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The *Hymenochaete cinnamomea – H. fuliginosa* complex (*Hymenochaetales, Basidiomycota*): a revision

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Abstract: The taxonomy of two collective *Hymenochaete* species, *H. cinnamomea* and *H. fuliginosa*, is revised via morphological evidence and DNA data (ITS, LSU, and *TEF1* regions). Study of the type of *Thelephora fuliginosa* (= *H. fuliginosa*) revealed that the name should be placed among the synonyms of *Hydnoporia tabacina*. As hitherto understood, *H. fuliginosa* is shown to cover six species, viz. the reinstated *H. fusca* and *H. tenuis*, both widespread in the Northern Hemisphere, and four new species, *H. clandestina* (Europe and Macaronesia), *H. furva* (North Europe), *H. lesurae* (Central Europe), and *H. obsoleta* (the North American North-West). The name *H. tenuis* was misapplied in East Asia, and a new species, *H. daurica*, is therefore described. The present concept of *H. cinnamomea* covers at least ten species. Of them, *H. arida*, *H. cinnamomea* s. str., *H. fibrillosa*, *H. laxa*, *H. rudis*, and *H. spreta* are restored as good species, and *H. floccula* (East Asia), *H. scabra* (North America and Europe), *H. similis*, and *H. tenebraria* (North America and East Asia) are introduced as new. Additionally, the identity of *H. carpatica*, *H. corticolor*, and *H. epichlora* is clarified based on newly collected and sequenced material.

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INTRODUCTION

Hymenochaete (*Hymenochaetales*, *Basidiomycota*) is a genus of crust fungi easily recognizable due to the presence of setae, i.e. tapering, dark-coloured cells often projecting above the hymenial surface. The original generic concept was proposed by Léveillé (1846) and further elaborated by Cooke (1880), Massee (1890), Bresadola (1897, 1903), and Burt (1918). Because of quite uniform macroscopic and anatomical traits, *Hymenochaete* spp. were believed to form a natural genus. Recent DNA studies corrected this viewpoint and showed that several hydnoid and poroid taxa previously classified in *Cyclomyces*, *Hydnochaete* and *Inonotus* belong to *Hymenochaete* (Wagner & Fischer 2002, He & Dai 2012, Parmasto *et al*. 2014). At the same time, a few species with smooth or hydnoid hymenophore related to *Hymenochaete tabacina* were excluded from the genus and eventually found their place in *Hydnoporia* (Wagner & Fischer 2002, Binder *et al.* 2005, He & Dai 2012, Miettinen *et al.* 2019). However, most of these studies did not critically reevaluate species concepts from older literature when transferring these species into or out of *Hymenochaete*.

The present paper deals with two resupinate species, *Hymenochaete cinnamomea* and *H. fuliginosa*, which are considered widespread and common in Europe and North America (Parmasto 2001, Corfixen & Parmasto 2017). Both species were shown to belong to the core of *Hymenochaete* (Parmasto *et al.* 2014, Spirin *et al*. 2015, Liu *et al*. 2025) although their identity was never critically revised. Parmasto (2001) stated that the type specimens of both species were likely lost. We were able to locate the type material of *Thelephora fuliginosa* Pers. in Leiden (Persoon's herbarium in L) and of *T. cinnamomea* Pers. in Uppsala (Fries's herbarium in UPS). These types were the starting point for a revision of *H. cinnamomea* and *H. fuliginosa* and their presumed synonyms. In total, nineteen species from this group are treated below, of which nine are described as new to science. Additionally, we provide the first ITS sequences of *H. carpatica* from Europe and *H. corticolor* from North America; the latter species is redescribed based on the type material and newly obtained and sequenced specimens.

MATERIAL AND METHODS

Specimens and morphology

Type specimens and other collections from fungaria H, GB, O, UPS, L, LE, TUF, GJO, NY, PC, K, ARAN, C, NYS, LJF were studied. Fungarium acronyms are given according to Index Herbariorum (Thiers 2025). Studied collections with DNA sequences are marked with asterisk (*). Microscopic routine and terminology follow Spirin *et al.* (2015) and Miettinen *et al.* (2019). All structures were measured from microscopic slides mounted in Cotton Blue, using phase contrast and oil immersion lens (Leitz Diaplan microscope, ×1250 amplification). In total, 30 basidiospores, 20 setae and at least 10 basidia and subhymenial / subicular hyphae were measured per each specimen studied. The following abbreviations are used in morphological descriptions: L – mean basidiospore (setal) length, W – mean basidiospore (setal) width, Q' – length / width ratio, Q – mean length / width ratio, n – number of measurements per specimens measured. Basidia of all species dealt with below are rather uniform, cylindrical or narrowly clavate, with a slight median constriction; we therefore do not specify their shape in each species description. Measuring basidia in most *Hymenochaete* spp. is challenging because of tightly arranged hymenial cells and the frequent presence of secondary septa in basidial cells. We therefore considered a distance between the basidial top (excluding sterigmata) and the septum next to the medial constriction as the length of the basidium.

DNA amplification and phylogeny

We produced 90 nrDNA ITS sequences, 22 nrDNA LSU sequences and 24 *TEF1* sequences for this study. Genomic DNA was extracted from dried specimens and cultures using a version of the CTAB protocol (Kutuzova *et al.* 2017). The PCR and sequencing primers were ITS5, ITS4, and LR22 for nrDNA, ITS, JS1, and LR7 for nrDNA LSU (Viner *et al.* 2021a), EF1-983.2f (GCHYCHGGNCAYCGTGAYTTYAT), EF1-G2r (GCDATRTGNGCRGTRTGRCARTC) for *TEF1* (modified after Matheny *et al.* 2007), 983F-Xylo (GCRCCRGGHCAYCGTGAYTTYAT) and 1567R-Xylo (ACYGTRCCRATRSMGCCRATCTT) (this study). Sequencing was done by Macrogen Europe. Chromatograms were edited and contigs constructed in ChromasPro v. 2.1.10.1, as described in Viner *et al.* (2021b). We aligned sequences with PRANK v. 170427 (Löytynoja 2021) and modified the alignments by hand when needed. We excluded sites for *Hymenochaete*-wide ITS and LSU alignments manually. Substitution models for each marker (ITS, LSU, *TEF1*) were selected based on Akaike Information Criterion by ModelTest-NG v. 0.2.0 (Darriba *et al.* 2020). *TEF1* (including introns) was treated as one partition. Models were: GTR+G+I (dataset 1), GTR+I (4), HKY+G (3 *TEF1*), HKY+I (2, 3 ITS), HKY (5). Our main phylogenetic inference method was Bayesian, using MrBayes v. 3.2.7a (Ronquist *et al.* 2012), where analyses were run for 2–10 million generations of three parallel runs with eight chains each, temp = 0.1, all reaching convergence to < 0.01 standard deviation of split frequencies. We also conducted parallel maximum likelihood analyses with 100 starting trees and bootstrapping (1000 generations) with Raxml-NG v. 1.2.2 (Kozlov *et al.* 2019). The two methods were in full agreement for all the nodes, even modestly supported ones. For ITS datasets of the *H. cinnamomea* and *H. laxa* clades, we also conducted a Bayesian split network analysis with SplitsTree App v. 6.4.17 (Huson & Bryant 2024). Analyses were run in CSC – IT Centre for Science (Espoo, Finland) computing nodes. Sequences were submitted to GenBank and DDBJ (Supplementary Table S1). Alignments and raw phylograms are available via PlutoF (Abarenkov *et al.* 2010) at https://doi.org/10.15156/BIO/3301256.

We constructed the following sequence datasets:

Hymenochaete genus-level dataset (Fig. 1) of partial nrDNA ITS and LSU was rooted with *Hydnoporia* in line with Parmasto *et al*. (2014) and Liu *et al*. (2025). Our sampling relied on BLAST search and aforementioned phylogenetic analyses. The dataset included 113 specimens representing 107 species. Parts of ITS were excluded as unalignable (too variable) regions.

H. cinnamomea clade nrDNA ITS dataset (Fig. 2) to determine species limits within this clade. It utilized all full-length ITS sequences (16 in total) of ours as well as those available in GenBank and UNITE (Abarenkov *et al.* 2024) based on BLAST searches. In addition, *TEF1* sequences were produced to ascertain species status of *H. fibrillosa* (seven sequences) and *H. similis* (one sequence).

H. fusca clade nrDNA ITS and *TEF1* datasets (Fig. 3) for species delimitation within the clade. The ITS dataset included 31 sequences, including all available full-length sequences in GenBank and UNITE based on BLAST searches. The concatenated ITS+*TEF1* dataset included 7 specimens sequenced for both markers; ITS and *TEF1* data agree.

H. laxa clade nrDNA ITS dataset (Fig. 4) includes 33 sequences, including all available full-length sequences in GenBank and UNITE based on BLAST searches. To complement the ITS data, we also produced *TEF1* sequences of *H. laxa* (three) and *H. rudis* (six).

H. tenuis nrDNA ITS dataset of 20 sequences to study the genetic pattern within the species, including matching sequences from GenBank and UNITE.

RESULTS

Traditionally, *H. cinnamomea* was separated from other resupinate *Hymenochaete* species due to its loose, occasionally stratified, as a rule pale basidiocarps consisting of rather thin-walled, easily collapsing hyphae and relatively long (often exceeding 100 µm), straight setae (Bondartseva & Parmasto 1986, Parmasto 2001, Corfixen & Parmasto 2017). Specimens with clearly stratified basidiocarps were sometimes considered as representing a separate species, *H. arida* (Bondartseva & Parmasto 1986). In turn, *H. fuliginosa* was believed to be a tougher and darker-coloured species with firmer hyphae and slightly shorter setae than in *H. cinnamomea* (Parmasto 2001, Corfixen & Parmasto 2017). Some authors applied the name *H. fuliginosa* only to collections from coniferous wood and considered those from angiosperm hosts as a sister species, *H. subfuliginosa* (Bondartseva & Parmasto 1986, Corfixen & Parmasto 2017).

In the present study, we aimed at exhaustive sampling of *Hymenochaete* spp. that can be connected to the existing types of *H. cinnamomea* and its presumed synonyms (*H. arida*, *H. laxa*, *H. rudis*, *H. spreta*, and *Hyphoderma fibrillosum*), as well as *Hymenochaete fuliginosa* / *subfuliginosa* sensu auct. After studying the type material of *Thelephora fuliginosa* (= *H. fuliginosa*) in Leiden (L0113849), we concluded that it belongs to *Hydnoporia tabacina* and should therefore be discarded from use for the species so named in the earlier literature. Consequently, we focused on other names historically associated with *H. fuliginosa*, i.e. *H. fusca*, *H. subfuliginosa*, and *H. tenuis*.

Fig. 1. Bayesian consensus phylogram of *Hymenochaete* nrDNA ITS and LSU sequences. Clades of *H cinnamomea* and *H. fuliginosa*-like taxa have been annotated with large headings, and newly produced sequences of target species are marked in red. Support values between 0 and 1 denote posterior probabilities, and 10–100 bootstrap support values of a parallel maximum likelihood analysis. Values of highly supported nodes are printed in bold.

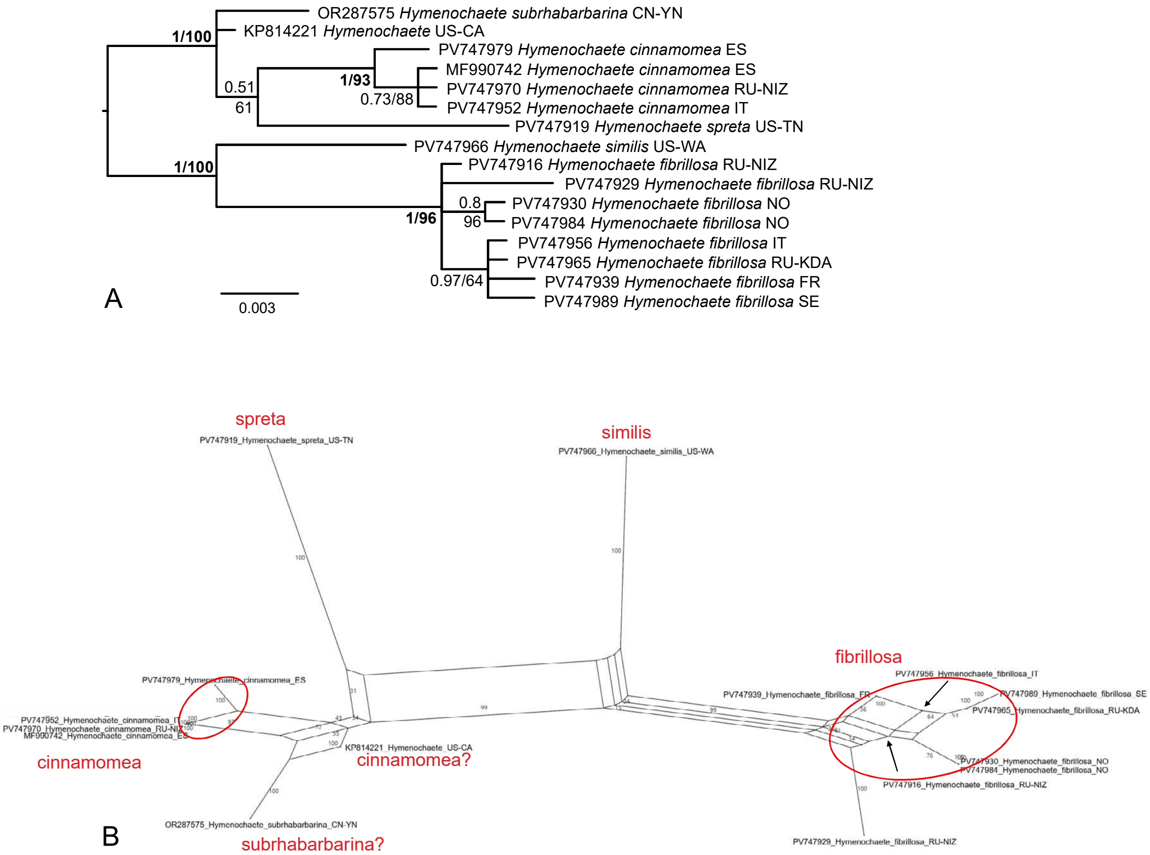

Fig. 2. The *Hymenochaete cinnamomea* clade. A midpoint-rooted Bayesian consensus phylogram (**A**) and Bayesian split network graph (**B**) based on nrDNA ITS sequences. In the upper tree support values between 0 and 1 denote posterior probabilities, and 10–100 bootstrap support values of a parallel maximum likelihood analysis. Values of highly supported nodes are printed in bold.

