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RESEARCH ARTICLE

Current distribution data for the red-listed species of aphylloroid fungi in Ukraine

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Abstract. The article provides current information on distribution patterns of six species of aphylloroid fungi (*Agaricomycetes*, *Basidiomycota*) listed in the *Red Data Book of Ukraine: Clavariadelphus pistillaris*, *Gomphus clavatus*, *Hericium coralloides*, *Picipes rhizophilus*, *Polyporus umbellatus*, and *Sparassis crispa*. Altogether, about 500 occurrences of the fungal fruitbodies in the country are reported. Of them, over 410 recent observations have been added to those published in the *Red Data Book of Ukraine* in 2009. Majority of that data has been provided over the last few years via mushroom citizen science, i.e. involvement of volunteers in collecting distribution data for macrofungi with large and distinctive fruitbodies. Only specialist-verified observations were included in the datasets reported in the article. The compiled data will serve as a considerably improved basis for future re-assessments of the conservation status of these threatened species for the next edition of the *Red Data Book of Ukraine*.

Keywords: distribution, fungal conservation, *Gomphales*, mushroom citizen science, *Polyporales*, *Red Data Book of Ukraine*, threatened species

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Introduction

Aphylloroid fungi (*Agaricomycetes*, *Basidiomycota*), both decomposers and mycorrhizal symbionts, are essential component of forest ecosystems. Wood-inhabiting macrofungi that are capable of decomposing dead wood play a vital role in recycling processes. Furthermore, wood-decay fungi as well as litter saprobionts provide a variety of viable habitats for turnover of various biodiversity elements. Thus, maintaining diversity of aphylloroid fungi is crucial for ecosystem functioning.

Fungal conservation requires sufficient knowledge on the occurrence and species-specific distribution patterns of the fungi. Although there are many gaps in the knowledge on distribution and other limitations for fungal red-listing, an increased number of aphylloroid fungi, including those reported in this article, has been

red-listed nationally and internationally over recent years (http://iucn.ekoo.se/iucn/species_list/).

In the third edition of the *Red Data Book of Ukraine* (2009), eight species of aphylloroid fungi are listed: *Clavariadelphus pistillaris* (L.) Donk, *Fomitopsis officinalis* (Batsch) Bondartsev & Singer (as *Laricifomes officinalis* (Vill.) Kotl. & Pouzar), *Grifola frondosa* (Dicks.) Gray, *Gomphus clavatus* (Pers.) Gray, *Hericium coralloides* (Scop.) Pers., *Picipes rhizophilus* (Pat.) J.L. Zhou & B.K. Cui, in Zhou, Zhu, Chen & Cui (as *Polyporus rhizophilus* Pat.), *Polyporus umbellatus* (Pers.) Fr., and *Sparassis crispa* (Wulfen) Fr. For each species, a distribution map was provided as derived from bibliographic sources, herbarium and personal data available by that time.

Over the past decade, information on the occurrence of these rather well-known and conspicuous macrofungi has significantly expanded. In addition to previously

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documented localities, novel published records were made freely available online as well as those unpublished were communicated, particularly through the citizen science websites. Indeed, the major drivers of the recent fungal findings were intensive observation efforts made by enthusiastic amateurs under the guidance of professional mycologists, including the authors of this article. Thus, using information updated on a continuous basis, one of the above mentioned species, *Grifola frondosa*, listed in the *Red Data Book of Ukraine* as Vulnerable (VU), has been recently re-assessed and recommended to be assigned to a higher threat category, i.e. Endangered (EN) (Shevchenko et al., 2019). Another species, *Fomitopsis officinalis*, most probably was erroneously recorded in the country; thus, because of highly doubtful historical data and unconfirmed species occurrence, it was proposed to be excluded from the *Red Data Book of Ukraine* (Hayova et al., 2020).

This article contributes to distribution data for the other six nationally red-listed species of aphylloroid fungi in Ukraine: *C. pistillaris*, *G. clavatus*, *H. coralloides*, *Pi. rhizophilus*, *Po. umbellatus*, and *S. crispa*. Updated information on the occurrence of these fungi in the country is particularly important for re-assessment of the species for the next edition of the *Red Data Book of Ukraine* that is currently under preparation.

Materials and methods

Various sources of information on distribution data for each species were analysed. As a primary data source, we used label locality data on the specimens deposited in the Fungarium (KW-M) at the National Herbarium of Ukraine (KW) as well as relevant published data obtained from literature reports. For historical records, taxonomic names and administrative units were checked and updated where necessary.

Apart from herbarium materials and bibliographic data, additional information on fungal occurrence was considered and, if appropriate, taken into account. Since the selected species are red-listed, i.e. protected by law in Ukraine, their unauthorised sampling and/or collecting fruitbodies in the country are strictly prohibited. Therefore a list of records for each species is largely based on a dataset derived from observational field research. Different field work methods of collecting data through observations were used. Some records resulted from traditional surveys of fungal diversity or mycological inventories carried out in nature conservation areas by

professional mycologists, in particular by staff members of the Department of Mycology at the M.G. Kholodny Institute of Botany, National Academy of Sciences of Ukraine. However, significant portions of the datasets were compiled on a basis of unpublished results of random observations made by amateurs and reported through two social network groups (<https://www.facebook.com/groups/Hryby.Ukrayiny/?ref=bookmarks>, <https://www.facebook.com/groups/119266158163241/>). These observation reports were only accepted by experts after verification, if a record was confirmed by one or several good quality digital images of the fungus in its natural habitat, with locality data and date of observation. Thus for each validated record, several levels of site names in the region are indicated, including municipality, village or nature conservation area and, wherever possible, specific location, followed by date, or date interval, and full name of the person. For published records, publication references are provided. Exact locality data and georeference information are omitted in the article due to data access restrictions for the red-listed species.

Results

For six species of aphylloroid fungi listed in the *Red Data Book of Ukraine* (2009), all known up to now records in Ukraine, from historical to the most recent ones, are reported. Of them, over 410 additional observations are dated within 2009–2020. Thus, including the previously known sites published in 2009, a total of about 500 occurrences are provided below.

Fungal species and administrative units (regions and districts) are arranged alphabetically.

***Clavariadelphus pistillaris* (L.) Donk, Meded. Bot. Mus. Herb. Rijks Univ. Utrecht 9: 72. 1933 (Fig. 1, A)**

This is a litter fungus rarely occurring in deciduous and mixed forests, preferably in beech forests. In the distribution map provided in the *Red Data Book of Ukraine* (2009), 12 sites were indicated. Since then, at least 20 new occurrences of the species have been reported. Thus at present, records of *C. pistillaris* are also known from three more regions, Chernivtsi, Ivano-Frankivsk, and Khmelnytskyi. As can be seen from the list below, most frequently its fruitbodies were observed in forest habitats in Hutsulshchyna National Nature Park (Ivano-Frankivsk Region). In four regions (Chernihiv, Kyiv, Sumy, and Ternopil), historical bibliographic reports dated back to the late 19th – early 20th centuries were not confirmed thereafter.

