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Rare polypore *Obba rivulosa* (Fungi, *Basidiomycota*) found for the first time in the Czech Republic – on charred wood after a big fire near Hřensko

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Holec J., Vampola P., Zíbarová L., Tomšovský M. (2026): Rare polypore *Obba rivulosa* (Fungi, *Basidiomycota*) found for the first time in the Czech Republic – on charred wood after a big fire near Hřensko. – Czech Mycology 78(1): 23–37.

Three years after a large-scale fire in the Bohemian Switzerland National Park (Czech Republic), the rare species *Obba rivulosa* was found at three locations. Its basidiomata grew on burnt stumps of *Picea abies* and on a fallen, charred trunk of *Pinus sylvestris*. The macromorphological and micromorphological characters of the found basidiomata are briefly summarised. The obtained ITS barcode fits the European subpopulation, which may represent a cryptic species. Habitats of the finds are described and discussed in detail. The occurrence of *O. rivulosa* on burnt wood is reported in the literature, but its connection to this substrate may be stronger than previously expected. This is evidenced by the fact that during the long history of intensive research on polypores in the Czech Republic, the species had never been recorded, while it recently suddenly appeared at three burnt sites within one year.

Key words: *Gelatoporiaceae*, Czech Switzerland National Park, ITS DNA, ecology, succession, burnt conifer wood.

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Holec J., Vampola P., Zíbarová L., Tomšovský M. (2026): Vzácný choroš *Obba rivulosa* (Fungi, *Basidiomycota*) nalezen poprvé v České republice – na ohořelém dřevě po obrovském požáru u Hřenska. – Czech Mycology 78(1): 23–37.

Tři roky po rozsáhlém požáru v Národním parku České Švýcarsko byl na třech lokalitách nalezen vzácný choroš *Obba rivulosa*. Jeho plodnice vyrostly na spálených pařezech smrku ztepilého (*Picea abies*) a na padlém ohořelém kmeni borovice lesní (*Pinus sylvestris*). Stručně jsou shrnuty makromorfologické a mikromorfologické znaky nalezených plodnic. Získaná sekvence DNA zapadá do evropské subpopulace, která může představovat samostatný kryptický druh. Podrobně jsou popsána a diskutována stanoviště nálezů. Výskyt *O. rivulosa* na spáleném dřevě je v literatuře uváděn, ale vazba

na tento substrát může být silnější, než se dříve myslelo. Důkazem toho je skutečnost, že během dlouhé historie intenzivního studia chorošů v České republice nebyl tento druh nalezen, zatímco nyní se během jednoho roku náhle objevil na třech požárem zasažených lokalitách.

INTRODUCTION

In the summer of 2022, a big fire affected the National Parks (NP) of Bohemian Switzerland (České Švýcarsko) and Saxon Switzerland (Sächsische Schweiz) (Hruška et al. 2022, 2023, Boháč & Drápela 2023, Patzelt 2023, Salov 2024, Špulák 2024). The area represents a sandstone landscape with a characteristic geomorphology of rocks, deep valleys, and occurrence of relevant habitats. On permeable sandstone bedrock, the soil and litter dry out easily in summer, especially in the recent series of very warm and dry years, which increases the risk of fire. The fire was caused by still unclear human activity on July 23, 2022 in Malinový důl gorge near the village of Hřensko and lasted for 20 days in Bohemian Switzerland. Even though the fire was extinguished with all available means (Špulák 2024), it gradually affected more than 1,060 ha of the park territory (about 13% of the Bohemian Switzerand NP area). All major habitats were affected regardless of whether they were located on dry or waterlogged soil, i.e. both healthy spruce (*Picea abies*) forests and those killed with bark beetles, clearings covered by grass, beech (*Fagus sylvatica*) forests, and pine (*Pinus sylvestris*) forests on sandstone rocks (Hruška et al. 2023).

After the fire, natural succession of all groups of organisms began very soon. Currently (autumn 2025), the burnt areas are covered by a dense growth of 2–5 m high birches (*Betula* sp.) with an admixture of saplings, especially of aspen (*Populus tremula*), pine (*Pinus sylvestris*), and larch (*Larix decidua*), with an undergrowth of mosses, herbs, and bracken (*Pteridium aquilinum*). Researchers from various fields of the natural sciences reacted quickly to the event and some results have already been published (e.g. Kudláčková et al. 2024, Lanta et al. 2025, Šebek et al. 2025, Yilgan et al. 2025).