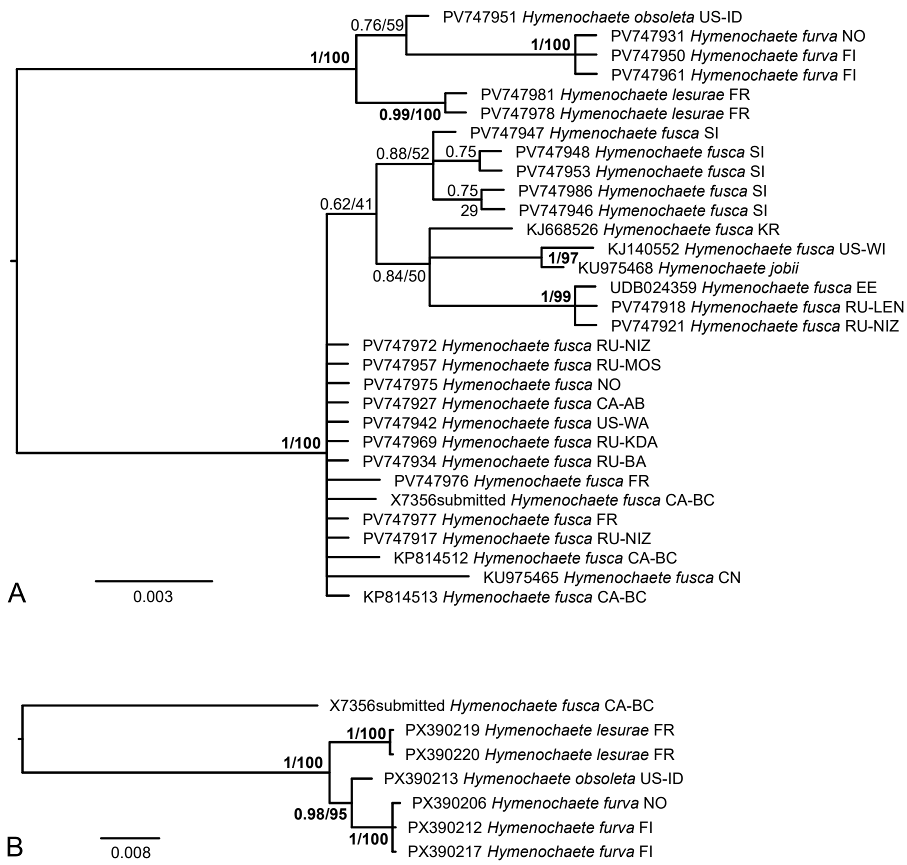

Fig. 3. The *Hymenochaete fusca* clade. A midpoint-rooted Bayesian consensus phylogram of nrDNA ITS sequences (**A**), and a similar tree based on concatenated ITS and *TEF1* sequences (**B**). Values between 0 and 1 denote posterior probabilities, and 10–100 bootstrap support values of a parallel maximum likelihood analysis. Values of highly supported nodes are printed in bold.

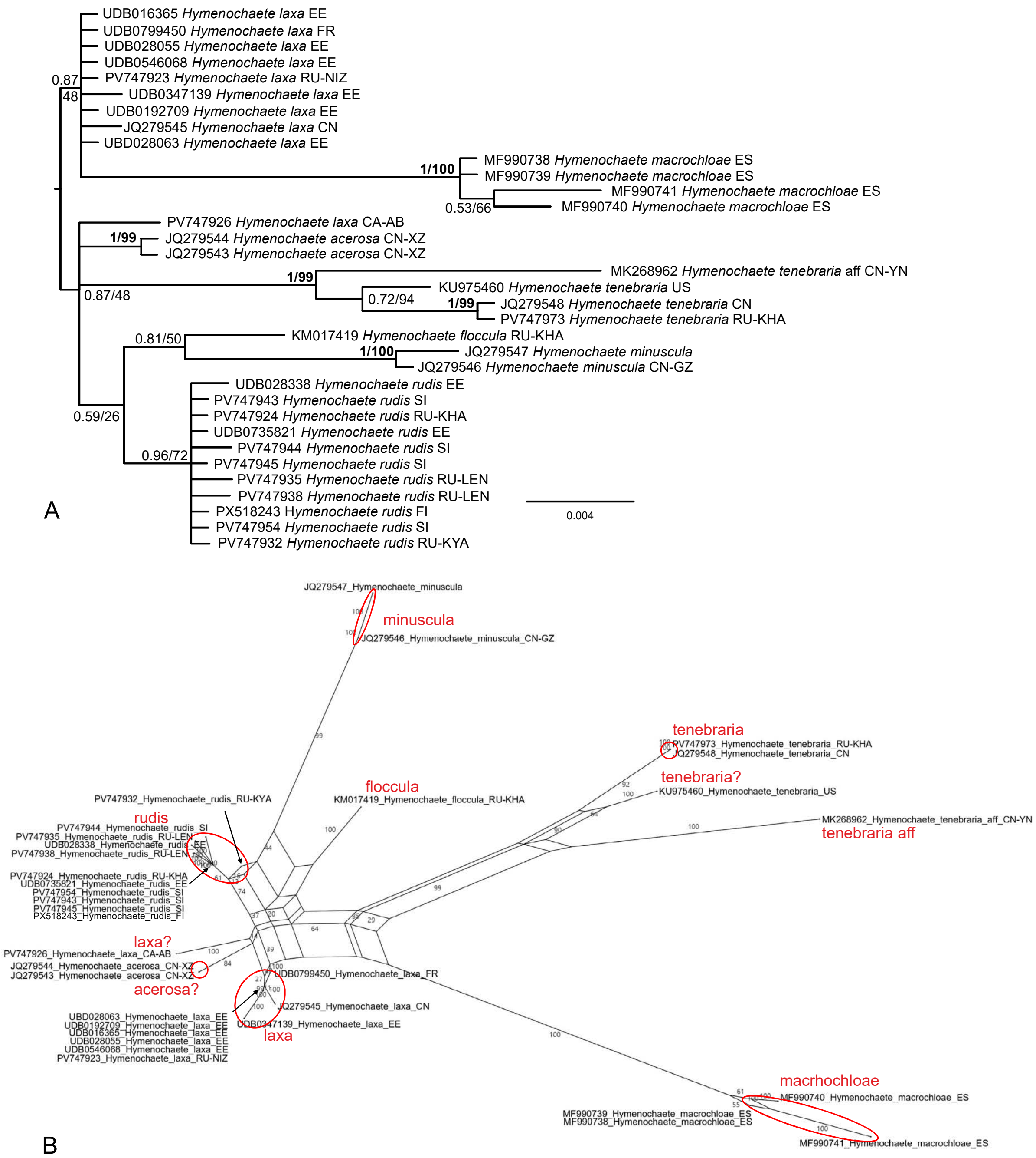

Fig. 4. The *Hymenochaete laxa* clade. A midpoint-rooted Bayesian consensus phylogram of nrDNA ITS sequences (**A**) and a Bayesian split network (**B**) based on the same data. In the upper tree support values between 0 and 1 denote posterior probabilities, and 10–100 bootstrap support values of a parallel maximum likelihood analysis. Values of highly supported nodes are printed in bold.

We compiled five datasets to analyse *H. cinnamomea / fuliginosa* sensu auct. position within the large *Hymenochaete* clade and to clarify the species-level taxonomy of four species complexes:

Our genus-level nrDNA ITS + LSU dataset includes the main lineages of the genus after Parmasto *et al.* (2014), with the addition of new species introduced by Liu *et al*. (2025) and our newly generated sequences. Sequences representing *H. cinnamomea* and *H. fuliginosa* in the traditional sense are divided into eight clades of four distantly related lineages (Fig. 1):

1) ***H. cinnamomea* clade**, ***H. fusca* clade,** and ***H. tenuis***, the most common *"H. fuliginosa"* species in North Europe. The lineage of these related clades also contains the recently described *H. dichotoma* and *H. piceae*.

2) ***H. arida*** and ***H. daurica*** (a new *Ericaceae*-inhabiting species from the Far East mixed earlier with *H. tenuis*) belong to a large clade of Chinese species such as *H. fissurata* and *H. membranacea.*

3) ***H. clandestina***, a new European species with *H. fuliginosa*-like basidiocarps collected from *Ericaceae*, is related to *H. asiatica*, *H. conifericola*, *H. hainanensis*, and *H. subinnexa* described from China.

4) ***H. laxa* clade** and ***H. scabra*** are found within a clade with such species as *H. moniliformis*, *H. orientalis*, and *H. subepichlora*. Sequences of *"H. epichlora"* by Liu *et al.* (2025) also fall in this clade. Our new sequence data show that *H. epichlora* sensu typi from North America does not belong to this lineage and is thus not related to the species so named by Liu *et al*. (2025). Their sequences originated from China

and represent another, possibly yet unnamed species.

The traditional concept of *H. cinnamomea* thus contains species belonging to four unrelated lineages (*H. cinnamomea* clade, *H. laxa* clade, *H. arida*, and *H. scabra*), and the same is true for *H. fuliginosa* (*H. fusca* clade, *H. clandestina*, *H. daurica*, and *H. tenuis*).

In addition to the aforementioned species, we publish here the first sequences of the sister species *H. carpatica* from Europe and *H. corticolor* from North America. Together with a Chinese sequence of *H. cupulata* they form a distinct lineage within *Hymenochaete.* Although each is represented by a single sequence, considerable difference in ITS sequences (2.7 %) as well as morphological differences (Spirin *et al*. 2015) support their separation.

The *H. cinnamomea*, *H. fusca*, and *H. laxa* clades represent species complexes. We constructed ITS and/or *TEF1*-based analyses of the three clades to assist in species delimitation and to assess their diversity.

The ***H. cinnamomea* clade** consists of 4–6 species (Fig. 2): distinct species are at least the Eurasian species *H. cinnamomea* s. str. and *H. fibrillosa*, and the North American *H. similis* and *H. spreta*. Based on the single ITS sequence available it is unclear if East Asian *H. subrhabarbarina* is a distinct species or a part of variable *H. cinnamomea* s. str. *Hymenochaete fibrillosa* shows quite high intraspecific genetic diversity in ITS (variation in 0–11 bases, up to 1.7 % within 8 specimens) and *TEF1* (1–27 bp, up to 2.8 %, 6 specimens). For comparison, its closest relative *H. similis* differs from *H. fibrillosa* with about the same amount in ITS (12 bp or 1.8 %) and even less in *TEF1* (13 bp or 1.3 %). However, since this variation does not correlate with geography or morphology and phylogenetic data provide no basis for a clear division, we currently see no grounds for dividing *H. fibrillosa* into several species. Despite the inner variation of *H. fibrillosa*, its differences to *H. similis* are constant, and we do not doubt that *H. similis* is a distinct species. Morphologically, *H. similis* can be separated from *H. fibrillosa* (as well as from *H. cinnamomea* s. str.) due to its constantly wider basidiospores.

The ***H. fusca* clade** includes four species: *H. fusca*, *H. furva*, *H. lesurae*, and *H. obsoleta* (Fig. 3). The latter three are closely related and known from only few specimens. However, their distribution areas do not overlap. ITS differences within this group are 1.1–1.5 % between species but *TEF1* differences show the same pattern. The smallest genetic differences are between the sister species *H. furva* from Europe and *H. obsoleta* from North America; their separation is supported by distinct differences in the basidiospore shape and size. *Hymenochaete fusca* is a widespread species with considerable internal ITS variation, up 1.4 % (to 9 bp) between specimens. However, no clear geographic pattern arises, and material is morphologically homogenous. Nevertheless, *H. fusca* would deserve a more in-depth genetic analysis in the future. At present, we accept *H. subfuliginosa* as a later synonym of *H. fusca*.

The ***H. laxa* clade** contains in our estimation 7–10 species, as suggested by the ITS phylogenetic tree and network (Fig. 4). Specimens are few and ITS differences in some cases small, and we have not seen specimens of all ITS groups. Hence the exact number of species in the clade remains somewhat uncertain. The ITS phylogeny does not support *H. laxa* as a separate species, although it does not preclude it either. The phylogenetic network points to several distinct species in the *H. laxa* complex. The most closely related and least distinct based on their ITS sequences are the East Asian *H. acerosa* and the more widespread Eurasian *H. laxa* and *H. rudis*, with a mere 4–6 bp ITS difference (0.6–0.9 %). However, our additional TEF1 sequences offer clear support for the separation of *H. laxa* and *H. rudis* at the species level: a comparison of three European *H. laxa* and six *H. rudis* specimens shows 24 bp difference (2.5 %) between the two species as opposed to 0–1 bp within species.

A Canadian *H. laxa* specimen has minor ITS differences from the rest of the material, but due to its morphological similarity with European *H. laxa*, we consider it *H. laxa* for the time being. Based on our sequence data we cannot comment on the validity of *H. acerosa* as a separate species; *H. laxa* is the older name, should the two be proven conspecific. The original description of *H. acerosa* (He & Li 2011) precludes its conspecificity with either of them; the species should be reinvestigated further with additional genetic markers. As for the rest of species in the clade, since *H. laxa* and *H. rudis* are distinct based on genetic and morphological evidence, we conclude by extension that species with equally clear morphological differences and larger ITS sequence differences are good species (*H. floccula*, *H. machrocloae*, *H. tenebraria*, and *H. minuscula* sensu Dai 2010).