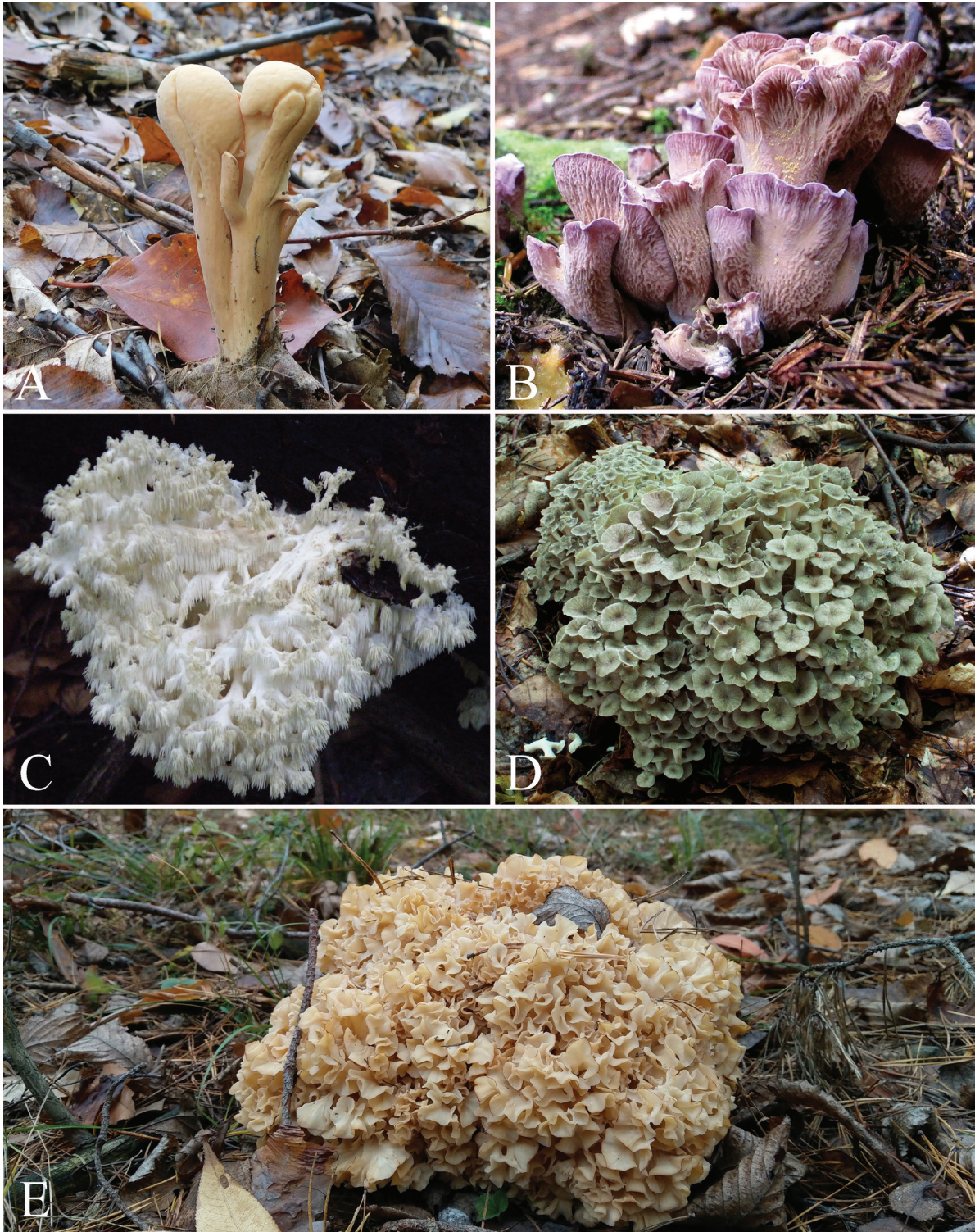


Fig. 1. Fruitbodies of the red-listed apylophoroid fungi in Ukraine. A: *Clavariadelphus pistillaris* (photo by O. Volutsa). B: *Gomphus clavatus* (photo by S. Kozlan). C: *Hericium coralloides* (photo by O. Volutsa). D: *Polyporus umbellatus* (photo by O. Lozovyi). E: *Sparassis crispa* (photo by O. Zykov)

Distribution in Ukraine

Autonomous Republic of Crimea: Simferopol District, Angarskyi Pass, Angar-Butun forest parcel, 11.09.2002, 21.09.2002, I. Sarkina (Sarkina et al., 2003); Yalta municipality, Nikita, Nikita Botanical Garden, Cape Martian Nature Reserve, 04.03.1999, I. Sarkina (Sarkina et al., 2003).

Cherkasy Region: Kaniv District, Kaniv Nature Reserve (Usichenko et al., 2005; Prudenko, Dzhagan, 2008).

Chernihiv Region: Sosnytsia District, Sosnytsia settlement (Borščow, 1869).

Chernivtsi Region: Chernivtsi District, Kulykivka village, 18.10.2020, O. Volutsa.

Ivano-Frankivsk Region: Bohorodchany District, Hrabovets village, 26.08.2006, V. Malanyuk (Malanyuk, 2019); Kosiv District, Hutsulshchyna National Nature Park, Sheshory village, 12.09.2013, V. Heluta; Holytsia ridge, 02.10.2010, 18.10.2014, October 2016–2017, 17.08.2018, L. Derzhypilskyi; Yablunivka forestry, September 2012, L. Derzhypilskyi, S. Fokshei; Kamenystyi ridge, Gregit mountain, Mykhalkova mountain, 18.08.2010, L. Derzhypilskyi (Fokshei, 2016, 2019); *ibid.*, 11.09.2013, L. Derzhypilskyi, S. Fokshei, V. Heluta; Yaremche District, Tatariv village, 28.08.2020, M. Osadchyi.

Kharkiv Region: Zmiiv District, Korobiv Khutir village, Homilshanski Lisy National Nature Park, 03.11.2002, D. Leontyev (Akulov, Leontyev, 2008; Usichenko, 2011).

Khmelnitskyi Region: Dunaivtsi District, Makiv village, 11.08.2019, O. Nedokushev; Yarmolyntsi District, Yarmolyntsi settlement, 25.10.2020, O. Nevstruyeva.

Kyiv city: Kyiv, 30.10.2020, N. Volosatova.

Kyiv Region: Irpin (Girzitska, 1929).

Lviv Region: Lviv city, Sukhiv, 30.08.1968 (Dudka, 2008); Pustomytsi District, Hryniv village, 26.09.2017, O. Sharabura.

Sumy Region: Krolevets District, Krolevets town (Borščow, 1869).

Ternopil Region: Zalishchyky District, Zalishchyky town, 12.09.1918 (Wróblewski, 1922).