Mycologists did not hesitate either, keen on the possibility of observing fungal succession in such a large area affected by fire (see Fox et al. 2022 for a summary of the knowledge on fire and fungi). A pre-selection of suitable study areas was made by J. Holec together with I. Marková from the Bohemian Switzerland NP Administration on September 12, 2022. A team consisting of J. Holec, L. Zíbarová, and M. Kříž subsequently visited areas most severely affected by fire on September 23, 2022. They recorded a mass occurrence of anthracophilous ascomycetes there, especially of the genus *Anthracobia*. Extensive research then continued until the end of the season. The same team, with a contribution by P. Zehnálek, then intensively monitored the occurrence of fungi in 23 permanent plots 10 × 10 m

in size in several different habitats burnt at varying intensity in the vicinity of Hřensko, in Pravčický důl gorge, and Černý důl gorge in 2023–2025. Some interesting partial results have already been published (Holec et al. 2023, Holec & Zehnálek 2024) and a comprehensive article on the monitoring results is under preparation. It can only be briefly summarised here that most of the terrestrial anthracophilous fungi already receded by the end of the third year, being replaced by a mass occurrence of saprotrophic and mycorrhizal fungi.

During summer and autumn 2025, an unknown polypore was collected on burnt conifer wood in three plots (PD6 at Pravčický důl, CD5 and CD8 at Černý důl). Subsequently, P. Vampola identified it as *Obba rivulosa* (Berk. & M.A. Curtis) Miettinen & Rajchenb., a rare species already partially known from charred wood (e.g. Kotiranta 1985, Gilbertson & Ryvarden 1986, Ryvarden & Melo 2017, Bernicchia & Gorjón 2020, Anonymus on-line a), which was not yet known from the Czech Republic, although it had been previously discussed by Czech authors (Vampola & Pouzar 1996). The aim of the article is to briefly present its main features and its ecology in Bohemian Switzerland, and put this information in the context of previously published data on the species.

MATERIAL AND METHODS

Basidiomata of *Obba rivulosa* were found during regular monitoring of 23 permanent 100 m^2 square plots (10 × 10 m), sampled four times a year (spring, summer, autumn, late autumn) for occurrences of macrofungi in 2023–2025. In the field, the collections of *O. rivulosa* were provisionally identified as inconspicuous common species (namely *Antrodia serialis*, *Physisporinus sanguinolentus* s.l. or '*Poria*'). Therefore, their appearance when fresh was not captured by means of a description or photography. The geographical coordinates given for the individual collections of *O. rivulosa* were not targeted at the occurrence of basidiomata, but represent the centre of the research plot. With regard to the fact that the real accuracy of handheld GPS devices, in our case Garmin GPSmap 60CSx, is 3–5 m depending on signal quality, the deviation between the coordinates of the centre of the plot and the real location of the fungus is fully within the limits of measurement accuracy. The collections are therefore localised sufficiently accurately. Micromorphological identification of the material was carried out by P. Vampola using a light microscope and Melzer's reagent in January 2026. For micromorphological characters, the number of measurements is given in brackets for all four collections. Voucher specimens are deposited in the Mycological Department of the National Museum, Prague (fungarium PRM) and the private fungarium of L. Zíbarová (L. Z.).

DNA was extracted from dried tissue, and the ITS region of the ribosomal RNA gene (ITS) was amplified according to Tomšovský et al. (2025). The dataset of ITS sequences was completed with sequences of *Obba rivulosa* from various countries, other *Obba* species and species from related genera *Cinereomyces*, *Gelatoporia*, and *Sebipora* (Yao et al. 1999, De Koker et al. 2003, Tomšovský et al. 2010, Miettinen & Rajchenberg 2012, Floudas & Hibbett 2015, Ren et al. 2017, Wang et al. 2020, Luo & Zhao 2022). *Mycoleptonodoides* spp. were selected as the outgroup according to results by Justo et al. (2017). All the additional sequences were retrieved from GenBank.