The European ***H. tenuis***, represented by 20 sequences in our ITS dataset, appears very uniform genetically, internally differing by 0–2 bp between specimens. East Asian (2) and North American (2) specimens differ by further 1–3 bp, the maximum difference being 7 bp (1.1 %) between a specimen from Idaho and part of the European material. The Idaho specimen differs by 3–4 bp (0.4–0.6 %) from the East Asian and New York specimens. Morphologically, the *H. tenuis* material from different continents is fairly uniform. Viewed as a whole, the genetic differences are minor and consequently *H. tenuis* should be considered a widespread northerly species.

Taxonomy

Hymenochaete arida (P. Karst.) Sacc., *Syll. Fung*. **9**: 228. 1891. Figs 5A, B–7.
Basionym: *Hymenochaetella arida* P. Karst., *Bidr. Känned. Finlands Nat. Folk* **48**: 428, 1889.

Typus: **Finland**, Etelä-Häme, Tammela, Mustiala, on bark of deciduous tree, Jul. 1865, *Karsten 809* (**lectotype**, selected by Parmasto 2001: 143) (H6074674, studied).

Basidiocarps annual or short-living perennial, covering a few cm, effused, soft, pale ochraceous to greyish, smooth, older basidiocarps with yellowish or reddish tints, irregularly cracking, 0.1–0.5(–1) mm thick. *Margin* gradually thinning out. Section: basidiocarp uniformly coloured or with a slightly darker (rusty-brownish) deeper layer. Monomitic, *hyphae* clampless. Subicular hyphae hyaline to yellowish or pale ochraceous, slightly thick-walled, easily collapsing, loosely interwoven to subparallel, (3.7–)4.0–5.8(–6.2) µm diam. (n = 30/2). Subhymenial hyphae hyaline to very pale brownish, thin- or slightly thick-walled, easily collapsing, loosely arranged, mostly interwoven, (2.1–)2.6–4.9(–5.2) µm diam. (n = 40/2). *Setae* dark-brown, sharp- to rather blunt-

Fig. 5. Basidiocarps of *Hymenochaete* spp. photographed *in situ*. **A.** *H. arida* (*Spirin 12207)*. **B.** *H. arida*, streamside habitat with *Alnus glutinosa*, fruitbodies marked with an arrow (*Spirin 12060*). **C.** *H. cinnamomea* (*Spirin 13694*). **D.** *H. clandestina* (holotype). **E.** *H. daurica* (holotype). **F.** *H. fibrillosa* (*Spirin 12277*). **G.** *H. furva* (*Spirin 12404*).

tipped, straight or clearly hooked at the basal part, often with the tip eroded, easily breaking in microscopic slides, many with a long contracted root-like base, some pleural, not encrusted (a few setae with sparse incrustation at the basal part seen in senescent hymenium only), (63–)64–145(–150.5) × (6.1–)7.0–13.0(–13.6) µm (n = 91/5), L = 90.4–116.5, W = 8.85–10.09, Q = 9.37–13.17, projecting up to 80 µm. *Hyphidia* present, simple, thin-walled, associated with setae, up to 70 × 1–1.5 µm. *Basidia* four-spored, thin-walled, 13–18 × 3.5–5 µm. *Basidiospores* hyaline, thin-walled, cylindrical-subfusiform, straight or slightly curved, (5.2–)5.3–9.1(–9.7) × 2.1–3.2(–3.3) µm (n = 180/6), L = 6.38–7.66, W = 2.29–2.64, Q = 2.55–2.96.

Distribution and ecology: Europe (Finland, Latvia, Norway, Russia); bark and wood of deciduous trees (predominantly *Alnus* spp.) in humid habitats.

Notes: *Hymenochaete arida* was described from two specimens collected in Finland (Karsten 1889). Since then, it was treated either as a close relative of *H. cinnamomea* (Bresadola 1903, Bourdot & Galzin 1927, Bondartseva & Parmasto 1986) or its synonym (Parmasto 2001, Corfixen & Parmasto 2017). Even being accepted as a species, it was seemingly mixed up with other pale-coloured *Hymenochaete* species (for example, see description of *H. arida* in Burt 1918 or Bourdot & Galzin 1927). Parmasto (2001) typified *H. arida* with one of the authentic collections which is richly fertile and in perfect condition for microscopic study.

From other species treated here, *H. arida* differs in having setae of highly variable shape and size, as well as long and narrow basidiospores. Pale and soft basidiocarps, as well as occurrence at the base of still corticated standing trees (mainly *Alnus* spp.) in inundated habitats can help with the species identification in the field. *Hymenochaete rudis* occurs in the same habitats as *H. arida* but it has as a rule deeper-coloured and thicker basidiocarps. Microscopically, *H. rudis* differs from *H. arida* in having sharp-pointed, more regularly shaped setae and on average shorter basidiospores. *Hymenochaete arida* is the generic type of *Hymenochaetella*.

Material examined: **Finland**, Varsinaissuomi, Bromarv, Solböle, *Corylus avellana*, 17 Oct. 1976, *Niemelä* (H); Uusimaa, Helsinki, Pakila, *Alnus incana*, 7 Jun. 1958, *Kujala* (H); Vanhakaupunki, *Alnus* sp., 6 Jun. 1994, *Saarenoksa 03194* (H); *Padus avium*, 14 Jul. 1990, *Saarenoksa 07790* (H); 22 Jun. 1991, *Saarenoksa 08591* (H); driftwood, 16 Jul. 1993, *Saarenoksa 21693* (H); Viikki, Hakala, *A. incana*, 30 Jun. 1985, *Saarenoksa 59985* (H); Östersundom, *Alnus glutinosa*, 28 Oct. 2022, *Spirin 16059* (H); Hyvinkää, Myllykylä, *A. incana*, 19 Sep. 1993, *Haikonen 15659* (H); Kaukas, *A. incana*, 26 Apr. 2008, *Miettinen 12616* (H); Pornainen: Vähä Laukkoski, *A. glutinosa*, 27 Mar. 1993, *Haikonen 15029* (H); Sipoo, Hindsby, *A. incana*, 2–3 Jul. 1985, *Saarenoksa 57785*, *60085* (H); Etelä-Karjala, Vehkalahti, Pyhältö, *Populus tremula*, 5 Jun. 1976, 4 Jul. 1976, *Fagerström* (H); *A. incana*, 26 Jun. 1976, *Fagerström* (H); fallen log, 21 May 1977, *Fagerström* (H); *Picea abies* (?), 22 May 1980, *Fagerström* (H); Etelä-Häme, Somero, Häntälä, *A. incana*, 8 Jul. 1995, *Issakainen & Vauras 10248* (H); Tammela, *Alnus* sp., 8 Sep. 1892, *Thesleff* (H). **Norway**, Vestfold, Stokke, Brattås, hardwood, 24 May 2010, *Marstad 132-10* (O F244532). **Russia**, Leningrad Reg., Boksitogorsk Dist., Talitsa, *A. incana*, 17 Aug. 2018, *Spirin 12143*, *12150*, *12153* (H); Radogosch, *Betula pubescens*, 20 Aug. 2018, *Spirin 12206** (H); *A. incana*, 20 Aug. 2018, *Spirin 12207* (H); Nizhny Novgorod Reg., Arzamas Dist., Pustyn', *A. glutinosa*, 18 Jun. 1999, *Spirin* (LE211237, H); Varnavino Dist., Shada, *B. pubescens*, 24 Aug. 1999, *Spirin* (LE 222955); Vetluga Dist., Ispravnikova Duga, *Quercus robur*, 19 Aug. 1999, *Spirin* (LE 212667, 214004); Lukoyanov Dist., Panzelka, *A. glutinosa*, 26 Jul. 2018, *Spirin 12060** (H); Sharanga Dist., Kilemary, *A. glutinosa*, 21 Aug. 2004, *Spirin 2278* (H).

Hymenochaete cinnamomea (Pers.) Bres., *Atti Ist. Reale Accad. Rovereto Sci.* **3**: 119. 1897. Figs 5C–7.
Basionym: *Thelephora cinnamomea* Pers., *Mycol. Europaea* **1**: 141. 1822.

Typus: [**Switzerland**, Neuchâtel, *Quercus*], 'Julio, Chaillet' (herb. E. Fries, UPS F-175802, studied) (**lectotype**, selected here, MycoBank MBT10029869).

Basidiocarps perennial, covering a few cm but sometimes more substantial, up to 20 cm in widest dimension, effused, first compact but rather soft, light brown, sometimes with greyish hues, smooth, then tough, rusty- to chocolate-brown, as a rule cracking, 0.1–2 mm thick. *Margin* gradually thinning-out, in juvenile basidiocarps well-visible, rusty-brown, later of more or less the same colour as the hymenial surface. Section: basidiocarp uniformly coloured or with a slightly darker deeper layer. Monomitic, *hyphae* clampless. Subicular hyphae brownish, slightly or distinctly thick-walled, rather tightly arranged, mostly interwoven, (3.3–)3.4–5.2(–5.4) µm diam. (n = 40/3), in senescent basidiocarps almost indiscernible. Subhymenial hyphae yellowish or brownish, slightly or distinctly thick-walled, loosely or rather tightly arranged, vertically arranged, often short-celled and slightly inflated, (2.4–)2.5–4.8(–5.0) µm diam. (n = 80/4). *Setae* brown, sharp-tipped, straight or slightly curved, sturdy, occasionally biradicate, as a rule encrusted by small-sized, densely arranged crystals, (68.5–)75–120(–153) × (4.7–)5.6–9.3(–10.0) µm (n = 160/8), L = 88.1–99.0, W = 6.45–7.97, Q = 11.82–15.21, projecting up to 80 µm. *Hyphidia* present, simple, thin-walled, occasionally encrusted, scattered among basidia or associated with setae, up to 65 × 1–1.5 µm. *Basidia* four-spored, thin-walled or slightly thick-walled and brownish at the base, 11.5–20.0 × 3.5–5 µm. *Basidiospores* hyaline, thin-walled, cylindrical to narrowly ellipsoid, straight or indistinctly concave, longest spores subfusiform, (4.2–)4.4–6.8(–7.1) × (2.1–)2.2–3.2 µm (n = 286/9), L = 5.31–5.88, W = 2.41–2.89, Q = 1.84–2.31.

Distribution and ecology: Europe (Austria, Estonia, France, Germany, Italy, Norway, Romania, Russia, Spain, Switzerland), Macaronesia (Canary Ids.); fallen logs and dead branches of deciduous trees (mostly *Fagus* and *Quercus*), in exceptional cases conifers (*Picea*).

Notes: The species was first introduced as *Thelephora cinnamomea* by Persoon (1822) based on a specimen collected by J.F. de Chaillet in Switzerland. No authentic material survived in Persoon's herbarium. Evidently, a duplicate of the same collection was sent by Chaillet to Fries, as we could judge from the label information in Fries's herbarium (UPS) and his remarks in Elenchus Fungorum (Fries 1828: 201). Bresadola studied this material and reestablished *T. cinnamomea* as a member of *Hymenochaete* (Bresadola 1897). Since then, *H. cinnamomea* has been treated as a resupinate *Hymenochaete* species in Europe and North America, being distinguished from its counterparts due to softer, occasionally stratified basidiocarps and longer, subulate setae.

We restudied the aforementioned Chaillet's material in UPS. It consists of two parts glued to the cardboard: one is a fragment of rather rotten, decorticated wood and another is a piece of a corticated branch. Our study showed that fungi on these substrates are not conspecific although superficially similar. The fungus on bare wood has rather compact, uniformly coloured basidiocarps. It possesses sharp-pointed, sturdy, only rarely biradicate setae, 77–102 × 5.2–7.8 µm (n = 7) and broadly cylindrical to narrowly ellipsoid basidiospores, (4.2–)4.4–6.2(–6.4) × (2.3–)2.5–3.2 µm (n = 25). Subicular hyphae are rather narrow, of diameter comparable to the subhymenial ones, (3.8–)4.0–5.2(–5.3) µm (n = 10) vs. (2.9–)3.0–4.4(–4.8) µm (n = 20). The fungus on the corticated branch is certainly softer, almost pellicular, with a looser subicular layer. It is sterile, with totally collapsed hymenium but setae are abundant, sharp or rarely rather blunt, predominantly bi- or multiradicate, 82–154 × 6.4–9.8 µm (n = 8). Moreover, subicular hyphae of this fungus are considerably wider than the subhymenial ones, (5.2–)5.3–7.0(–7.2) µm (n = 20) vs. (2.8–)2.9–4.3(–4.6) µm (n = 20). Based on these traits, we concluded that it is conspecific with *Hymenochaete laxa* (see below). It seems that Persoon and Fries mostly relied on the fungus with softer basidiocarps because they both stressed the loose consistency of *T. cinnamomea*. However, if this part of Chaillet's specimen were selected as a lectotype, *T. cinnamomea* would turn out to be an older name for *H. laxa*. In our opinion, this perspective is less desirable than choosing the other piece as a lectotype of *T. cinnamomea* and, consequently, retaining both *H. cinnamomea* and *H. laxa* in use.

As redefined here, *H. cinnamomea* is most similar to *H. fibrillosa*. Both species have encrusted setae and are widely distributed in temperate forests of Europe. *Hymenochaete cinnamomea* seems to have a more southern distribution mostly limited to the distribution area of *Fagus*. It differs from *H. fibrillosa* in having tougher and thicker basidiocarps, as well as longer basidiospores.