Transcarpathian Region: Mizhhirya District, Synevyr National Nature Park, 21.08.2017, T. Niroda (Tyukh, Niroda, 2019); Rakhiv District, Svydovets mountain range, Kuziy massif, August 1933 (Pilát, 1940); Carpathian Biosphere Reserve, Marmarosh massif (Gleb et al., 2016); Rakhiv town, 20.09.2017, V. Nebela; Svalyava, 23.10.2020, V. Rudenko; Tyachiv District (Rekita, 2014).

Gomphus clavatus (Pers.) Gray, *Nat. Arr. Brit. Pl. (London) 1: 638. 1821 (Fig. 1, B)*

This species is known as a rare fungus forming mycorrhiza with coniferous trees and beech in mature and old growth forests on calcareous and loamy soils (limestone, chalk, marl, etc.). Apart from a single locality near Kyiv city (Zerova et al., 1972) referred to in the *Red Data Book of Ukraine* (2009), 20 more observations have been reported for this species during the past decade. In general, our knowledge on its distribution has expanded to include three western administrative units – Chernivtsi, Ivano-Frankivsk, and Transcarpathian regions, as well as another recent record in Kyiv Region. The greatest number of occurrences (14) for *G. clavatus* is currently known from Ivano-Frankivsk Region.

Distribution in Ukraine

Chernivtsi Region: Vyzhnytsia District, Shurdyn pass, 21.08.2016, S. Kozlan.

Ivano-Frankivsk Region: Kosiv District, Hutsulshchyna National Nature Park, Kramy mountain meadow, 31.07.2014, 05.08.2015, S. Fokshei, O. Pohribnyi (Fokshei, 2016, 2019); Bania Bereziv village, 12.08.2019, V. Basaraba; Sheshory village, 20.07.2019, Y. Myzerniuk; Kosiv town, 08.07.2014, O. Zykov; *ibid.*, 25.07.2019, Ye. Rudenko; Nadvirna District, Gorgany Nature Reserve, Bystrytsia village, 06.08.2011, V. Malanyuk (Malanyuk, 2012, 2019); Deliatyn settlement, Klyvskyi Botanical Reserve, 09.09.2008, V. Malanyuk (Malanyuk, 2019); Verkhovyna District, Verkhovynskyi National Nature Park, Perkalab village, 19.08.2013, V. Malanyuk (Malanyuk, 2019); Bukovets village, 02.09.2018, 09.08.2019, S. Kozlan; Staishche village, 28.08.2015, Bila Kobyla mountain, 19.08.2018, T. Danchuk; Verkhovyna settlement, early July 2016, T. Horelova; *ibid.*, 19.07.2020, Kh. Zubyuk.

Kyiv city (Zerova et al., 1972).

Kyiv Region: Poliske District, Radynka village, 07.07.2018, M. Zykova (KW-M71263).

Transcarpathian Region: Mizhhirya District, Pylypets village, August 2014, Yu. Bengus (Bengus, 2016); Rakhiv District, Chorna Tysa village, 26.08.2016, K. Fedorova; Carpathian Biosphere Reserve, Chornohirsky massif, Kozmeshchyk forest parcel, 06.09.2017, R. Gleb (Antosyak et al., 2019); Lazeshchyna village, 08.09.2017, R. Gleb.

Hericium coralloides (Scop.) Pers., *Neues Mag. Bot. 1: 109. 1794 (Fig. 1, C)*

This saprobic fungus causing white rot of wood can be most frequently found on large fallen trunks, as well

as dead standing trunks, of *Fagus* spp. and *Quercus* spp. *Hericium coralloides* is known as an indicator of old growth forests; moreover, due to attractive fruitbodies it is often used as a flagship species in fungal conservation. In the *Red Data Book of Ukraine* (2009), *H. coralloides* is listed as a Vulnerable species; in total, 24 sites are depicted in the distribution map provided therein. By now, this number increased to at least 120 sites, thus the actual number of occurrences exceeds the previously known number by about fivefold. Of them, more than a half of observations are dated by 2017–2020. The majority of all known up to now observations are located in Ivano-Frankivsk, Lviv, and Transcarpathian regions.

Distribution in Ukraine

Autonomous Republic of Crimea: Korbek village (currently Izobilne village, Alushta) (Léveillé, 1842); Izobilne forestry, middle flow of the Alma river, 05.10.1960, E. Koval (Sarkina et al., 2003); Mountain Crimea, Southern Coast of Crimea (Isikov, 2003); Alushta municipality, Crimean Nature Reserve, Central forestry, October 1936, Basman mountain, autumn 1937, S. Gutsevich (Sarkina et al., 2003); Alushta municipality, July, September, October 1987, V. Isikov; *ibid.*, September 1989, L. Horovyi (KW-M7868); *ibid.*, 22.09.2000, M. Prydiuk (Sarkina et al., 2003); Generalske village, 02.06.2018, Yu. Krasylenko; Feodosia municipality, Karadag Nature Reserve, Svyata mountain, 10.07.2008 (Sarkina, Mironova, 2010); Simferopol District, Chatyrdag mountain, 01.07.2001, 03.10.2001, I. Sarkina (Sarkina et al., 2003); Yalta municipality, 20.08.1988, 19.11.1989, 04.11.2000, V. Isikov; Yalta Mountain Forest Nature Reserve, Livadiya forestry, Comboplo forest parcel, 25.07.1988, I. Sarkina (Sarkina et al., 2003); Ai-Petri mountain, 13.07.1993, 19.07.1995, I. Sarkina (Sarkina et al., 2003).

Cherkasy Region: Cherkasy town, 20.10.2018, V. Lobas; Kaniv District, Kaniv Nature Reserve (Usichenko et al., 2005; Prudenko, Dzhagan, 2008); *ibid.*, 29.10.2013, V. Shevchyk; *ibid.*, 10.10.2014, 23.09.2015, 14.09.2017, 10.09.2018, Yu. Kulsha (Kulsha et al., 2019); Ozeryshche village, 19.10.2012, V. Gryshchenko, Ye. Yablonovska-Gryshchenko (Kulsha et al., 2019).

Chernivtsi Region: Chernivtsi District, Kulykivka village, 17.10.2020, H. Apetri; Khotyn District, Hrynyachka village, 21.10.2019, Zh. Storozhenko; Vyzhnytsia District, Vyzhenka village, 19.06.2013, O. Volutsa; *ibid.*, 04.08.2020, O. Shcherbata.

Dnipropetrovsk Region: Novomoskovsk District, Samarskyi forest (Taran et al., 1989).

Donetsk Region: Svyatohirsk municipality, Svyatohirsk town, 18.07.2019, N. Mykhailchenko; Slovyansk District, Svyati Hory National Nature Park (Red Data..., 2009).