The phylogenetic inference based on maximum likelihood criteria was conducted by IQ-Tree, featuring automatic model selection (ModelFinder) and ultrafast bootstrapping with 10,000 replicates. The analysis was performed in Galaxy, Version 2.4.0+galaxy1 (Minh et al. 2020; https://usegalaxy.eu).

RESULTS

Obba rivulosa (Berk. & M.A. Curtis) Miettinen & Rajchenb., Mycol. Progr. 11(1): 142, 2012

≡ *Polyporus rivulosus* Berk. & M.A. Curtis, J. Linn. Soc., Bot. 10 (no. 45): 318, 1868 [1869]
≡ *Poria rivulosa* (Berk. & M.A. Curtis) Cooke, Grevillea 14 (no. 72): 109, 1886
≡ *Physisporinus rivulosus* (Berk. & M.A. Curtis) Ryvarden [as *'rivulosa'*], Mycotaxon 20(2): 353, 1984
≡ *Ceriporiopsis rivulosa* (Berk. & M.A. Curtis) Gilb. & Ryvarden, N. Amer. Polyp., Vol. 1 *Abortiporus – Lindtneria* (Oslo): 194, 1986
= *Poria albipellucida* D.V. Baxter, Pap. Mich. Acad. Sci. 23: 291, 1938 [1937]

Representative descriptions and illustrations. Kotiranta (1985: 67, 68), Ryvarden & Gilbertson (1994: 538), Bernicchia & Gorjón (2020: 480), Rivoire (2020: 544).

Morphology of dried basidiomata (Figs 1–3). Basidiomata fully resupinate, forming either irregular coatings with protrusions or elongated growths along wood cracks when young, several centimetres long, then forming nodular steps of tubes on a vertical substrate, whitish to creamy when young, then yellowish towards the centre, with a white, fringed to cottony edge, at maturity turning ochraceous on the lateral side of the steps after drying or bruising, pores white, irregularly polygonal to elongated, finely toothed under a lens, 3–4/mm.

Fig. 1. *Obba rivulosa*, Pravčický důl, study plot PD6, leg. L. Zíbarová (L. Z. 12878). Scale bar = 10 mm.

Fig. 2. *Obba rivulosa*, Černý důl, study plot CD5, leg. J. Holec (PRM 964721). Scale bar = 10 mm.

Fig. 3. *Obba rivulosa*, Černý důl, study plot CD8, leg. L. Zíbarová (L. Z. 12879). Scale bar = 10 mm. Figs 1–3 represent dried basidiomata from fungaria. Photos by J. Holec.

M i c r o m o r p h o l o g y. Basidiospores (57) broadly ellipsoidal to subglobose, (3.8)4.0–6.0(6.4) × (3.6)3.8–4.6(5.0) µm. Basidia (60) broadly clavate, 12–28 × 5–11 µm. Cystidioles (51) narrowly to broadly fusiform, some of them lageniform, 14–31 × 4–10 µm. Hyphal system monomitic. Generative hyphae (36) 2.0–4.3 µm in diameter, with clamp connections.