Material examined: **Austria**, Steiermark, Liezen, Grundlsee, Kammersee, *Fagus sylvatica*, 15 Aug. 2016, *Friebes* (GJO 0086890). **Estonia**, Saaremaa, Mässa, Kuressaare, *Picea abies*, 8 Aug. 1999, *E. Larsson 6-99** (GB-0150313). **France**, Moselle, Hayange, Sainte-Neige, *Quercus* sp., 25 Aug. 1993, *Trichies 93266* (H, G.T.); Hettange-Grande, Garche, *Quercus* sp., 20 Sep. 2007, *Trichies 07342* (H, G.T.). **Germany**, Bavaria, Böhmerwald, Mittelsteighütte Nat. Res., *F. sylvatica*, 1 Sep. 1990, *Niemelä 5380* (H). **Italy**, Lombardy, Varese, Bedero Valcuvia, Marteghetta, *F. sylvatica*, 14 Oct. 2019, *Spirin 13684*, *13694** (H); Sardinia, Nuoro, Montarbo, *Arbutus unedo*, 3 Dec. 2000, *Ryvarden 43438* (H ex O). **Norway**, Vestfold, Larvik, Vemannsås, *Ulmus glabra*, 30 Sep. 2018, *Spirin 12517* (O); Oppland, Nord-Fron, Liadalane, *Alnus incana*, 7 Oct. 2025, *Spirin 18423* (H, GB). **Romania**, Caraş-Severin, Semenic, *F. sylvatica*, 16 Sep. 2021, *Spirin 15068* (H). **Russia**, Nizhny Novgorod Reg., Lukoyanov Dist., Razino, *Q. robur*, 22 Jul. 1999, *Spirin* (LE 211324); *U. glabra*, 30 Jul. 2021, *Spirin 14399** (H). **Spain**, Canary Ids., San Miguel de la Palma, Puntallana, *Picconia excelsa* (?), 29 Jul. 2022, *Viner 2022/1073** (H).

Hymenochaete clandestina Spirin & Viner, ***sp. nov.*** MB 861355. Figs 5D–7.

Etymology: *Clandestinus* (Lat., adj.) – clandestine, secret.

Typus: **Sweden**, Bohuslän, Öckerö, Hönö, Krakudden, 57.69655 11.6221, *Calluna vulgaris* (thick dead stem), 15 Jul. 2024, *Spirin 17323** (**holotype** GB, isotype – H).

Basidiocarps perennial, covering a few cm, effused, tough-leathery or corky, light brown to ferruginous brown, smooth, often irregularly cracking, 0.1–1 mm thick. Margin adnate, concolourous with hymenial surface, occasionally slightly elevated. Section: basidiocarp uniformly coloured or with a slightly darker (ferruginous brown) deeper layer. Monomitic, *hyphae* clampless. Subicular hyphae brownish to rusty brown, distinctly thick-walled, interwoven or subparallel, hardly discernible, 2–3 µm diam. Subhymenial hyphae hyaline to brownish, slightly or distinctly thick-walled, tightly arranged, interwoven, (1.5–)1.6–4.0(–4.2) µm diam. (n = 40/2). *Setae* brown, sharp-tipped, straight, sturdy, not encrusted, occasionally biradicate, (58–)68–100(–115) × (5.4–)6.3–8.8(–9.5) µm (n = 100/5), L = 81.4–84.5, W = 7.39–7.74, Q = 6.93–8.02, projecting up to 70 µm. *Hyphidia* rare, simple, thin- or slightly thick-walled, usually associated with setae, up to 50 × 0.5–1.5 µm. *Basidia* four-spored, thin-walled or slightly thick-walled at the base, 13–24 × 3.5–5 µm. *Basidiospores* hyaline, thin-walled or with a distinct wall, ellipsoid to broadly ellipsoid, (3.3–)3.4–5.7(–6.1) × (2.6–)2.7–3.9(–4.0) µm (n = 150/5), L = 3.86–4.71, W = 3.06–3.31, Q = 1.25–1.43.

Distribution and ecology: Europe (Sweden), Macaronesia (Canary Ids.); dead corticated stems, rarely branches of *Calluna vulgaris* and probably *Myrica faya*.

Notes: Morphologically, *H. clandestina* is confusingly similar to *H. fusca*. The only reliable morphological difference between them is the spore shape and size: the basidiospores of *H. clandestina* are ellipsoid and on average wider than in *H. fusca*. Along the south-western coast of Sweden, *H. clandestina* occurs on *Calluna vulgaris* together with another similar species, *H. tenuis*, which differs from *H. clandestina* and *H. fusca* by shorter setae.

Material examined: **Spain**, Canary Ids., San Miguel de la Palma, Puntallana, *Myrica faya* (?), 22 Jul. 2022, *Viner 2022/1005** (H). **Sweden**, Bohuslän, Öckerö, Hönö, *Calluna vulgaris*, 12 Nov. 2023, *Spirin 17009** (GB); 12 Aug. 2024, *Spirin 17357* (GB); Hälsö, *C. vulgaris*, 11 Jul. 2023, *Spirin 17297*, *17299* (GB, H).

Hymenochaete daurica Spirin, ***sp. nov.*** MB 61356. Figs 5E–7.
Etymology: *Dauricus* (Lat., adj.) – in reference to Dauria, a biogeographic region of Far East Asia.

Typus: **Russia**, Khabarovsk Reg., Khabarovsk Dist., Levyi Ulun, 50.0555 134.262, *Rhododendron dauricum* (dead corticated stem), 24 Aug. 2012, *Spirin 5591** (**holotype** H).

Basidiocarps perennial, covering a few cm, effused, tough-leathery or corky, greyish brown, sometimes with a light lilac tint, randomly cracking, sometimes irregularly tuberculate, 0.1–0.5 mm thick. *Margin* adnate, concolourous with the hymenial surface, occasionally slightly elevated. Section: basidiocarp uniformly coloured or with a slightly darker (ferruginous brown) deeper layer. Monomitic, *hyphae* clampless. Subicular hyphae brownish to brown, distinctly thick-walled, interwoven or subparallel, (1.4–)1.7–2.8(–3.0) µm diam. (n = 20/1). Subhymenial hyphae hyaline to brownish, slightly or distinctly thick-walled, tightly arranged, vertically arranged or interwoven, occasionally short-celled and slightly inflated, (2.0–)2.2–3.3(–3.8) µm diam. (n = 40/2). *Setae* brown, sharp- or rarely blunt-tipped, straight or curved, sometimes sinuous, sturdy, not encrusted, (25–)28–53(–57) × (4.2–)4.3–6.3(–7.4) µm (n = 41/2), L = 36.1–41.9, W = 5.26–5.27, Q = 6.93–8.02, mostly embedded or projecting up to 20 µm, accidentally bifurcate. *Hyphidia* rare, simple, thin- or slightly thick-walled, scattered among hymenial cells or associated with setae, up to 20 × 1–2 µm. *Basidia* four-spored, thin-walled or slightly thick-walled at the base, 11.5–21 × 3–4.5 µm. *Basidiospores* hyaline, thin-walled, cylindrical to narrowly ellipsoid, (2.9–)3.0–4.1(–4.4) × (1.9–)2.0–2.8(–2.9) µm (n = 60/2), L = 3.46–3.59, W = 2.22–2.30, Q = 1.56–1.57.

Distribution and ecology: Asia (Russian Far East); dead corticated branches of *Rhododendron dauricum*.

Notes: *Hymenochaete daurica* is superficially similar to *H. fusca*, *H. tenuis* and other species formerly addressed as *H. fuliginosa* s. auct. It differs from all other species treated here in having considerably shorter, occasionally sinuous setae. The species seems to be rather common in temperate East Asia, and it always occurs on fallen twigs and dead stems of *Rhododendron dauricum*. The description of *H. tenuis* by Bondartseva & Parmasto (1986) at least partly refers to *H. daurica*.

Material examined (all records on *R. dauricum*): **Russia**, Khabarovsk Reg., Khabarovsk Dist., Malyi Kukachan, 18 Aug. 2012, *Spirin 5382* (H); Levyi Ulun, 22 Aug. 2012, *Spirin 5492** (H); 24 Aug. 2012, *Spirin 5595*, *5602*, *5607* (H); 25 Aug. 2012, *Spirin 5612* (H); Ulun, 26 Aug. 2012, *Spirin 5650*, *5668*, *5673*, *5683*, *5684* (H); Povorotnaya, 27 Aug. 2012, *Spirin 5727*, *5740* (H).

Hymenochaete epichlora (Berk. & M.A. Curtis) Cooke, *Grevillea* **8**(48): 147. 1880. Figs 7, 8.
Basionym: *Corticium epichlorum* Berk. & M.A. Curtis, *Grevillea* **1**(12): 178. 1873.

Typus: **USA**, Alabama, [no locality or collecting date indicated], 'ad corticem mort. Symploci', *Peters* (Ravenel's Fungi Caroliniani Exsiccati 5: 24, 1860) (**isotype** H, studied).
Basidiocarps annual, covering a few cm, effused, rather soft, yellowish-ochraceous to light yellowish-brown, smooth or minutely rimose, 0.05–0.2 mm thick. *Margin* pruinose, adnate, concolourous with or slightly paler than the hymenial surface. Section: basidiocarp one-layered, uniformly coloured.

Monomitic, *hyphae* clampless. Subicular hyphae brownish, slightly thick-walled, subparallel or interwoven, (1.9–)2.0–4.1(–4.2) µm diam. (n = 20/1). Subhymenial hyphae hyaline to yellowish or brownish, thin- or slightly thick-walled, rather loosely arranged, vertically arranged or interwoven, frequently anastomosing, occasionally short-celled and slightly inflated, (2.1–)2.2–3.4(–4.2) µm diam. (n = 40/2). *Setae* brown, sharp-tipped, straight or occasionally slightly curved, sturdy, often biradicate, not encrusted, (37–)38–62(–68) × (5.2–)5.3–8.7(–9.0) µm (n = 40/2), L = 47.7–51.9, W = 6.30–7.33, Q = 7.18–7.62, projecting up to 30 µm. *Hyphidia* present, simple or sparsely branched, thin-walled, associated with setae, up to 25 × 0.7–1.2 µm. *Basidia* four-spored, thin-walled or slightly thick-walled at the basal part, 9–14 × 4–5 µm. *Basidiospores* hyaline, thin-walled, cylindrical to broadly cylindrical, some slightly curved, longest spores subfusiform, (3.8–)4.0–5.2(–5.3) × (1.9–)2.0–2.6(–2.7) µm (n = 60/2), L = 4.40–4.53, W = 2.19–2.29, Q = 1.98–2.01.

Distribution and ecology: North America (Canada – Alberta; USA – Alabama); wood of conifers (*Picea*) and deciduous trees (*Symplocos*, Ericales).

Notes: The species is known to us only from the type material and one recent collection from Canada which was used for DNA study. The Canadian specimen is much thinner (ca. 0.05 mm thick) than the type specimen of *H. epichlora* (up to 0.2 mm thick) but otherwise very similar to it. Therefore, we consider them conspecific. Pale, soft basidiocarps of *H. epichlora* consisting of loosely arranged, quickly collapsing hyphae make it similar to some species of the *H. cinnamomea* complex (i.e. *H. arida* and *H. laxa*). Microscopically, *H. epichlora* differs from them in having much shorter setae and smaller basidiospores. *Hymenochaete jaapii* Corfixen, recently described from Europe, is a soft species with short setae and small basidiospores although with much darker basidiocarps than *H. epichlora*. To our knowledge, no DNA sequences of *H. jaapii* are available.

Material examined: **Canada**, Alberta, Yellowhead Co., Whitehorse Wildland Provincial Park, *Picea glauca*, 26 Jul. 2015, *Spirin 8951** (H).

Hymenochaete fibrillosa (Wallr.) Spirin & K.H. Larss., ***comb. nov.*** MB 861357. Figs 5F, 9.
Basionym: *Hyphoderma fibrillosum* Wallr., *Flora Cryptogam. Germaniae* **2**: 577. 1833.

Typus: **Sweden**, Västergötland, Göteborg, Änggården, 57.67894 11.95984, *Ulmus glabra* (fallen decorticated log), 9 Jul. 2024, *Spirin 17278** (**neotype** GB) (designated here, MBT10029870).

