–743.
21. Ryvarden L., Melo I. Polypoid fungi of Europe. Synopsis Fungorum. 2014; 31: 1–455.
22. Spirin V. Notes on some rare polypores, found in Russia 2. *Junghuhnia vitellina* sp. nova, plus genera *Cinereomyces* and *Skeletocutis*. Karstenia. 2005; 45: 103–113.
23. Tomšovský M., Menkis A., Vasaitis R. Phylogenetic relationships in European *Ceriporiopsis* species inferred from nuclear and mitochondrial ribosomal DNA sequences. Fungal biology. 2010; 114: 350–358.
24. Zhou L.-W., Qin W.-M. A new species of *Skeletocutis* (Polyporaceae) on bamboo in tropical China. Mycotaxon. 2012; 119: 345–350.
25. Zibarová L., Kout J. First record of *Skeletocutis ochroalba* (Polyporales) in the Czech Republic. Czech Mycol. 2014; 66(1): 61–69.

References:

1. Heluta V.P. Flora Gribov Ukrainy. Muchnistorosianyie griby. Kyiv: Nauk. Dumka; 1989. 256 p.
2. Ordynets O.V., Akulov O.Yu. [Aphyllophoroid fungi of the "Kreidova flora" branch of Ukrainian Steppe Nature Reserve]. Studia Biologica. 2011; 5(3): 109–124.
3. Ordynets O.V., Akulov O.Yu., Shyan-Hlotova H.V. [Aphyllophoroid fungi of Stanychno-Luhansk branch of Luhansk Nature Reserve]. Nature Reserves in Ukraine. 2011; 17(1–2): 28–33.

М. Шевченко, асп., **І. Дудка**, д-р біол. наук
Інститут ботаніки імені М. Г. Холодного НАН України, Київ, Україна

ГРИБИ РОДУ *SKELETOCUTIS* (POLYPORACEAE) ЛІВОБЕРЕЖНОГО ЛІСОСТЕПУ УКРАЇНИ

На основі аналізу літературних даних та власних гербарних матеріалів встановлено, що для Лівобережного Лісостепу України відомо п'ять видів грибів із роду *Skeletocutis*. Один вид – *Skeletocutis brevispora* – є новим для України, ще один – *Skeletocutis carneogrisea* – уперше виявлений у Лівобережному Лісостепу. Для двох видів – *Skeletocutis nivea*, *Skeletocutis subincarnata* – виявлено нові місцезнаходження в межах регіону дослідження.

Ключові слова: *рід, Skeletocutis brevispora*, поширення, Ічнянський національний природний парк, Україна.

М. Шевченко, асп., **І. Дудка**, д-р біол. наук
Інститут ботаніки імені Н. Г. Холодного НАН України, Київ, Україна

ГРИБЫ РОДА *SKELETOCUTIS* (POLYPORACEAE) ЛЕВОБЕРЕЖНОЙ ЛЕСОСТЕПИ УКРАИНЫ

На основе анализа литературных данных и собственных гербарных материалов было установлено, что для Левобережной Лесостепи Украины известно пять видов грибов из рода *Skeletocutis*. Один вид – *Skeletocutis brevispora* – является новым для Украины, еще один – *Skeletocutis carneogrisea* – впервые обнаружен в Левобережной Лесостепи. Для двух видов – *Skeletocutis nivea*, *Skeletocutis subincarnata* – обнаружены новые местонахождения в пределах региона исследования.

Ключевые слова: род, *Skeletocutis brevispora*, распространение, Ичнянский национальный природный парк, Украина.