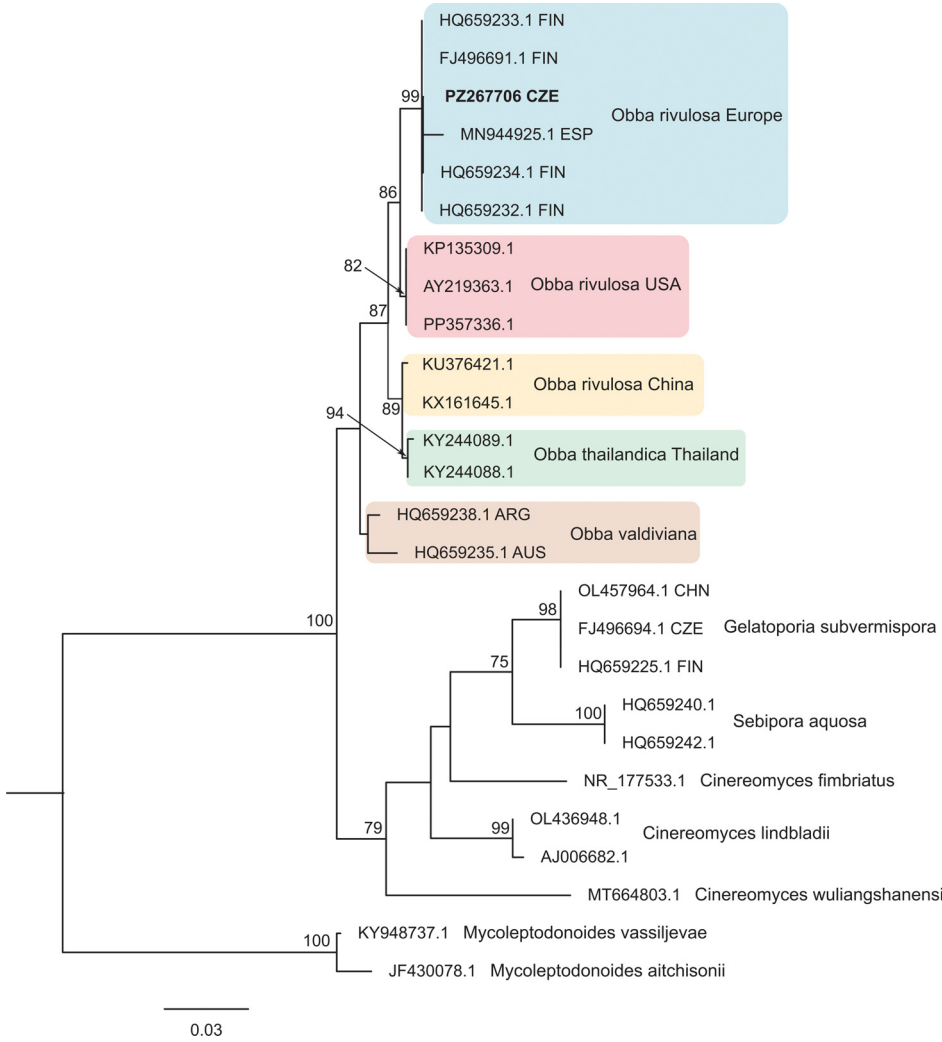

Fig. 4. Phylogenetic position of sequenced *Obba rivulosa* specimen (PRM 964721). The newly obtained sequence is highlighted in bold. Country codes follow the ISO 3166 standard. Numbers at the branches indicate maximum likelihood bootstrap proportions. The bar indicates the number of expected substitutions per position. DNA sequences of *Mycoleptodonoides* spp. were selected as the outgroup.

Phylogeny. Fig. 4 presents the phylogenetic position of sequenced specimen PRM 964721 (GenBank accession no. PZ267706) among other sequences of *Obba rivulosa* from Europe. Almost all sequences of *O. rivulosa* from Europe are from Finland, only the sequence of MN944925 refers to a root tip of *Castanea* from Spain, which confirms the wide ecological amplitude of the fungus. The phylogenetic tree revealed significant genetic differences between *O. rivulosa* populations from different continents, if compared to the related *Gelatoporia subvermispora*.

Studied collections

Czech Republic. Bohemian Switzerland National Park:

– approx. 3.6 km ENE of Hřensko, Pravčický důl gorge, south-western slope, 290 m a.s.l., 50°52.824' N, 14°17.512' E, permanent mycological research plot **PD6** [40 m NW of this plot is a study site (T1940055) of the Institute of Botany of the Czech Academy of Sciences with a microclimate sensor], on charred fallen trunk of *Pinus sylvestris*, 31 Jul 2025, leg. L. Zíbarová, det. P. Vampola (L. Z. 12878).

– approx. 4.4 km E of Hřensko, Černý důl gorge, southern slope, 250 m a.s.l., 50°52.766' N, 14°18.235' E, permanent mycological research plot **CD5** and study site H9 of the Institute of Botany of the Czech Academy of Sciences with a microclimate sensor just a few metres from plot CD5, on burnt wood of charred stump of *Picea abies*, 14 Oct 2025, leg. J. Holec JH 108/2025, det. P. Vampola (PRM 964720); ibid., 20 Nov 2025, leg. J. Holec JH 149/2025, det. P. Vampola (PRM 964721; DNA sequence of ITS deposited in GenBank under accession no. PZ267706).