Basidiocarps perennial, covering a few cm but sometimes more substantial, up to 20 cm in widest dimension, effused, first densely floccose or soft-membranous, clay-coloured to bright ochraceous, smooth, then compact, reddish- or rusty- to chocolate-brown, smooth or irregularly cracking, 0.1–1 mm thick. *Margin* gradually thinning out, adnate, in juvenile

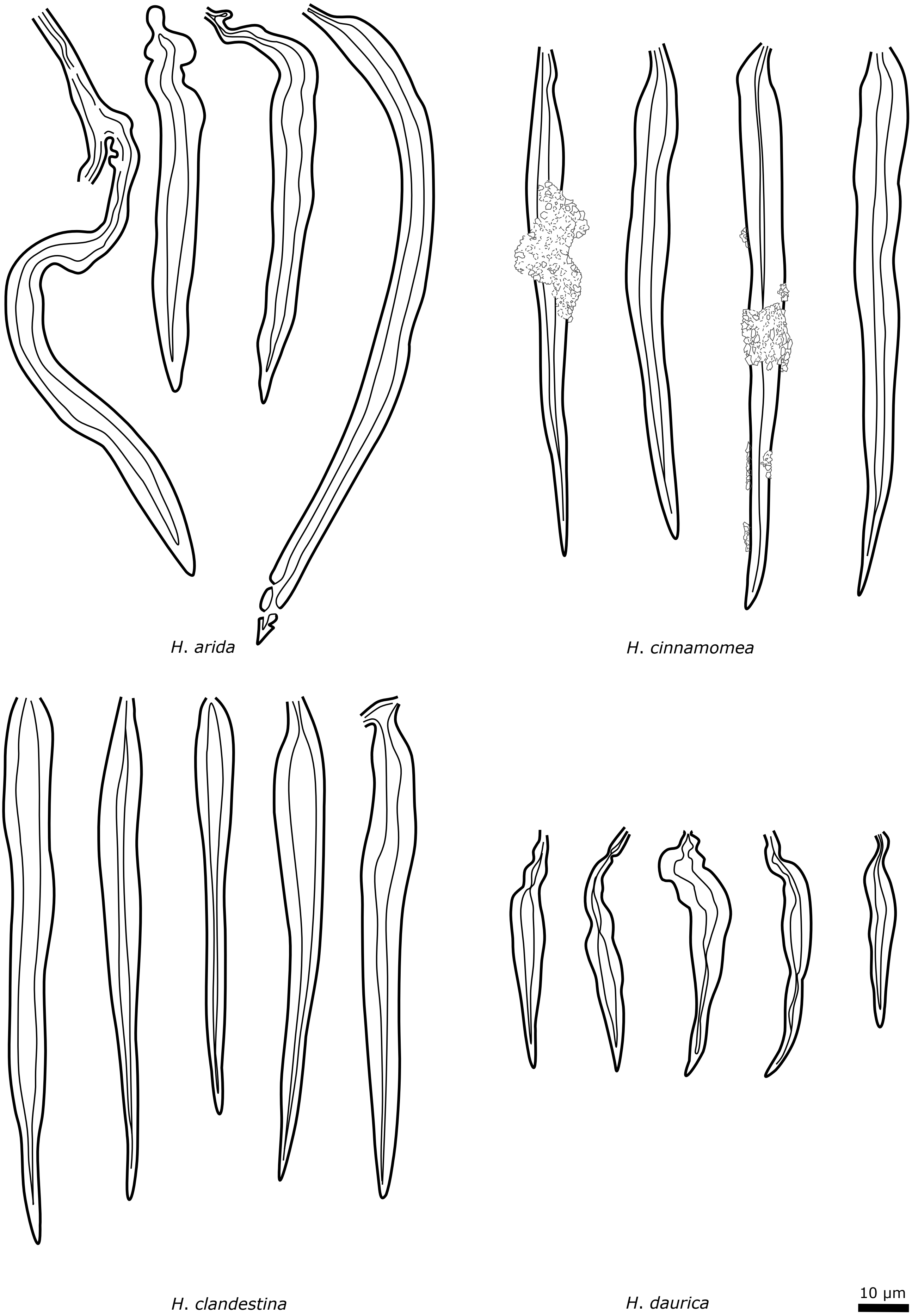

Fig. 6. Setae of *Hymenochaete* spp.: *H. arida* (lectotype), *H. cinnamomea* (*Spirin 13694*), *H. clandestina* (holotype), *H. daurica* (holotype).

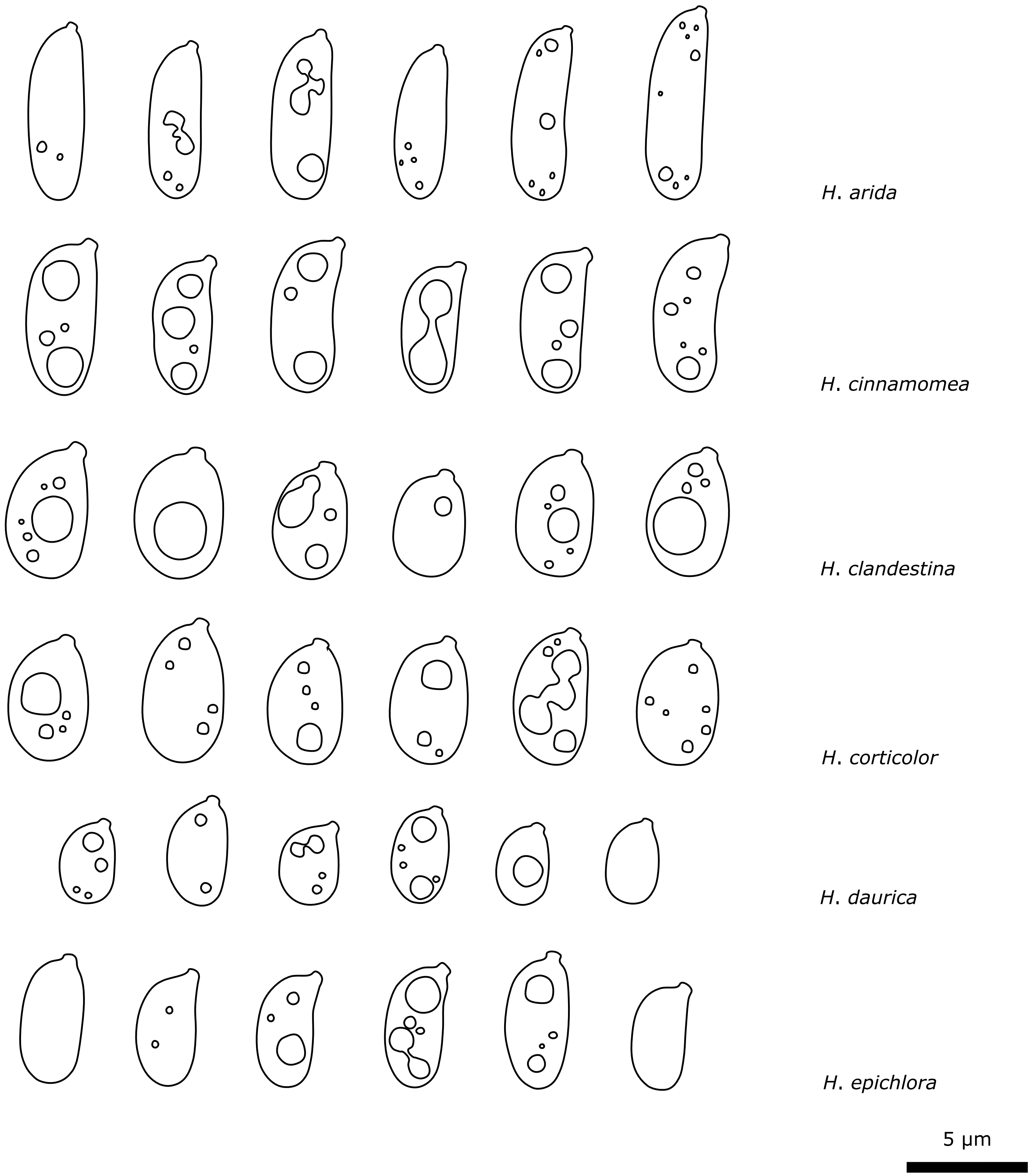

Fig. 7. Basidiospores of *Hymenochaete* spp.: *H. arida* (*Spirin 12206*), *H. cinnamomea* (*Spirin 13694*), *H. clandestina* (holotype), *H. corticolor* (*Miettinen 19567*), *H. daurica* (holotype), *H. epichlora* (*Spirin 8951*).

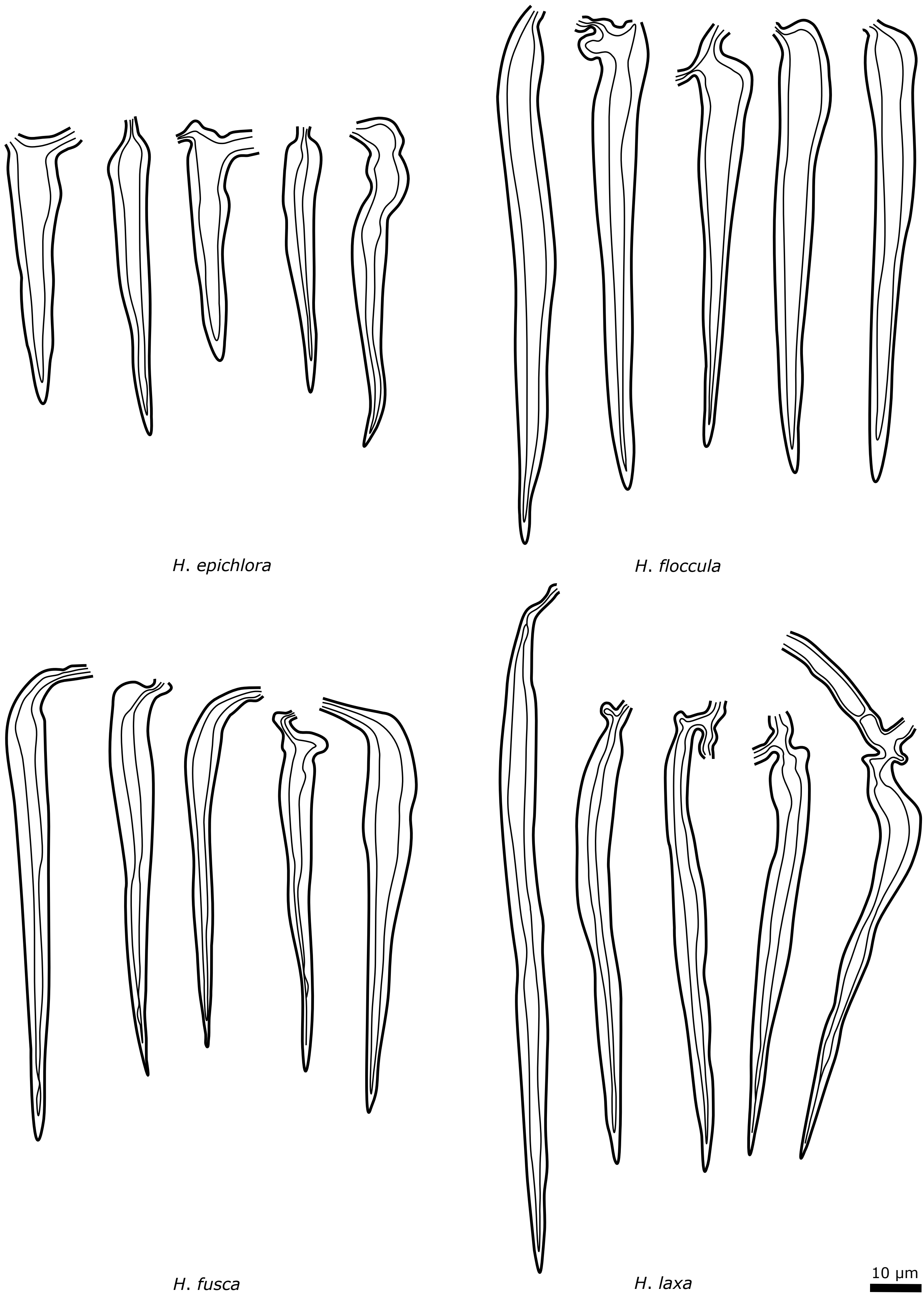

Fig. 8. Setae of *Hymenochaete* spp.: *H. epichlora* (*Spirin 8951*), *H. floccula* (holotype), *H. fusca* (holotype), *H. laxa* (lectotype).

basidiocarps well-visible, yellowish or light ochraceous, sometimes very dark (rusty brown to ferruginous brown), later of more or less the same colour as the hymenial surface. Section: basidiocarp uniformly coloured or two-layered, with a loose, rather light-coloured hymenial layer and a bit more compact, clearly darker deeper layer. Monomitic, *hyphae* clampless. Subicular hyphae brownish, slightly or distinctly thick-walled, rather tightly arranged, mostly interwoven, (3.2–)3.4–5.0(–5.2) µm diam. (n = 30/2), in senescent basidiocarps collapsing and almost indiscernible. Subhymenial hyphae yellowish or brownish, slightly or distinctly thick-walled, loosely or rather tightly arranged, interwoven or vertically arranged, often short-celled and slightly inflated, (2.2–)2.3–4.6(–4.8) µm diam. (n = 120/6). *Setae* brown, sharp-tipped, straight or slightly curved, sturdy, occasionally biradicate, as a rule encrusted by small-sized, densely arranged crystals, (72–)75–149(–153) × (4.3–)4.5–9.3(–9.7) µm (n = 215/11), L = 91.0–117.4, W = 5.51–7.92, Q = 13.81–18.05, projecting up to 70 µm. *Hyphidia* present, simple, thin-walled, occasionally encrusted, scattered among basidia or associated with setae, up to 50 × 1–1.5 µm. *Basidia* four- or (rarely) two-spored, thin-walled or slightly thick-walled and brownish at the base, 10.5–19.5 × 3–4.5 µm. *Basidiospores* hyaline, thin-walled, cylindrical to narrowly ellipsoid, straight or indistinctly concave, longest spores subfusiform, (3.8–)3.9–5.8(–7.0) × (2.0–)2.1–3.1(–3.2) µm (n = 360/12), L = 4.37–5.04, W = 2.26–2.79, Q = 1.59–2.08.

Distribution and ecology: Europe (Austria, Estonia, Finland, France, Italy, Norway, Poland, Russia, Slovenia, Sweden); bark and wood of deciduous trees (most often on *Corylus avellana* and *Tilia cordata*), rarely on conifers (*Juniperus*, *Picea*, *Pinus*).

Notes: *Hyphoderma fibrillosum* was described from Germany as growing on rotten cherry twigs (Wallroth 1833) and later treated as a synonym of *Corticium cinnamomeum* (= *Hymenochaete cinnamomea*) (Saccardo 1891, Mussat in Saccardo 1901). No extant type material is known. Nevertheless, the protologue gives rather certain indications that Wallroth dealt with a pale-coloured (reddish to brownish), soft *Hymenochaete* species ('adnato-resupinatis membranaceis … hymenium carneum s. dilute-cinnamomeum, veluti areolato-colliculosum' – op cit.). In our opinion, this description fits best to a close relative of *H. cinnamomea* s. typi widely distributed in temperate Europe. Our phylogenetic analyses recover a clade close to *H. cinnamomea* for which there is no name (Fig. 2). Rather than introducing a new name we prefer to apply the existing name *Hyphoderma fibrillosum* and to fix our interpretation by selecting a neotype.