Ivano-Frankivsk Region: Dolyna District, 03.10.2020, H. Kornilo; Halych District, Halych National Nature Park, Krylos village, 20.09.2010 (Malanyuk, 2012, 2013, 2019); Pukasivtsi village, 02.11.2019, H. Marunchak; Kosiv District, Hutsulshchyna National Nature Park (Malanyuk, 2012); *ibid.*, autumn 2013 (Bisko et al., 2016); Kosiv town, 15.10.2013, 07.05.2014, 07.10.2014, Yu. Petrichuk (Petrichuk, Pasaylyuk, 2015); *ibid.*, 09.06.2019, 17.08.2020, S. Kozlan; Sheshory village, Hutsulshchyna National Nature Park, autumn 2013 (Bisko et al., 2016); Horod village, 07.10.2014, Yu. Petrichuk (Petrichuk, Pasaylyuk, 2015); *ibid.*, 09.06.2019, S. Kozlan; Kamenystyi ridge, September 2009–2011, 05.09.2012, 11.09.2013, September 2014, 15.07.2015, 01.10.2015, June & September 2016, L. Derzhypilsky, S. Fokshei (Fokshei, 2019); *ibid.*, 15.10.2013, Yu. Petrichuk, M. Pasaylyuk (Fokshei, 2019); Kosmach village, Kamenystyi ridge, Ladeskul mountain, September 2005, L. Derzhypilsky (Fokshei, 2019); Mykhalkova mountain, 25.10.2010, 13.10.2011, L. Derzhypilsky, S. Fokshei (2019); Lysyna Kosmatska mountain, 01.09.2013, O. Akulov, L. Derzhypilsky (Fokshei, 2019); Kernychnyi forst parcel, 15.10.2014, October 2017, L. Derzhypilsky, S. Fokshei (Fokshei, 2019); Sokilsky ridge, October 2014, 02.07.2018, S. Fokshei (Fokshei, 2019); Yabluniv settlement, 17.06.2020, O. Soltys; Nadvirna District, 16.09.2018, T. Hrabovska; Rohatyn District, 06.11.2020, V. Stasyshyn; Voroniv village, 27.05.2017, L. Babyak; Yaremche municipality, Vorokhta settlement, 11.08.2019, V. Ilchysyn; *ibid.* 27.09.2020, A. Yemchuk.

Kharkiv Region: Zmiiv District, Homilshanski Lisy National Nature Park, 02.07.2003, 19.07.2004, O. Akulov (Akulov, Leontyev, 2008; Usichenko, 2011).

Khmelnytskyi Region: Horodok District, Ivankivtsi village, 28.07.2019, V. Kydanchuk-Dronska.

Kirovohrad Region: Znamyanka District, Vodyane village, Chornoliskyi Landscape Reserve, 10.09.1977, V. Heluta, A. Bukhalo (Red Data..., 2009); *ibid.*, 16.09.2018, Yu. Vovkotrub; *ibid.*, 13.10.2018, O. Kyrpa.

Kyiv city: 30.05.2020, anonymous; Holiiv District, Feofania park, 27.10.2019, S. Strybozh; Holiiv National Nature Park, 11.11.2017, Ye. Rudenko; Kytaiv, 05.11.2017, 13.10.2018, O. Ivashchenko.

Kyiv Region: Borodyanka District, Koblytsya village, 15.11.2020, Ye. Plakhotnyuk.

Lviv Region: Lviv city, 29.09.2017, T. Vertepny; Lviv city, Vynnyky, 25.10.2020, U. Nych; Boryslav municipality, Skhidnytsya settlement, 02.10.2020, Yu. Bykova; Brody District, Perelisky village, 2012–2013, V. Batochenko (Batochenko, 2019); Drohobych District, Medvezha village, 11.10.2019, I. Blyznyk; Peremyshlyany District, Sukhodil village, 23.09.2018, A. Kozak; Pustomyty District, Lypnyky village, 27.07.2019, H. Pankiv; Sambir District, Sprynya village, 04.10.2020, O. Kit; Skole District, Skolivski Beskydy National Nature Park, 07.10.2016, O. Kamyrynskyi; Hrebeniv village, 09.09.1976, T. Horova (KW-M2073); *ibid.*, 15.08.1976, T. Horova (KW-M2076); Smozhe village, 12.09.1975, T. Horova (KW-M2074); Stryi District, 08.09.2020, Ya. Terletsky; 01.09.2020, I. Berezovskyi; Turka District, Verkhnye Husyne village, 12.07.2014, O.V. Babyichuk (Babyichuk, 2019); Yavoriv District, 22.09.2020, M. Holota; Domazhyr village, 20.10.2019, R. Kalyna; Roztochya Nature Reserve, 14.09.1991, 23.09.1996, 24.09.1997, 29.09.1998 (Baziuk, 2000); Roztochchya Nature Reserve, Vereshchytsia village, 11.09.2017, O. Stolyarov; Rokytno village, 12.09.2017, S. Dyomin; Stradch village, 19.09.1981 (Dudka, 2008); Zhovkva District, 12.09.2020, O. Korostynska; Rokytno village, 19.09.2017, K. Sokolov; Zarudtsi village, 08.09.2017, K. Sokolov; Zavadiv village, 27.07.2019, O. Yesipenko; Zhydachiv District, 15.09.2017, 06.11.2017, 26.07.2020, Ya. Terletsky; *ibid.*, 10.10.2020, M. Motychak; Zolochiv District, Cheremoshnya village, 09.10.2017, R. Yurechko (Yurechko, 2019); Pidhirne village, 30.09.2018, A. Servanchuk; Pobich village, 11.10.2018, V. Sapozhnyk, R. Yurechko (Yurechko, 2019); Trudovach village, 09.10.2017, R. Yurechko (Yurechko, 2019).

Mykolaiv Region: Voznesensk District, Trykraty village, 26.11.2020, O. Balahura.

Sumy Region: Krolevets District, near Krolevets town (Borščow, 1869); Trostyanets District, Trostyanets town, 25.10.2006, V. Parkhomenko (Karpenko, 2009).

Ternopil Region: Berezhany District, Berezhany town, Rai (Namysłowski, 1914); Terebovlya District, Strusiv village, mid-September 2016, O. Stolyarov.