– approx. 5 km E of Hřensko, Černý důl gorge, southern slope, 290 m a.s.l., 50°52.879' N, 14°18.732' E, permanent mycological research plot **CD8**, on unburnt part of charred *Picea abies* stump, 20 Nov 2025, leg. L. Zíbarová, det. P. Vampola (L. Z. 12879).

Habitats. Before the fire, plots CD5 and CD8 at Černý důl were clearings after spruce plantations which had died after 2015 due to a bark beetle outbreak and had subsequently been cut down as part of calamity logging (Fig. 5). While plot CD5 had only sporadically developed vegetation according to aerial maps just before the fire (19 July 2022, mapy.com; accessed 26 Jan 2026), the centre of plot CD8 was located in a dense stand of bracken (*Pteridium aquilinum*). During the fire, both plots were heavily damaged by the fire, as were their surroundings (partly clearings, partly spruce forests still standing but killed by bark beetles, at a greater distance also sloping beech(-pine) forests and rocky pine forests), so all aboveground vegetation and the plant litter was burnt and the remaining spruce stumps were charred severely. Immediately after the fire, both sites had the appearance of completely burnt, black areas with charred stumps. While this remained so in plot CD5 by the end of 2022, in plot CD8, *Pteridium* quickly regenerated from the rhizomes which had survived the fire belowground. As described in the Introduction, succession then progressed very quickly in both plots. In the autumn of 2025, a dense stand of young birch trees 2–5 m high had already developed in the CD5 plot (Fig. 6) and the surface was mostly covered by a mosaic of grasses, herbs, mosses, and litter of mainly birch leaves. In the CD8 plot, the birch stand was much sparser, because succession towards forest was blocked by the recovered dense stand of *P. aquilinum*.

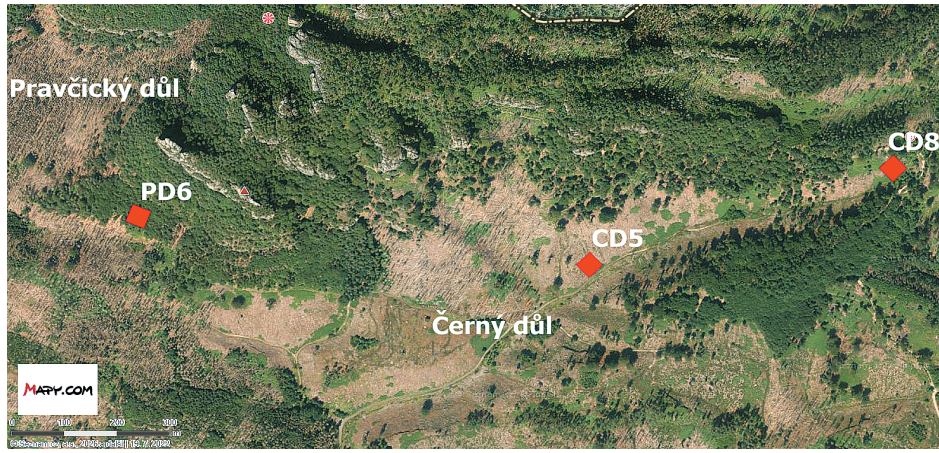

Fig. 5. Location of research plots with *Obba rivulosa*. The plots (10 × 10 m in size) are indicated as red squares enlarged for better visibility. The basis is an aerial photograph from 19 July 2022, shortly before the fire. At that time, the PD6 plot consisted of an acidophilic beech forest with scattered pine trees, the CD5 plot of a clearing after a felled spruce plantation, as well as the CD8 plot, which was however subsequently overgrown with *Pteridium aquilinum*. All three plots were affected by fire during the summer of 2022. Source of underlying photograph: Mapy.com.

Fig. 6. Černý důl, 12 June 2025. View from the upper part of the valley in southwestern direction. The burnt areas are already covered by a dense growth of birch with an admixture of other tree species. The southern slope with study plot CD 5, site of occurrence of *Obba rivulosa* in 2025, is marked with an ellipse. Photo L. Zíbarová.