Hymenochaete fibrillosa can be distinguished from *H. cinnamomea* due to somewhat softer and normally paler basidiocarps and shorter basidiospores. However, basidiospores of *H. fibrillosa* specimens collected in the winter can be unusually large, with an average length approaching the lowermost limits of *H. cinnamomea*. These hibernating individuals of *H. fibrillosa* have exceptionally pale (pale ochraceous or greyish) and soft basidiocarps, thus differing from rusty- or chocolate-brown, rather tough wintering fruitbodies of *H. cinnamomea*.

Material examined: **Austria**, Steiermark, Deutschlandsberg, Deutschlandsberger Klause, *Alnus glutinosa*, 13 Mar. 2021, *Friebes* 20210232 (GJO). **Estonia**, Lääne-Virumaa, Väike-Maarja, Luusiku, *A. glutinosa*, 22 Sep. 1956, *Parmasto* (Mycotheca Estonica 1: 4, 1957) (H). **Finland**, Ahvenanmaa, Lemland, Slattholmen, *Juniperus communis*, 18 Sep. 1976, *Fagerström* (H); Finström, Mangelbo Nat. Res., *Corylus avellana*, 25 Oct. 2001, *Saarenoksa 27901* (H); Geta, Snäkö, *J. communis*, 24 Oct. 2001, *Kotiranta 19105a* (H); Jomala, Ramsholm Nat. Res., *C. avellana*, 23 Oct. 2001, *Kotiranta 19003* (H); Varsinaissuomi, Pohja, Fiskars, *C. avellana*, 27 Sep. 2001, *Kotiranta 18906* (H); Karjalohja, Karkali, *C. avellana*, 3 Oct. 1937, *Laurila 4013* (H); Uusimaa, Helsinki, Laajasako, *A. glutinosa* (?), 1 Nov. 1958, *Kujala* (H); Porvoo, Tamminiemi, hardwood, 16 Nov. 1958, *Kujala* (H); Raasepori, Tammisaari, *C. avellana*, Aug. 1928, *Häyrén* (H), *T. cordata*, 15 Jul. 1987, *Niemelä 4024* (H);, Vantaa, Tammisto, *C. avellana*, 7 Jul. 1990, *Saarenoksa 03390* (H); Satakunta, Noormarkku, Paasjoki, *Salix caprea* (?), 25 Aug. 1937, *Laurila* (H); Siikainen, Vuorijärvi, *A. incana*, 6 Sep. 1937, *Laurila* (H); Etelä-Häme, Asikkala, Pyhäsuo, *Salix* sp., 24 Sep. 1993, *Haikonen 15681* (H); Hollola, Isosaari, *C. avellana*, 28 Apr. 1986, *Haikonen 7090* (H); 18 Oct. 1986, *Haikonen 7931* (H); Lahti, Mukkula, *C. avellana*, 12 Nov. 1989, *Haikonen 11148* (H); Lammi, Biological Station, *C. avellana*, 5 Sep. 1968, *Niemelä* (H); Luopioinen, Kouhijoki, *Padus avium* (?), 8 Jun. 1987, *Haikonen 8281* (H). **France**, Pyrénées-Orientales, Maureillas-las-Illas, *Erica* sp. 1 Jan. 2020, *Miettinen 23445** (H). **Italy**, Liguria, Imperia, Pigna, Buggio, *Castanea sativa*, 17 Oct. 2019, *Spirin 13831*, *13837*, *13842**, *13847** (H). **Norway**, Aust-Agder, Iveland, Glupsetjørn, *Tilia cordata*, 17 Aug. 2010, *Klepsland 10-S076* (O F-247597); Vestfold, Larvik, Vemannsås, *T. cordata*, 30 Sep. 2018, *Spirin 12520** (O, H); Akershus, Asker, Esvika, *T. cordata*, 28 Sep. 2018, *Spirin 12458** (H, O); Telemark, Porsgrunn, Heistad, *Rosa* sp., 13 Oct. 2012, *Molia 337i-2012** (O F245647). **Poland**, Podlasie: Hajnówka. Białowieża National Park, *Q. robur*, 23 Sep. 2019, *Miettinen 22740* (H); *T. cordata*, 23 Sep. 2019, *Miettinen 22753* (H). **Russia**, Leningrad Reg., Volkhov Dist., Zagubie, *T. cordata*, 3 Oct. 2010, *Spirin 3644* (H); Nizhny Novgorod Reg., Arzamas Dist., Pustyn', *Pinus sylvestris*, 12 Aug. 2015, *Spirin 9156* (H); *Q. robur*, 12 Aug. 2015, *Spirin 9120* (H); *T. cordata*, 2 Jul. 2000, *Spirin* (LE 213891); Lukoyanov Dist., Razino, *A. glutinosa*, 30 Jul. 2021, *Spirin 14416* (H); *Padus avium*, 24 Jul. 2018, *Spirin 12014** (H); *T. cordata*, 8 Aug. 1997, *Spirin* (LE 213169); 7 Aug. 2013, *Spirin 6009*, *6012a* (H); 8 Aug. 2014 *Spirin 7248* (H); 15 Aug. 2015, *Spirin 9260* (H); 29 Jul. 2017, *Spirin 11257** (H); 7 Sep. 2018, *Spirin 12257* (H); 8 Sep. 2018, *Spirin 12270*, *12274*, *12277* (H); 25 Jul. 2021, *Spirin 14300* (H); *U. glabra*, 30 Jul. 2021, *Spirin 14402* (H); Sanki, *Q. robur*, 19 Aug. 2009, *Spirin 3078* (H); 7 Aug. 2014, *Spirin 7193* (H); Sharanga Dist., Kilemary, *P. abies*, 24 Aug. 2019, *Spirin 13015* (H); *T. cordata*, 23 Aug. 2019, *Spirin 12956*, *12966* (H); 25 Aug. 2019, *Miettinen 22420* (H). **Slovenia**, Gorenjska, Bohinj, Mrežce, *P. abies*, 26 Sep. 2019, *Spirin 13232* (H). **Sweden**, Öland, Persnäs, *Betula* sp., 6 Aug. 1953, *Nannfeldt* (Flora Suecica #13363, H); Småland, Nybro, Alsterån, *Q. robur*, 25 Sep. 2024, *Spirin 17574* (GB).

Hymenochaete floccula Spirin, ***sp. nov.*** MB 861358. Figs 8, 9.

Etymology: *Floccula* (Lat., noun) – diminutive of "floccus", a tuft of wool.

Typus: **Russia**, Khabarovsk Reg., Khabarovsk Dist., Malyi Niran, 49.52247 134.4102, *Actinidia kolomikta* (dead hanging branch), 8 Aug. 2012, *Spirin 5063** (**holotype** H, isotype – TUF).

Basidiocarps annual, covering a few cm, effused, densely floccose, light ochraceous or light brown, smooth, 0.05–0.1 mm thick. *Margin* pruinose, adnate, of the same colour as the hymenial surface. Section: basidiocarp one-layered, uniformly coloured. Monomitic, *hyphae* clampless. Subicular hyphae brownish, thin- to slightly thick-walled, sparse, subparallel, (3.8–)4.0–5.2(–5.4) µm diam. (n = 20/1). Subhymenial hyphae hyaline to yellowish or brownish, thin-walled, rather loosely arranged, vertically arranged, short-celled and slightly inflated, easily collapsing, (3.0–)3.2–4.1(–4.3) µm diam. (n = 20/1). *Setae* brown, sharp-tipped, straight, sturdy, sometimes bifurcate, occasionally bi- or multiradicate, not encrusted, (65–)70–110.5(–114) ×

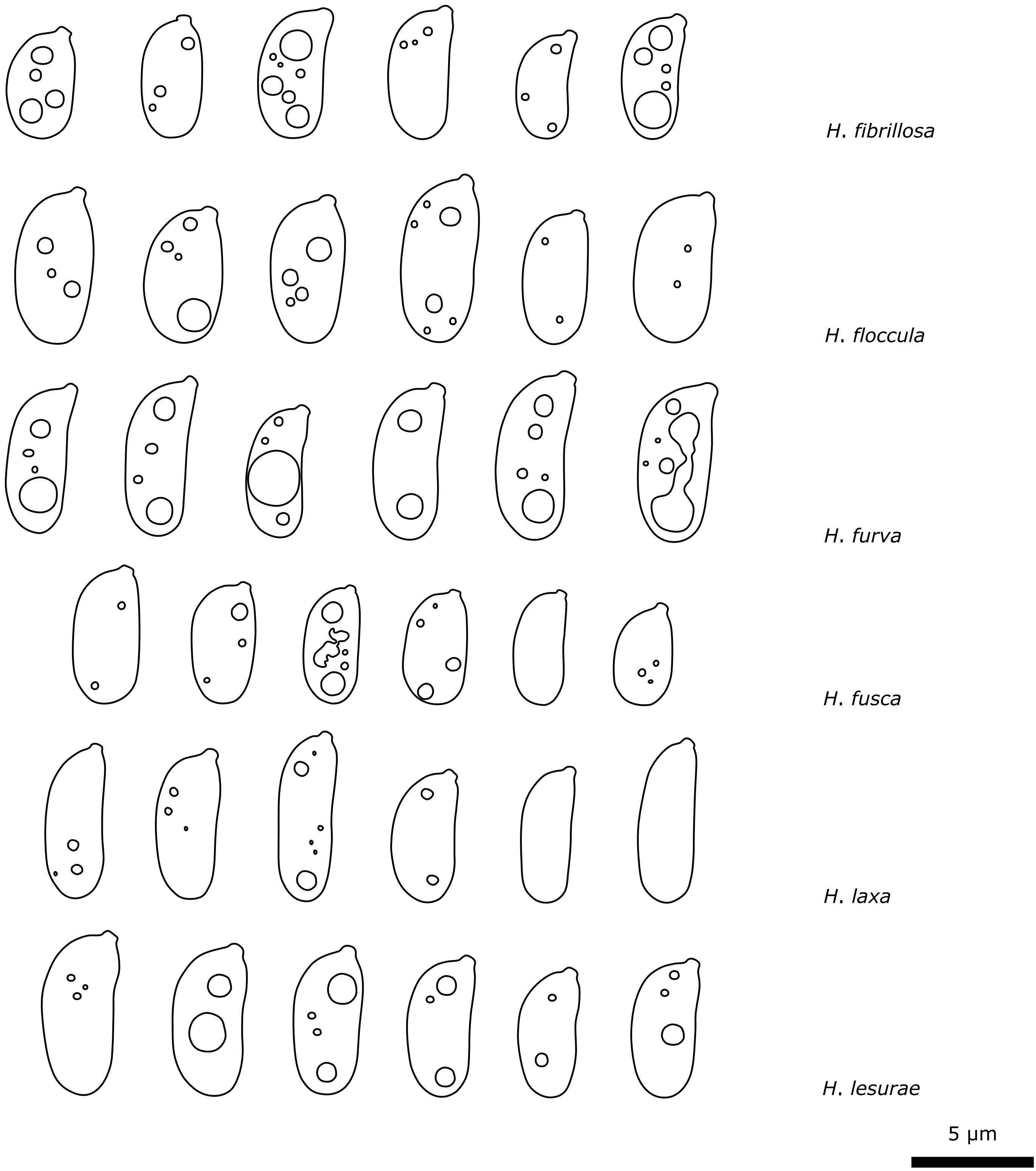

Fig. 9. Basidiospores of *Hymenochaete* spp.: *H. fibrillosa* (neotype), *H. floccula* (holotype), *H. furva* (holotype), *H. fusca* (holotype), *H. laxa* (TUF124071), *H. lesurae* (holotype).

(6.0–)6.2–8.9(–11.2) µm (n = 20/1), L = 91.1, W = 7.37, Q = 12.65, projecting up to 80 µm. *Hyphidia* present, simple, thin-walled, associated with setae, up to 40 × 1.5–2.5 µm. *Basidia* four-spored, thin-walled, 9.5–14.5 × 4–5.5 µm. *Basidiospores* hyaline, thin-walled, cylindrical to narrowly ellipsoid, (5.0–)5.1–7.2(–8.1) × (2.5–)2.6–3.3(–3.4) µm (n = 30/1), L = 5.62, W = 2.93, Q = 1.92.

Distribution and ecology: Asia (Russian Far East); dead corticated branch of a liana (*Actinidia kolomikta*).

Notes: Morphologically, *H. floccula* is most similar to *H. scabra*. Both species have soft basidiocarps, rather long, non-encrusted setae and hyphae of approximately the same diameter throughout. However, *H. scabra* possesses clearly thicker and darker basidiocarps, and its setae are on average longer than in *H. floccula*. Exceptionally thin basidiocarps and occasionally bifurcate setae of *H. floccula* differentiate it from *H. scabra* and other outwardly similar *Hymenochaete* species. *Hymenochaete floccula* is so far known from the type locality in East Asia.

Hymenochaete furva Spirin & Miettinen, ***sp. nov.*** MB861359. Figs 5G, 9.

Etymology: *Furvus* (Lat., adj.) – dark.

Typus: **Finland**, Sompion Lappi, Sodankylä, Tuore Naakiselkä, 67.75006 26.01549, *Picea abies* (fallen decorticated log), 3 Sep. 2020, *Spirin 14150** (**holotype** H).