Transcarpathian Region: Irshava District, Bilyk village, 23.10.2020, S. Dudash; Khust District, Drahove village, 05.10.2019, M. Popadynets; Mizhhirya District, Synevyrska Polyana village, September 2019, P. Shehda; Mukachevo District, Kolchyne village, 12.10.2009, R. Bilanych; Verkhnya Vyznytsia village, 28.10.2020, M. Chusa; Rakhiv District (Pilát, 1940); Pip Ivan mountain, Berlebash, August 1937 (Pilát, 1940); near the Bilyi Potik

River, October 1935 (Pilát, 1940); near the Mokranka River, August 1932 (Pilát, 1940); Svydovets, Kuzyi, August 1933 (Pilát, 1940); Kvasy village, 14.09.1954, 16.09.1954, M. Smitska; Carpathian Biosphere Reserve (Marmarosh massif), near Strungi mountain meadow, August 2016 (Akulov, 2016; Gleb et al., 2016); Petros mountain, 10.10.2010, Ye. Novosad; Perechyn District, Lumshory village, 23.07.2019, A. Zubenko; *ibid.*, 02.08.2020, O. Khaustova; Svalyava District, Svalyava town, 01.10.2017, I. Bezvershenko; *ibid.*, 23.10.2020, V. Rudenko; Polyana village, 17.09.2020, M. Sanytskyi; Uklyn village, 09.10.2017, V. Rudenko; Tyachiv District (Rekita, 2014), Carpathian Biosphere Reserve, Uholsko-Shyrokoluzhanskyi massif (Küffer et al., 2004); *ibid.*, 13.06.2018, A. Kozurak; Mala Uholka village, 14.09.1976, T. Horova (KW-M2075), *ibid.*, 23.10.2015, 25.09, 30.09.2017, R. Gleb; Uzhhorod District, Uzhhorod town, 10.09.2017, H. Ponomarenko; *ibid.*, 15.10.2017, Y. Dub; between Nevytske and Kamianytsia villages, 26.09.2014, O. Bezsmertna; Orikhovytsya village, 12.10.2020, I. Katrych-Rusyn; Kamianytsya village, 23.09.2020, O. Khartum; Velykyi Bereznyi District, Kostryna village, Uzhansky National Nature Park, 06.09.1954, M. Smitska.

Vynnytsia Region: Vinnytsia town, Piatnychany forest, 18.11.2020, O. Hershtyn.

Volyn Region: Kovel District, Kovel town, V. Heluta (Red Data..., 2009).

***Picipes rhizophilus* (Pat.) J.L. Zhou & B.K. Cui, in Zhou, Zhu, Chen & Cui, PLoS ONE 11(8): e0159495, 16. 2016**

This rare fungus inhabiting rhizomes of steppe grasses is confined to forb-bunchgrass and bunchgrass steppe communities in Ukraine. In the *Red Data Book of Ukraine* (2009), *Picipes rhizophilus* is listed under its synonymic name, *Polyporus rhizophilus* Pat. The largest number of occurrences of *P. rhizophilus* originates from the 1950s and 1970s, 17 and 8, respectively; most of these specimens, collected in five sites in the steppe zone (Donetsk and Luhansk regions), are deposited in the Fungarium (KW-M) at the National Herbarium of Ukraine (KW). There are only three additional records from Crimea and Luhansk Region reported in the early 2000s.

Distribution in Ukraine

Autonomous Republic of Crimea: Kazantyp Nature Reserve (Sarkina, 2008); Opuk Nature Reserve, July 2002 (Sarkina, 2004); Southern Coast of Crimea (Sarkina, 2008).

Donetsk Region: Nikolske District, Ukrainian Steppe Nature Reserve, Kamyani Mohyly branch, 01.06.1954, 03.09.1954, O. Boychuk (KW-M18449, KW-M18450); *ibid.*, 09.05.1955, I.N. Kolesnyk (KW-M18446); Novoazovsk District, Ukrainian Steppe Nature Reserve, Homutovskyi Step branch, 05.06.1970, I. Soldatova (KW-M18464, KW-M18465, KW-M18467); *ibid.*, 06.06.1970 (KW-M18466) (Soldatova, 1972); *ibid.*, 21.10.1972, I. Soldatova (KW-M18476).

Kherson Region: Chaplynka District, Askania-Nova Biosphere Reserve, 16.06.1970 (KW-M18470) (Soldatova, 1972; Wasser, Soldatova, 1977); Hola Prystan District, Chornomorskyi Biosphere Reserve, 06.06.1972 (Soldatova, 1972).

Luhansk Region: Dovzhansk District, Luhansk Nature Reserve, Provalskyi Step branch, Provallya village, 18.09.2005, M. Prydiuk (Prydiuk, 2005); Milove District, 1954, 1955, M. Zerova (Zerova, 1956, 1957; Soldatova, 1972); Luhansk Nature Reserve, Striltsivskyi Step branch, 30.05.1955, M. Zerova (KW-M18445); *ibid.*, 27.05.1956, 29.05.1956, 19.08.1956, 12.05.1957, 14.05.1957, 23.05.1957, 24.05.1957, 25.05.1957, 28.05.1957, Z. Sarycheva (KW-M18443, KW-M18448, KW-M18451–KW-M18457, KW-M18459); *ibid.*, 13.05.1958, O. Dubovyk, *ibid.*, 09.06.1956, O. Boychuk (KW-M18485); *ibid.*, 15.05.1971 (Soldatova, 1972).

***Polyporus umbellatus* (Pers.) Fr., Syst. Mycol. (Lundae) 1: 354. 1821 (Fig. 1, D)**

This rare species develops its distinctive fruitbodies at the trunk bases or on large underground roots of *Quercus* spp., *Fagus* spp., and *Carpinus* spp. In Ukraine it is known to occur in oak, oak-hornbeam, and beech forests. In the distribution map presented in the *Red Data Book of Ukraine* (2009), 12 sites are indicated. Since then, over 130 occurrences of *P. umbellatus* have been reported from new and already known localities. Thus altogether, a total number of the records has increased more than tenfold during 2009–2020. Moreover, records of this fungus at present are known from six more regions of the country: Chernivtsi, Ivano-Frankivsk, Khmelnytskyi, Vinnytsia, Volyn, and Zhytomyr regions. Majority of the reports came from Ivano-Frankivsk Region.

Distribution in Ukraine

Autonomous Republic of Crimea: Alushta municipality, Crimean Nature Reserve, autumn 1936, S. Gutsevich (Sarkina et al., 2003); Bakhchisarai District, Bilogirsk District, Simferopol District (Sarkina et al., 2003).

Cherkasy Region: Kaniv District, Kaniv Nature Reserve, 19.06–24.07.2009, 14.06–27.07.2010,

16.06.2011, June 2012, M. Prudenko; *ibid.*, 05.06.2014, 12.06–06.08.2015, 10.06–04.07.2016, 10.06.2017, 20.06.2018, Yu. Kulsha (Usichenko et al., 2005; Prudenko, Dzhagan, 2008; Kulsha et al., 2019); Monastyrshche District, Satanivka village (Red Data..., 2009).

Chernivtsi Region: Khotyn District, Blyshchad village, 16.08.2018, Zh. & Yu. Storozhenko (Storozhenko, 2019); Storozhynets District, Storozhynets town, 06.09.2018, V. Kravchuk; Vyzhnytsya District, Voloka village, July 2019, N. Kostyn; Zastavna District, Rzhavyntsi village, 20.06.2019, I. Rubtsov.