Fig. 7. Pravčický důl, plot PD6, 4 April 2023. The fallen, charred pine trunk on which *Obba rivulosa* basidiomata appeared in 2025, is visible in the foreground. The standing beech and pine trunks were also charred, which led to their death. Photo L. Zíbarová.

In contrast to the plots at Černý důl, plot PD6 at Pravčický důl (Fig. 7) was a mixed forest with a native tree species composition before the fire (mainly beech with admixture of pine, and with occasional birch and oak in the vicinity; mapped as Czech habitat type L5.4 – acidophilic beech forest, according to data on website aopkcr.maps.arcgis.com, Chytrý et al. 2010). The intensity of the fire was lower here, but the litter, lying wood and standing trees were burnt. All trees in the plot had completely died by the end of 2023. Mass rejuvenation of birch also took place here, although to a lesser extent in terms of density and growth rate. The pine trunk on which *Obba rivulosa* was found had already fallen before the fire and was thus exposed to intense fire and charred over almost its entire surface.

Discussion

Taxonomy

The micromorphological characteristics of our collections generally correspond to already published descriptions (e.g. Kotiranta 1985, Ryvarden & Melo 2017), except for the larger spore size range (3.8–6.4 × 3.6–5.0 µm). *Obba rivulosa* is characterised by white basidiomata, creamy to light ochre-brown when dry, resupinate, annual or biennial, up to 3 mm thick, with small polygonal pores, a monomitic hyphal system, almost spherical spores, generative hyphae with clamps (best visible in places of hyphal branching, observation by L. Zíbarová), absence of true cystidia and, conversely, presence of prominent fusiform cystidioles (Ryvarden & Gilbertson 1994, Ryvarden & Melo 2017). Species of the very similar but unrelated genus *Physisporinus* have generative hyphae without clamps.

Based on molecular data, Miettinen & Rajchenberg (2012) showed that our species belongs to the *Cinereomyces* clade within *Polyporales*, together with *Cinereomyces*, *Gelatoporia*, and *Sebipora* (presently *Gelatoporiaceae*, see Justo et al. 2017), and introduced the generic name *Obba* for it. The revealed genetic heterogeneity (Fig. 4) suggests possible existence of geographically separated cryptic species (see also Miettinen & Rajchenberg 2012, Ren et al. 2017). To address this problem seriously, more sequenced collections, more genes and molecular data from the holotype or recent collections from Cuba will be needed.

Habitat

The species was found both on sites of former spruce plantations on the gentle slopes of Černý důl and in a natural stand of acidophilic beech forest with admixed pine on a steep slope at Pravčický důl. After 2015, the mature even-aged spruce stands at Černý důl were affected by bark beetles following a history of severe droughts, and dead trees were cut down as part of calamity logging at the sites of both records and in their broad surroundings (Fig. 5). This 'removal' management practice was not applied everywhere in the Bohemian Switzerland NP. For example, in the neighbouring Pravčický důl, dead spruce trees were left standing (Fig. 5, top left). By contrast, the stands of acidophilic beech forest were alive before the fire (Fig. 5, see the area around PD6). The three microlocalities of *Obba rivulosa* share the fact that they were exposed to fire at a greater or lesser extent during the 2022 fire. The basidiomata started to develop on partly burnt substrates (spruce stumps and a fallen pine trunk) three years after the fire. Thanks to the monitoring of relevant plots, we know that they had not appeared there before.