Basidiocarps perennial, covering a few cm but sometimes more substantial, up to 10 cm in widest dimension, effused, tough-leathery or corky, first chocolate-brown, smooth or irregularly cracking, then darkening to fuscous-brown, 0.2–0.5 mm thick. *Margin* gradually thinning out, in juvenile basidiocarps well-visible, ferruginous-brown, then more or less concolourous with the hymenial surface, adnate. Section: basidiocarp uniformly coloured or with a slightly darker (ferruginous brown) deeper layer. Monomitic, *hyphae* clampless. Subicular hyphae brown, distinctly thick-walled, tightly arranged and often almost indiscernible, 2.5–4.5 µm diam. Subhymenial hyphae hyaline to brownish, slightly or distinctly thick-walled, tightly arranged, vertically arranged, short-celled and slightly inflated, (2.8–)2.9–4.7(–5.0) µm diam. (n = 60/3). *Setae* brown, sharp- or more rarely blunt-tipped, straight, occasionally inflated at the base, sturdy, not encrusted, (60–)63–115(–118) × (5.7–)5.8–11.0(–13.3) µm (n = 120/6), L = 81.9–94.7, W = 7.47–9.23, Q = 9.10–12.71, projecting up to 80 µm. *Hyphidia* present, simple, thin- or slightly thick-walled, usually associated with setae, up to 25 × 1.5–3 µm. *Basidia* four-spored, thin-walled or slightly thick-walled at the base, 14–20 × 3.5–4.5 µm. *Basidiospores* hyaline, thin-walled, cylindrical to subfusiform, straight or slightly curved, (5.2–)5.3–7.2(–8.0) × (2.1–)2.2–3.2(–3.3) µm (n = 180/6), L = 6.16–6.42, W = 2.64–2.88, Q = 2.20–2.36.

Distribution and ecology: Boreal Europe (Finland, Norway, North-West Russia, Sweden); decorticated wood of conifers (*Picea abies*) and deciduous (*Salix* spp.) trees.
Remarks: *Hymenochaete furva* is morphologically indistinguishable from *H. lesurae* described below. These species can be differentiated by DNA sequences and geographic distribution (boreal vs. temperate Europe). *Hymenochaete fusca* is another species confusingly similar to *H. furva*. These two species can be separated only due to different shape and size of basidiospores, which are on average longer and more clearly subfusiform in *H. furva*. *Hymenochaete furva* seems to be a rare species distributed in boreal forests of North Europe (middle to north boreal zone). It often occurs together with another similar-looking species, *H. tenuis*, and all of its recent records came from old-growth spruce-dominated forests. The latter species has clearly shorter setae and shorter basidiospores.

Material examined: **Finland**, Etelä-Häme, Padasjoki, Vesijako, *Picea abies*, 11 Sep. 1980, *Kotiranta 2519* (H); Sompion Lappi, Sodankylä, Palo-Naakiselkä, *Salix caprea*, 4 Sep. 2020, *Spirin 14163** (H). **Norway**, Hedmark, Løten, Gitvola, *P. abies*, 26 Sep. 2018, *Spirin 12404** (O, H). **Russia**, Murmansk Reg., Kandalaksha Dist., Kutsajoki, Sieminkijoki, *S. caprea*, 27 Jul. 1937, *Laurila* (H). **Sweden**, Torne Lappmark, Jukkasjärvi, Nuolja, *Salix* sp., 4 Sep. 1910, *Romell 2986* (H); Snuoratjåkko, *Salix nigricans*, 14 Jul. 1928, *Nannfeldt* (H ex Fungi Suecici #1295).

Hymenochaete fusca (P. Karst.) Sacc. & P. Syd., *Syll. Fung*. 14**:** 218. 1899. Figs 8–10A.
Basionym: *Hymenochaetella fusca* P. Karst., *Hedwigia* **35**: 174. 1896.
Typus: **Sweden**, [no collecting site], Aug. 1880 *Starbäck* (**holotype** H7027709, studied).
Synonym: *Hymenochaete subfuliginosa* Bourdot & Galzin, *Bull. Soc. Mycol. France* **38**: 184. 1922.
Typus: **France**, Aveyron, Saint-Affrique, Vignoles, *Quercus* sp., 12 Jun. 1914, *Galzin 15666* (herb. Bourdot 15372) (**lectotype** PC, studied) (selected by Parmasto 2000: 64).

Basidiocarps perennial, covering a few cm but sometimes more substantial, up to 15 cm in widest dimension, effused, tough-leathery or corky, first olivaceous- or chocolate-brown, smooth or irregularly cracking, sometimes irregularly tuberculate, then fading to greyish-brown, 0.2–1.5(–2) mm thick. *Margin* gradually thinning out, in juvenile basidiocarps well-visible, ferruginous brown, then more or less concolourous with the hymenial surface, occasionally slightly elevated. Section: basidiocarp uniformly coloured or with a slightly darker (ferruginous brown) deeper layer. Monomitic, *hyphae* clampless. Subicular hyphae brownish, slightly or distinctly thick-walled, tightly arranged and almost indiscernible, 3–5 µm diam. Subhymenial hyphae hyaline to brownish, thin- or slightly thick-walled, tightly arranged, vertically arranged, short-celled and slightly inflated, (2.0–)2.1–4.3(–4.9) µm diam. (n = 150/8). *Setae* brown, sharp-tipped, straight, sometimes slightly swollen at the base, sturdy, not encrusted, (64–)69.5–118(–130) × (5.0–)5.8–10.4(–12.3) µm (n = 444/22), L = 82.1–102.1, W = 7.11–8.66, Q = 10.62–14.22, projecting up to 80 µm, accidentally notched or bifurcate. *Hyphidia* present, simple, thin- or slightly thick-walled, scattered among hymenial cells or associated with setae, up to 70 × 0.5–2 µm. *Basidia* four-spored, thin-walled or slightly thick-walled at the base, 11.5–21 × 3–4.5 µm. *Basidiospores* hyaline, thin-walled, cylindrical to narrowly ellipsoid, straight or slightly curved, longest spores subfusiform, (4.1–)4.2–6.8(–7.2) × (2.0–)2.1–

Fig. 10. Basidiocarps of *Hymenochaete* spp. photographed *in situ*. **A.** *H. fusca* (*Miettinen 12500.1*). **B.** *H. laxa* (*Miettinen 25320.1*). **C.** *H. obsoleta* (holotype). **D.** *H. rudis* (*Miettinen 24548*). **E.** *H. scabra* (*Miettinen 23404*). **F.** *H. similis* (holotype). **G.** *H. spreta* (*Miettinen 19610.1*). **H.** *H. tenuis* (*Miettinen 13332*).

3.2(–3.3) µm (n = 630/21), L = 4.56–6.11, W = 2.21–3.01, Q = 1.77–2.52.

Distribution and ecology: Europe (Austria, Bulgaria, Estonia, Finland, France, Norway, Romania, Russia, Slovenia, Sweden), Asia (China, South Korea), North America (USA – Washington, Wisconsin; Canada – Alberta, British Columbia); decorticated wood of conifers and deciduous trees (predominantly *Quercus*).

Notes: Höhnel & Litschauer (1906) placed *H. fusca* among the synonyms of *H. fuliginosa*. Burt (1918) agreed with this synonymy although he noted that *H. fusca* is the same species as *H. fuliginosa* sensu Bresadola, and that it still could be different from *H. fuliginosa*. The species was described based on a single collection from Sweden which, therefore, should be treated as a holotype. This specimen is in perfect condition, with a well-preserved hymenium and abundant basidiospores, and its identity is doubtless. Morphologically, it is identical to the type material of *H. subfuliginosa*, and we treat the latter species as a synonym of *H. fusca*.

Hymenochaete fusca is widely distributed in temperate and boreal forests of the northern hemisphere although it seems to be rare everywhere. It occurs mostly on angiosperm hosts (mainly on *Quercus*) in temperate forests while the vast majority of collections from boreal and mountain areas are from conifers. Superficially, *H. fusca* is most similar to *H. furva*, *H. lesurae*, and *H. tenuis*. The latter species has considerably shorter setae than *H. fusca* and *H. furva* (see below). Differences of *H. fusca* from *H. furva* and *H. lesurae* are discussed under the latter species.

Material examined: **Austria**, Steiermark, Liezen, Bad Mitterndorf, conifer, 19 Jul. 2016, *Dämon* (GJO 0088157); Bruck-Mürzzuschlag, St. Barbara im Mürztal, *Fagus sylvatica*, 27 May 2019, *Friebes* (GJO). **Bulgaria**, Sofia Prov., Dolna Banya, Ibar, *Abies alba* (?), 20 Apr. 2008, *Miettinen 12500.1* (H). **Canada**, Alberta, Yellowhead Co., Whitehorse Wildland Provincial Park, *Picea glauca*, 26 Jul. 2015, *Spirin 8939*, *8943*, *8953**, *8962* (H); British Columbia, Clearwater, Placid Lake trail, *Tsuga occidentalis*, 27 May 2023, *Miettinen 26067** (H). **Estonia**, Saaremaa, Viidumäe, *Quercus robur*, 2 Jun. 1998, *Kotiranta 15596* (H); Valgamaa, Otepää, Kõlli järv, *Picea abies*, 12 Sep. 2015, *Spirin* (TUF109455). **Finland**, Varsinaissuomi, Turku, Ruissalo, *Q. robur*, 19 Sep. 1936, 10 Sep. 1937, *Laurila* (H); 16 Oct. 2020 *Miettinen 24291* (H); Lohja, Tamminiemi, *P. abies*, 5 Nov. 2020, *Spirin 14258* (H); Etelä-Häme, Jaala, Hundasjärvi, conifer, 4 Jun. 1989, *Haikonen 10338* (H); Lammi, Untulanharu, *C. avellana* (?), 11 Sep. 2002, *Miettinen 6705* (H); Kittilän Lappi, Kittilä, Aakenus, *P. abies*, 1 Sep. 2000, *Kinnunen 1160* (H); Pyhäjärvi, *P. abies*, 30 Aug. 2000, *Kinnunen 1146* (H); Sompion Lappi, Sodankylä, Kolholaki, *P. abies*, 3 Sep. 2020, *Spirin 14135* (H); Tuore Naakiselkä, 2 Sep. 2020, *Miettinen 23934* (H); Pelkosenniemi, Kultakero, *P. abies*, 6 Sep. 2020, *Spirin 14199*, *14201* (H). **France**, Hautes-Pyrénées, Pragnères, Barrada, *A. alba*, 27 Oct. 2005, *Trichies 05201* (H, G.T.); Aveyron, Castelnau-Pégayrols, Le Trou d'Enfer, *Quercus pubescens*, 22 Mar. 2024, Spirin *17126*, *17129* (H, GB); Combret, Bétirac, *Q. pubescens*, 6 Nov. 2024, *Spirin 17813* (H); Millau, Le Causse Noir, *Juniperus communis*, 8 May 2022, *Spirin 15317** (H); *Q. pubescens*, 13 Nov. 2022, *Spirin 16168* (H); Dourbie, *Q. pubescens*, 10 May 2022, *Spirin 15454*, *15458** (H); 15 Nov. 2022, *Spirin 16398* (H); *Salix alba*, 23 Feb. 2025, *Spirin 18173* (H); Saint-Affrique, Vignoles, *Quercus* sp., 15 Jun. 1915 *Galzin 18151* (herb. Bourdot 26771) (PC); Lozère, Saint-Etienne-du-Valdonnez, Forêt du Sapet, *A. alba*, 28–29 Jun. 2022, *Spirin 15546*, *15636* (H). **Greece**, Attica, Acharnes, Mount Parnitha, *Abies cephalonica*, 17 Jan. 2025, *Viner 2025-100a* (H). **Norway**, Aust-Agder, Arendal, Vigeland, *Q. robur*, 14 Sep. 2009, *Fonneland 09-137* (O F-290931); Evje og Hornnes, Linddalen, *Q. robur*, 21 Aug. 2005, *Fonneland 05-42* (O F-157972); Møre og Romsdal, Molde, Eikesdalen, *Alnus incana*. 17 Sep. 2014, *Svantesson** (GB). **Romania**, Arad, Runcu, *Quercus petraea*, 15 Sep. 2021, *Spirin 15017* (H). **Russia**, Bashkortostan, Meleuz Dist., Nugush, *T. cordata*, 2 Aug. 2012, *Kotiranta 25474** (H7021917); Krasnodar Reg., Sochi, Russkaya Mamaika, angiosperm branch, 14 May 2021, *Viner 2021-134** (H); Leningrad Reg., Boksitogorsk Dist., Kolp', *Picea abies*, 11 May 2018, *Spirin 11896** (H), Valgozero, *P. abies*, 16 Jul. 2014, *Spirin 7026* (H); Moscow, Losinyi Ostrov, *C. avellana*, 1 Jul. 2019, *Viner 2019-279** (H); Nizhny Novgorod Reg., Bogorodsk Dist., Krastelikha, *Q. robur*, 11 Aug. 2009, *Spirin 2885*, *2920* (H); Lukoyanov Dist., Panzelka, *Q. robur*, 13 Aug. 2007, *Spirin 2692* (H); 17 Aug. 2009, *Spirin 3012* (H); *Pinus sylvestris*, 19 Aug. 2015, *Spirin 9647** (H); Razino, *Q. robur*, 20 Aug. 2009, *Spirin 3109* (H); 28 Sep. 2013, *Spirin 6747* (H); 16 Aug. 2015, *Spirin 9337** (H); 6 Sep. 2018, *Spirin 12244*, *12246* (H); *T. cordata*, 20 Aug. 2009, *Spirin 3128* (H); Sanki, 14. *Q. robur*, 14 Jul. 2012, *Spirin 4704* (H); 31 Jul. 2021, *Spirin 14437** (H); Lyskovo Dist., Makarievo, *Q. robur*, 11 Aug. 2015, *Spirin 9087*, *9090* (H); Nizhny Novgorod, Botanical Garden, *Q. robur*, 13 Aug. 2009, *Spirin 2935* (H); Pavlovo Dist., Chudinovo, *Q. robur*, 10 Sep. 2018, *Spirin 12288*, *12292*, *12298* (H); Pochinki Dist., Kommunar, *Q. robur*, 21 May 1999 *Spirin* (LE 211331); Volgograd Reg., Novoanninsky Dist., Novoanninsky, *Q. robur*, 5 Jul. 2015, *Viner 2015-49* (H). **Slovenia**, Gorenjska, Bohinj, Studor, *A. alba*, 27 Jul. 2020, *Spirin 13853** (H); Mrzli Studenec, *A. alba*, 27 Jul. 2020, *Spirin 13875** (H); Kranjska Gora, Vršič, *Larix decidua*, 27 Sep. 2018, *Spirin 13320** (H); Jugovshodna, Kočevje, Podstenice, Rajhenavski Rog Forest Reserve, *A. alba*, 30 Jul. 2020, *Spirin 14011** (H); 19 Aug. 2021, *Spirin 14812* (H); Borovec pri Kočevski Reki, Krokar Forest Reserve, *A. alba*, 18 Aug. 2021, *Spirin 14674*, *14682*, *14706* (H); Podravska, Slovenska Bistrica, Šumik, *Picea abies*, 6 Nov. 2023, Miettinen *26440** (H, LJF). **Sweden**, Småland, Högsby, Barnebo, *Q. robur*, 23 Sep. 2024, *Spirin 17551* (GB); Västergötland, Vänersborg, Hunneberg, *Q. robur*, 15 Oct. 2024, *Spirin 17696* (GB); Västra Tunhem, *Q. robur*, 15 Oct. 2024, *Spirin 17713* (GB); Upland, Bondkyrka, coniferous fences, 11 Sep. 1929, *Lundell* (Fungi Suecici #727, H); Nåntuna, coniferous fences, 11 Apr. 1929, *Lundell* (Fungi Suecici #459, H); Dalarna, Venjan, Lybergsgnupen, *P. abies*, 23 Aug. 2024, *Spirin 17473* (GB). **USA**, Washington, Pend Oreille Co., Slate Creek, *Pinus ponderosa*, 15 Oct. 2014, *Spirin 8522** (H); Gypsy Meadows, *Picea engelmannii*, 17 Oct. 2014, *Spirin 8716a* (H).