Ivano-Frankivsk Region: Bohorodchany District, Hrabovets village, July 2003, V. Malanyuk (Malanyuk, 2019); Rosilna village, 15.06.2016, R. Polivchak; Halych District, Halych town, 2011–2018, V. Malanyuk (Malanyuk, 2019); Halych National Nature Park, Krylos village, June–August 2010–2012, 14.07.2011, 26.08.2012, V. Malanyuk (Malanyuk, 2012; 2013, 2019); Kurypiv village, 20.06.2016, R. Polivchak; *ibid.*, 09.07.2020, V. Khrystyuk; Vysochanka village, 19.08.2010, 26.08.2012, V. Malanyuk (Malanyuk, 2019); Kalush District, Ripyanka village, 14.07.2017, R. Polivchak; Pidmykhailya village, 07.06.2018, 02.09.2018, 21.06.2019, 15.08.2019, V. Petriv; Kolomyia District, 15.06.2019, I. Popovych; Hrushiv village, 18.06.2019, M. Marunyak; Kosiv District, near Kosiv town, 25.06.2020, S. Kozlan; Hutsulshchyna National Nature Park (Malanyuk, 2012); Lucha village, 17.06.2014, S. Fokshei (Fokshei, 2016, 2019); Verbovets village, 19.06.2014, 24.06.2014, M. Pasaylyuk (Petrichuk, Pasaylyuk, 2015); *ibid.*, 19.06.2019, V. Tsymbalyuk; *ibid.*, June–August 2009–2018, L. Derzhypilskyi, S. Fokshei (Fokshei, 2019); Khimchyn village, 14.06.2005, L. Derzhypilskyi; *ibid.*, July 2011, 27.06.2015, S. Fokshei (Fokshei, 2019); *ibid.*, 19.06.2014, Yu. Petrichuk (Petrichuk, Pasaylyuk, 2015); *ibid.*, 07.06.2018, Z. Hostyuk (Fokshei, 2019); *ibid.*, 04.07.2019, G. Yuriychuk; Kamenystyi ridge, September 2014, 18.06.2018, L. Derzhypilskyi (Fokshei, 2019); Luchky village, 17.06.2019, P. Kornas; Rybne village, 21.06.2019, R. Drohomiretskyi; Pistyn village, 13.07.2019, S. Kozlan; Verbovets village, 19.06.2019, V. Tsymbaliuk; Tysmenytsia District, Staryi Lysets village, 23.07.2017, V. Soychuk.

Kharkiv Region: Zmiiv District, Homilshanski Lisy National Nature Park, Haidary village, 21.06.2002, 30.06.2003, O. Akulov, D. Leontyev (Akulov, Leontyev, 2008; Usichenko, 2011); Homilshanski Lisy National Nature Park, 11.06.2018, D. Leontyev, Yu. Bengus (Prylutsky et al., 2019); Krasnokutskyi District, Slobzhansky National Nature Park, Koziivka village,

19.06.2013, O. Prylutsky, N. Brusentsova (Brusentsova et al., 2019; Prylutsky et al., 2019).

Khmelnyskyi Region: Derazhnya District, Zharok village, 25.06.2020, P. Martyniuk; Horodok District, Sataniv town, 1936 (Bondartsev, 1953); *ibid.*, 22.06.2019, 24.08.2019, V. Kydanchuk-Dronkska; Shepetivka District, Kamyanka village, 07.07.2010, A. Kondratyuk.

Lviv Region: Lviv city, 12.06.2019, S. Hrytsyk; *ibid.*, 30.06.2019, A. Mazurok; *ibid.*, 01.09.2019, Y. Khmura; Mykolaiv District, 23.06.2019, O. Lupynis; Peremyshlyany District, Bibrka settlement, 01.09.2019, V. Tsepin; Pustomyty District, Tovshchiv village, 02.09.2018, A. Chukhan; Yavoriv District, Oselya village, 20.06.2020, O. Cherkes; Roztochya Nature Reserve, Stavky village, 11.07.1998, 12.09.1999 (Baziuk, 2000); Yavoriv National Nature Park, 16.08.2019, O. Ruchko; Zhovkva District, Krekhiv village, 07.06.2019, A. Blavatskyi; Zhydachiv District, Monastyrets village, 10.08.2018, R. Berezovskyi; Chertizh village, 03.07.2019, I. Berezovskyi; Zolochiv District, Verhobuzh village, 09.07.2017, 28.07.2018, R. Yurechko (Yurechko, 2019).

Sumy Region: near Sumy town, 20.06.1984 (Karpenko, 2004); *ibid.*, 24.07.2003, O. Rodina (KW-M25456); Sumy municipality, near Bytytsia village, 15.06.1988 (Karpenko, 2004).

Ternopil Region: Berezhan District, Berezhan town, Rai (Namysłowski, 1914); *ibid.*, 05.09.2017, O. Furdela; Buchach District, Pomirtsivka village, 26.06.2018, S. Andreiv; Trybukhivtsi village, 19.06.2019, S. Andreiv; Sokoliv village, 23.06.2019, S. Andreiv; Duliby village, 07.07.2019, S. Andreiv; Terebovlya District, Strusiv village, mid-September 2016, O. Stolyarov; Zalischyky District, Lytiachivka village, 08.07.2018, R. Kutyr.

Transcarpathian Region: Mukachevo District, near Berezhynka village, 16.08.2020, S. Miles; Perechyn District, Tur'i Remety village, 17.06.2007, O. Lozovyi; Turichky village, 13.07.2009, O. Senchylo (Dzhagan et al., 2010); Rakhiv District, Velykyi Bychkiv settlement, 24.06.2017, R. Gleb; Rosishka village, 26.06.2017, R. Gleb; Svalyava District, 17.06.2017, A. Voronyuk; Tyachiv District, Carpathian Biosphere Reserve, Uholsko-Shyrokoluzhanskyi massif, Mala Uholka forest parcel, 01.08.2014 (Gleb, 2016; Antosyak et al., 2019); *ibid.*, 05.07.2016, R. Gleb; Vynogradiv District, Cherna village, 18.06.2016, V. Gleba.

Vinnitsia Region: Bar District, Mankivtsi village, 12.07.2017, O. Stakhmych; Kalynivka District, Kalynivka town, 09.06.2019, Ya. Antonova; Vinnitsia District, Vinnitsia city, 30.05.2018, D. Zhyltsov;

Zhmerynka District, Novoselytsia village, 08.06.2019, I. Semeniuk.

Volyn Region: Kivertsiv District, Tsumanska Pushcha National Nature Park, Berestyane village, June 2016, M. Zykova; Lutsk District, Garadzha village, 14.07.2017, V. Revniuk.

Zhytomyr Region: Zhytomyr town, 08.08.2017, O. Leontiuk.