Distribution and ecology

Obba rivulosa was described from Cuba and is also found in the USA including Alaska, Canada, Dominican Republic, Argentina, Chile, Australia, and Europe (Kotiranta 1985, Miettinen & Rajchenberg 2012, Ryvarden & Melo 2017, Angelini & Losi 2024). According to the GBIF database (Anonymus on-line a), there are also finds or sequences from Costa Rica, Ecuador, Uganda, Ethiopia, Russia, India, China, Thailand, Vietnam, and New Zealand. Although it is generally a rare species, in Europe it is known from a number of countries: Great Britain, France incl. Corsica, Madeira (Portugal), Spain, Italy, Germany, Poland, former Yugoslavia, Sweden, Finland, Estonia, Belarus (Kotiranta 1985, Vampola & Pouzar 1996, Karasiński & Wołkowycki 2015, Ryvarden & Melo 2017, Bernicchia & Gorjón 2020, Anonymus on-line a, Anonymus on-line b). However, some of the records could refer to *Obba valdiviana* (Rajchenb.) Miettinen & Rajchenb. from the Southern Hemisphere (Miettinen & Rajchenberg 2012) or *Obba thailandica* G.J. Ren & F. Wu described from Thailand (Ren et al. 2017). If populations from different continents are confirmed to represent separate species (see Taxonomy), the ecology and distribution data for each of them will need revision.

Obba rivulosa is a white-rot fungus growing on deadwood of conifers (*Abies* spp., *Pinus*, e.g. *P. sylvestris*, *P. halepensis*, *P. nigra* subsp. *laricio*, *P. pinaster*, and *P. monticola*, as well as *Pseudotsuga menziesii*, *Sequoia sempervirens*, *Thuja plicata*, and *Tsuga heterophylla*) and deciduous trees (*Alnus*, *Castanea*, *Populus*, *Quercus*) (Kotiranta 1985, Ryvarden & Melo 2017, Rivoire 2020). Our records come from burnt wood of spruce (*Picea abies*) and Scots pine (*Pinus sylvestris*). Surprisingly, spruce is a tree species not cited among the substrates in the abovementioned works. However, spruce wood was successfully used for experiments with laboratory cultures of *O. rivulosa* (Marinovíc et al. 2022). It is important to note that we have also found other fungi on charred spruce trunks and stumps in Bohemian Switzerland which we had previously not considered typical of this substrate. These include *Dichomitus squalens* (P. Karst.) D.A. Reid and *Vitreoporus dichrous* (Fr.) Zmitr.

Ryvarden & Melo (2017) characterise *O. rivulosa* as a species often found on burnt wood, but not specifically. Gilbertson & Ryvarden (1986) also refer to finds from "living redwood". Ryvarden & Gilbertson (1994: 538) state that the species is the main cause of heartwood rot in redwood (*Sequoia*) trunks in North America. Vlasák (2015) collected *O. rivulosa* in the hollows of burnt sequoias in the USA. Also its sister species *Obba thailandica* was described from charred wood. As a white-rot fungus, *Obba rivulosa* was studied for its ability to decompose lignin (see e.g. Miettinen et al. 2016, Wallenius et al. 2021, Marinovíc et al. 2022).

If the mycelium of *O. rivulosa* occurs mainly in heartwood, it may already have been present inside living trees and the subsequent burning of the wood

could have induced the formation of basidiomata three years later. American records both from living *Sequoia* and hollows of burnt individuals of the same tree species (see previous paragraph) fit to this. However, this speculation would best be confirmed by culturing or DNA metabarcoding of the fungus from wood samples. Another possibility is that the fungus had reached the locality by transfer of spores from a distant area and subsequently produced basidiomata on the suitable substrate, charred wood. Thanks to regular monitoring of the 23 study plots, we know with certainty that *O. rivulosa* first appeared in three of them in the summer and autumn of 2025. It is also significant that during the long history of intensive study of polypores in the Czech Republic (summarised e.g. by Kotlaba 1984, Vampola & Charvátová 2021), the fungus had not been recorded, while it suddenly appeared at three burnt sites after the big fire near Hřensko. This suggests that charred wood is a substrate preferred by *O. rivulosa*, which may be explained by the widespread availability of specific compounds in burnt wood, the suppression of competing fungi directly damaged by the fire, nutrient deficiency in burnt substrates, or extreme fluctuations in temperature and humidity at burnt sites (Fox et al. 2022, Lanta et al. 2025).

Bernicchia & Gorjón (2020) noted that *O. rivulosa* is often found near streams and in places periodically flooded. It should be noted that two of our records come from a slope near the floor of Černý důl gorge, where waterlogged sites still occur. These turn into periodically flowing stream after heavy rains, which further increases humidity. However, the location at Pravčický důl is completely different, lying on a steep and desiccating southwestern slope.

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