***Sparassis crispa* (Wulfen) Fr., Syst. Mycol. (Lundae) 1: 465. 1821 (Fig. 1, E)**

This is a wood decay fungus growing from trunk bases or roots of old coniferous trees, most frequently pines, but occasionally of spruce and fir trees as well. *Sparassis crispa* is listed as Endangered in the *Red Data Book of Ukraine* (2009), where its distribution map shows 12 sites for the species in the country. By 2020, the total number of finds has increased almost tenfold, up to about 120. However, these include some observations in reconfirmed sites, or within the same localities. Most frequently fruitbodies of *S. crispa* were observed in Kyiv Region, including Kyiv city surroundings, in 2017–2020. Recent reports also represent first records in the territory of six more regions in the country: Chernivtsi, Chernihiv, Donetsk, Ivano-Frankivsk, Khmelnytskyi, and Zhytomyr regions.

Distribution in Ukraine

Autonomous Republic of Crimea: Alushta municipality, Crimean Nature Reserve, bank of the river Kacha, autumn 1936, S. Gutsevich (Sarkina et al., 2003); Yalta municipality, Yalta Mountain Forest Nature Reserve, Simeiz; 21.10.1987, V. Isikov; *ibid.*, to southwest of Karagol lake, 07.10.1999, I. Sarkina (Sarkina et al., 2003).

Chernihiv Region: Chernihiv city, 12.09.2020, H. Sydorko; Bobrovytsia District, 06.10.2020, O. Skorokhod; Chernihiv District, Andriivka village, 12.09.2020, L. Radkovska; Kozelets District, Desna settlement, 18.08.2019, A. Skrypka; Mensk District, Makoshyne settlement, 19.10.2018, V. Bay.

Chernivtsi Region: Vyzhnytsia District, Myhove village, 01.09.2020, O. Kruhliy.

Donetsk Region: Donetsk city (Sukhomlyn, 2010).

Ivano-Frankivsk Region: Kosiv District, Hutsulshchyna National Nature Park (Bazyuk-Dubey, 2010).

Khmelnyskyi Region: Male Polissya National Nature Park, 09.10.2017, N. Kratasyuk; Shepetivka District, 28.10.2020, M. Bartoshchuk; Shepetivka town, 25.08.2020, R. Makarov.

Kyiv city: 18.10.2020, P. Karakay; 18.09.2020, L. Zinevych; 28.09.2020, O. Zykov; Desniansky District, Bykivnia Forest, 12.10.2017, Yu. Bykova; ibid., 13.06.2019, O. Opanasyuk; power plant №6, 01.10.2018, I. Nechyporenko; Holiiv District, Koncha-Zaspa, 21.09.2017, Z. Berest; ibid., 12.10.2017, L. Kapshuchenko-Pylypchuk; Obolon District, Pushcha-Vodytsia, 30.09.1970, L. Horovyi (KW-M2150); ibid., 01.10.2009, G. Dryhus (KW-M36427) (Dzhagan et al., 2010); ibid., 11.09.2017, O. Dytynenko; ibid., 10.10.2017, N. Kosynska-Honcharuk; ibid., 22.10.2017, Ye. Rudenko; ibid., 16.11.2017, V. Bogdanov; Mezhyhirya forestry, 08.10.2017, Ye. Rudenko; Dnipro water supply station (Vodohin), 21.10.2017, M. Bakumenko; ibid., October 2018, O. Frusevych; near Redkine lake (Ministerske lake), 30.07.2019, T. Vashkulat; Podilskyi District, Vynohradar, 30.09.2018, O. Stadnyuk; Svyatoshyn District, Novobilychi, V. Heluta; ibid., 24.08.2018, I. Yarchuk; ibid., near Romanivka village, 30.09.2018, O. Kalaydzhi.

Kyiv Region: Borodyanka District, Klavdievo-Tarasove settlement, 04.10.2019, S. Belyavsky; Piskivka village (Red Data..., 2009); ibid., 06.10.2018, 31.10.2020, A. Akulenko; Nemishaeve settlement, 02.09.2018, G. Molnar; Potashnya village, 13.11.2010, V. Heluta; ibid., 22.10.2011, V. Heluta; Boryspil District, Hnidyn village, 24.09.2017, N. Serha; Voronkiv village, 21.09.2020, N. Dan; Brovary District, 22.10.2020, T. Ulanova; Brovary town, 13.09.2011, O. Zykov; ibid., 16.10.2017, E. Anatskyi; ibid., 01.11.2018, O. Zynych; ibid., 29.09.2018, N. Zledenna; Zazymia village, 23.09.2017, A. Hladka; ibid., 29.09.2018, N. Zledenna; Fastiv District, Motovylyvka railway station, 2018, V. Karnakova; Irpin municipality, Vorzel settlement, 07.10.2020, N. Safina; Ivankiv District, Rozvazhiv village, 13.10.2019, O. Fostenko; Stanishivka village, 13.10.2019, O. Khlobystov; Kyiv-Svyatoshynski District, Boyarka, 12.09.2020, S. Trofimenko; Khotiv village, 02.10.2018, O. Pashchenko; Moshchun village, 30.09.2017, V. Moiseyenko; Gorbovychi village, 16.10.2017, O. Aleksikova; between Khodosivka and Lisnyky villages, 04.11.2017, M. Rusin; Maliutyanka village, 13.11.2017, Y. Sichkarenko; Makariv District, Komarivka village, 16.09.2017, A. Mazur; ibid., 19.10.2017, V. Hnatenko; ibid., 05.10.2018, I. Kravchenko; Polissya District, Romanivka village, 30.09.2018, O. Kalaydzhi; Vasylykiv District, Vasylykiv town, 16.10.2008; Danylivka village, 05.11.2019, K. Yurchenko; Dzvinkove village, 14.10.2020, O. Romanenko; Zdorivka village, 29.08.2020, M. Shevchenko; Vyshhorod District, 29.10.2020, O. Stepanov; ibid., 11.09.2020,

R. Kochuba; ibid., 08.11.2020, O. Komarovskiy; Dymer settlement, 03.11.2018, K. Klyueva; Kruhy village, 07.10.2017, I. Ivanova; Lyutizh village, 10.09.2017, O. Hanych; ibid., 11.11.2017, 30.09.2018, O. Kubatchenko; ibid., 30.09.2018, Ye. Rudenko; Katyuzhanka village, 03.11.2018, K. Klyueva.

Lviv Region: Lviv city, 22.09.2018, I. Bulyak; ibid., 10.08.2019, A. Makaryk; Pustomyty District, Derevach village, 05.10.1969 (Dudka, 2008); Skole District, near Trukhaniv village, 29.08.2020, anonymous (on spruce tree); Sokal District, Borove village, 27.10.2017, V. Bilas; ibid., 09.09.2018, V. Bortnyk; Horbkiv village, 04.11.2019, V. Rudenko; Staryi Sambir District, Katyna village, 27.08.2020, O. Derkach; Stryi District, Semyhyniv village, 29.09.2018, V. Fal; Yavoriv District, Ivano-Frankove settlement, 16.09.1998 (Baziuk, 2000); Seredkevychi village, 06.10.2019, V. Basaraba; Verbliany village, 15.10.2016, N. Deshchytsia; Vereshchytsya village, 14.10.2019, B. Horin; Zhovkva District, Dobrosyn village, 03.09.2017, H. Markelov.

Rivne Region: Dubrovytsia District, Dubrovytsia forestry, 11.09.1953, V. Solomakhina (Solomakhina, 1956, 1957); Ostroh District, Viliya village, 17.09.2017, A. Hulko; Mezhyrich village, September 2018, O. Holovko; Radyvyliv District, Soloniv village, 06.10.2019, V. Tkachuk; Sarny District, Chabel village, 30.09.2018, M. Melnyk; Volodymyrets District, Rafalivka settlement, 30.09.2018, O. Shatkovska.

Transcarpathian Region: Rakhiv District, Carpathian Biosphere Reserve, Marmarosh massif (Gleb et al., 2016); Kostylyvka village, Pip Ivan mountain, August 1936 (Pilát, 1940); Berlebash station, August 1937 (Pilát, 1940).

Volyn Region: Kamin-Kashyrskiy District, Klitytsk village, 20.10.2018, A. Parkhomchuk; Yalovatsk village, 24.10.2019, V. Ilchenko; Kivertsi District, Muravyshche village, early September 2004, O.P. Kurinchuk (Kurinchuk, 2005); Vesnyanka village, 17.09.2017, 29.09.2018, Yu. Prokopyuk; Lutsk District, Harasdzha village, 08.09.2016, V. Revnyuk; Manevychi District, Kolodii village, 06.09.2020, R. Hordiyevych; Pidhattya village, 13.09.2017, A. Voronyuk; Shatsk District, Shatsky National Nature Park, Svityaz village, 17.10.2018, K. Prasyuk; Vilshanka village, 24.10.2020, A. Klymyuk.

Zhytomyr Region: Malyn District, Zabrane village, 16.09.2017, S. Stepanyuk; Radomyshl District, 11.10.2020, A. Plyha; Zhytomyr District, Tryhirya village, 19.11.2017, 08.09.2018, V. Yakymchuk; ibid., 13.09.2018, T. Volodina.

Discussion

Since recently, a great opportunity to improve the information on fungal occurrence has been provided via mushroom citizen science, i.e. involvement of volunteers in collecting distribution data for macrofungi, particularly those having large, easily observed fruitbodies. Recent advances in digital technologies, viz. high-resolution photography, and in social networking services have facilitated public participation in mycological observations through social media, such as Facebook specialized groups and other platforms.

The past decade has seen a rapid increase in citizen science initiatives for collecting large-scale data on fungal diversity, including occurrence data for wood-inhabiting fungi (Heilmann-Clausen et al., 2016, 2019, and references therein). Various informal interest groups and citizen science projects guided by professional mycologists have appeared on the Internet in many countries in Europe and beyond, e.g. *Danish Fungal Atlas* (<http://www.svampeatlas.dk>, <https://svampe.databasen.org>), *Finnish Fungal Atlas* (<http://sieniatlas.fi>), *The Lost and Found Fungi Project* in the UK (<https://www.kew.org/science/engage/get-involved/citizen-science/lost-and-found-fungi>), *Mushroom Finder* in Austria (<https://www.univie.ac.at/oemykges/pilzfinder-at/>), *Fungal Diversity Survey* in North America (<https://fundis.org/>), *Fungimap Australia* (<https://www.inaturalist.org/projects/fungimap-australia>), etc. Field documentation contributed by amateurs during these projects has notably increased scientific knowledge on fungal diversity, habitat and substrate data as well as public awareness of fungal conservation.

The reported species of aphylloroid fungi are confined either to old-growth forests (*C. pistillar*, *G. clavatus*, *H. coralloides*, *P. umbellatus*, and *S. crispa*), or to steppe communities (*P. rhizophilus*). Due to continuous degradation of such habitats, these rare fungi are threatened from habitat loss and are legally protected in Ukraine. Until recently, there was still a significant lack of knowledge on their occurrence across the country. However, in recent years, as it is shown in this study, compiled lists of their records have considerably extended, in particular for *P. umbellatus*, *S. crispa*, and *H. coralloides*.

A huge increase in observation data for fungi in Ukraine has also happened as a result of recent flow of the information publically available online. The studied six species of aphylloroid fungi produce large and distinctive polyporoid, or clavarioid, or gomphoid

fruitbodies that usually cannot be overlooked. Overall views and close-up photographs of the observed fungi were taken by amateurs and uploaded to the Internet. These images have enabled professional mycologists, including the authors of this article, to verify reliable records and to compile datasets of the species distribution all over the country.

A great advantage of mushroom citizen science is collection of large amounts of data across large areas during a short optimal period for fungal fruiting that would be impossible otherwise. As a result, for some species a total number of records has increased exponentially. At the same time, almost all observations are located within the expected habitat ranges and thus fit into distribution patterns of the species. Likewise, a seemingly positive population trend does not reflect population growth, but rather fills the gaps in our knowledge on distribution of these fungi in the country.

Importantly, the compiled data serves as a considerably improved basis for future re-assessments of the Red List status of these fungi in Ukraine. On that basis, distribution maps will be produced and the species will be evaluated against the IUCN criteria for the next edition of the *Red Data Book of Ukraine*. Beyond that, information posted on social media is important for sharing and learning, and thus for enhancing public awareness of the protection of these threatened species of fungi. This is particularly true for *P. umbellatus*, *S. crispa*, and *H. coralloides* that otherwise would be likely picked up as edible fungi.

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Шевченко М.В., Гелюта В.П., Зикова М.О., Гайова В.П. 2021. **Сучасні дані про поширення видів афілофороїдних грибів, включених до Червоної книги України.** *Український ботанічний журнал*, 78(1): 47–61 [In English].

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Реферат. У статті подано узагальнену інформацію про поширення в Україні шести видів рідкісних афілофороїдних грибів (*Agaricomycetes*, *Basidiomycota*), включених до Червоної книги України – *Clavariadelphus pistillaris*, *Gomphus clavatus*, *Hericium coralloides*, *Picipes rhizophilus*, *Polyporus umbellatus* і *Sparassis crispa*. Для цих видів наводиться загалом на території країни близько 500 місцезростань; із них понад 410 виявлено після виходу у світ третього видання "Червоної книги України" у 2009 р. Значна частина цієї інформації була надана мікологами-аматорами, залученими упродовж кількох останніх років до збору даних про поширення на території країни грибів із добре помітними плодовими тілами. У статті подано виключно перевірену фахівцями інформацію про трапляння шести зазначених видів грибів. Узагальнені дані про поширення цих видів, що перебувають під загрозою зникнення, будуть використані для оцінки їхнього природоохоронного статусу у наступному виданні "Червоної книги України".

Ключові слова: *Gomphales*, *Polyporales*, види під загрозою зникнення, мікологи-аматори, охорона грибів, поширення, Червона книга України