Hymenochaete laxa (P. Karst.) Sacc., *Syll. Fung.* **9**: 228. 1891. Figs 8–10B.

Basionym: *Hymenochaetella laxa* P. Karst., *Bidr. Känned. Finlands Nat. Folk* **48**: 429. 1889.

Typus: **Finland**, Varsinais-Suomi, Turku, Ruissalo, *Corylus avellana*, Apr. 1861, *Karsten 1439* (**lectotype** H6074673, studied) (selected by Corfixen & Parmasto 2017: 56).

Basidiocarps annual or short-living perennial, covering a few cm, effused, densely floccose or soft-membranous, light ochraceous or light brown, smooth, then reddish- or rusty-brown, smooth or irregularly cracking, senescent sterile basidiocarps dark brown, 0.2–1(–1.5) mm thick. *Margin* first well-differentiated, felty, partly detaching, normally darker (rusty brown to dark brown) than the hymenial surface, then more compact, adnate or partly separating, more or less concolourous with the hymenophore. Rusty- or dark brown fluffy patches of sterile mycelium present at the marginal areas of basidiocarps. Section: basidiocarp clearly two-layered, with a more compact, rather light-coloured hymenial layer and softer, clearly darker deeper layer, in older parts distinctly stratified. Monomitic, *hyphae* clampless. Subicular hyphae brownish to rusty brown, slightly or distinctly thick-walled, rather loosely arranged, interwoven or subparallel, (4.2–)4.8–9.2(–9.3) µm diam. (n = 95/5). Subhymenial hyphae yellowish or brownish, slightly or distinctly thick-walled, rather loosely arranged, vertically arranged or interwoven, short-celled and slightly inflated, easily collapsing, (2.7–)3.0–5.2(–5.3) µm diam. (n = 100/5). *Setae* brown, sharp-tipped, rarely rather blunt, straight or rarely hooked at the base, sturdy, occasionally bi- or multiradicate, not encrusted, (60–)71–159(–172) × (5.2–)5.4–10.2(–11.2) µm (n = 160/8), L = 89.4–121.2, W = 7.05–8.02, Q = 12.13–15.20, projecting up to 70 µm. *Hyphidia* present, simple, thin-walled, associated with setae, up to 70 × 1–2.5 µm. *Basidia* four-spored, thin-walled or slightly thick-walled at the base, 9.5–17(–19) × 4–5.5 µm. *Basidiospores* hyaline, thin-walled, cylindrical to subfusiform, more rarely narrowly ellipsoid, straight or slightly curved, (4.8–)5.1–7.8(–8.1) × (2.0–)2.1–3.0(–3.1) µm (n = 240/8), L = 5.55–6.55, W = 2.30–2.74, Q =1.84–2.78.

Distribution and ecology: Europe (Estonia, Finland, France, Hungary, Norway, Russia, Switzerland, Ukraine), Asia (China), North America (Canada – Alberta); bark and wood of deciduous trees, most often *Corylus* and *Quercus*.

Notes: *Hymenochaetella laxa* was introduced by Karsten (1889) and soon moved to *Hymenochaete* by Saccardo (1891). Höhnel & Litschauer (1906) considered it a synonym of *H. cinnamomea* while Burt (1918) placed it among the synonyms of *H. arida*. Since then, *H. laxa* has never been recognized as a species of its own and remained almost forgotten. Corfixen & Parmasto (2017) designated a lectotype for it and left it as a synonym of *H. cinnamomea*. Compared to *H. cinnamomea* s. str., *H. laxa* is a softer species with clearly two- or multilayered basidiocarps and much longer, occasionally bi- or multiradicate, non-encrusted setae. The type of *H. laxa* is completely sterile although its occurrence on *Corylus* and the presence of characteristic patches of sterile mycelium helped us to connect it with newly collected and sequenced specimens.

Morphologically and phylogenetically, *H. laxa* is closest to *H. rudis*. Anatomically, the two species are almost indistinguishable except for somewhat longer and often subfusiform spores of *H. laxa*. The most striking macroscopic feature of *H. laxa* is the presence of dark-coloured, loose flecks of sterile mycelium at the basidiocarp margin. These structures have never been observed in *H. rudis*. Moreover, ecology and distribution of *H. laxa* and *H. rudis* are different. *Hymenochaete laxa* is distributed in nemoral and hemiboreal zones of Europe inhabiting still corticated, recently fallen branches or stems of deciduous trees, mainly *Corylus*. In turn, *H. rudis* is a boreal species occurring mostly on wood of *Alnus* and *Salix* and sometimes switching to coniferous hosts.

ITS sequences of *Hymenochaete acerosa* (JQ279543, JQ279544) show insignificant differences (2 bp, in both cases C vs. T) versus *H. laxa*. *Hymenochaete acerosa* was recently described from China as a relative of *H. cinnamomea* (He & Li 2011). All morphological traits of *H. acerosa* mentioned in the protologue, as well as the colour photograph of the type specimen, point to *H. laxa*, except for the clearly larger basidiospores of *H. acerosa*. We did not study any material of *H. acerosa* and it is still possible it is a good species. We leave this problem for future studies of the *H. laxa* complex, which will certainly require the use of other genetic markers. As said under Results, the identity of the Canadian material assigned here to *H. laxa* also needs further clarification.

Material examined: **Canada**, Alberta, Edmonton, Henrietta Louise Edwards Park, *Populus alba*, 28 Jul. 2015, *Spirin 9006** (H). **Estonia**, Pärnumaa, Pärnu-Jaagupi, Helenurme, *Quercus robur*, 19 Aug. 2015, *Saitta* (TUF124064*); Lääneranna, Karuse, *Q. robur*, 19 Aug. 2015, *Saitta* (TUF124071*); Valgamaa, Palupera, Tsorro, *C. avellana*, 11 Sep. 2012, *Spirin* (TUF115517*). **Finland**, Ahvenanmaa, Jomala, Ramsholm, *C. avellana*, 21 Aug. 1949, *Kukkonen & Kari* (H). Lemland, Slattholmen, *C. avellana*, 18 Sep. 1976 *Fagerström* (H); Varsinaissuomi, Bromarv, Framnäs, *C. avellana*, 12 Sep. 1963, *Kujala & Laine* (H); 20 Sep. 1964, *Weresub* (H); 18 Aug. 1966, *Laine* (H); 5 Sep. 1971, *Niemelä 431* (H); 7 Oct. 1979, *Kotiranta 1932* (H); Dragsfjärd, Holma, *Q. robur*, 27 Sep. 1995, *Vauras 10861* (H); Kimito, Rungola, *C. avellana*, 20 Jun. 1995, *Wikström 6190* (H); Karjalohja, Karkali, *C. avellana*, 3 Oct. 1937, *Laurila* (H); 4 Aug. 1944, *Laine* (H); Skraatila, *Alnus* sp. (?), 7 May 1997, *Kinnunen* (H); Uusimaa, Kirkkonummi, Estby, *Q. robur*, 5 Sep. 1971, *Niemelä* (H); Sipoo, Hindsby, *C. avellana*, 21 Aug. 1986, *Saarenoksa 20086* (H); 30 Aug. 1987 *Saarenoksa 23787* (H); Vantaa, Tammisto, *C. avellana*, 1 Aug. 1990, *Saarenoksa 19290* (H); Etelä-Häme, Asikkala, Viitaila, *C. avellana*, 1 Apr. 1993, *Haikonen 15062* (H); Hollola, Uskila, *C. avellana*, 24 Aug. 1999, *Haikonen 19647* (H). **France**, Aveyron, Millau, Le Causse Noir, *Cytisus* sp., 13 Nov. 2022, *Spirin 16159* (H); *Thymus* sp., 22 Mar. 2024, *Spirin 17156* (H); Haute-Loire, Le Chambon-sur-Lignon, Les Eyres, *C. avellana*,14 Jun. 2022, *Miettinen 25320.1* (H). **Hungary**, Heves, Gyöngyös, Mátraháza, *C. avellana*, 22 Sep. 1941, *Moesz* (H). **Norway**, Vestfold, Horten, Falkensten, hardwood, 21 Apr. 2010, *Marstad 99-10* (O F-244531); Akershus, Nannestad, Viksvangen, *C. avellana*, 12 Oct. 1971, *Gulden 1107/71* (H ex O). **Russia**, Nizhny Novgorod Reg., Bogorodsk Dist., Krastelikha, *Q. robur*, 14 Sep. 2010, *Spirin 3499* (H); Lukoyanov Dist., Sanki, *Acer platanoides*, 31 Aug. 2019, *Spirin 13092* (H); 31 Jul. 2021, *Spirin 14442* (H); *C. avellana*, 19 Aug. 2009, *Spirin 3093a* (H); 20 Aug. 2015, *Spirin 9677* (H); 4 Aug. 2017, *Spirin 11361* (H); 31 Aug. 2019, *Spirin 13069* (H); 31 Jul. 2021, *Spirin 14428* (H); *Q. robur*, 20

Aug. 2015, *Spirin 9705* (H); 4 Aug. 2017, *Spirin 11358** (H); *T. cordata*, 19 Jul. 1999, *Spirin* (LE 211336); 31 Jul. 2021, *Spirin 14450* (H). **Ukraine**, Zakarpattia Reg., Rakhiv Dist., Velykyi Bychkiv, *C. avellana*, VII.1933, *Pilát* (Fungi Carpatici Lignicoli Exsiccati #145, H).

Hymenochaete lesurae Spirin, ***sp. nov.*** MB 861360. Fig. 9.

Etymology: *Lesura* (Lat., noun) – the Roman name of Lozère, where the species was collected.

Typus: **France**, Lozère, Saint-Etienne-du-Valdonnez, Forêt du Sapet, 44.471 3.605, *Abies alba* (fallen decorticated branch), 28 Jun. 2022, *Spirin 15536** (**holotype** LY, isotype – H).

Basidiocarps perennial, covering a few cm effused, tough-leathery or corky, first chocolate-brown, irregularly cracking, then darkening to fuscous-brown, 0.2–0.4 mm thick. *Margin* gradually thinning-out, in juvenile basidiocarps well-visible, ferruginous-brown, then more or less concolourous with the hymenial surface, adnate. Section: basidiocarp uniformly coloured or with a slightly darker (ferruginous brown) deeper layer. Monomitic, *hyphae* clampless. Subicular hyphae brownish to dark brown, distinctly thick-walled, tightly interwoven or subparallel, (2.0–)2.1–5.1(–5.2) µm diam. (n = 16/1). Subhymenial hyphae hyaline to brownish, thin- to distinctly thick-walled, tightly arranged, vertically arranged, short-celled and slightly inflated, (2.4–)2.6–4.2(–4.3) µm diam. (n = 20/1). *Setae* brown, sharp- or more rarely blunt-tipped, straight, occasionally inflated at the base, sturdy, not encrusted, (70–)71–103(–106) × (6.1–)6.4–9.0(–10.1) µm (n = 40/2), L = 87.9–88.6, W = 7.52–8.06, Q = 11.02–11.86, projecting up to 70 µm. *Hyphidia* present, simple, thin- or slightly thick-walled, usually associated with setae, up to 30 × 0.5–1.5 µm. *Basidia* four-spored, thin-walled or slightly thick-walled at the base, 13.5–22 × 3.5–4 µm. *Basidiospores* hyaline, thin-walled, cylindrical to subfusiform, straight or slightly curved, (5.2–)5.3–7.2(–7.3) × (2.4–)2.5–3.0(–3.1) µm (n = 60/2), L = 6.08–6.72, W = 2.81–2.82, Q = 2.16–2.39.

Distribution and ecology: Europe (France); decorticated branches of conifers (*Abies*).

Notes: *Hymenochaete lesurae* is introduced here as a close relative of *H. furva* occurring in southern Europe. It is so far known from two records made at the type locality in France. *Hymenochaete lesurae* inhabits fallen branches of *Abies alba*; in temperate Europe, this substrate is otherwise often favoured by *H. fusca*. *Hymenochaete lesurae* can be distinguished from *H. fusca* due to its longer and more clearly subfusiform basidiospores. These differences are not absolute, and we strongly recommend using DNA methods for identification of presumed *H. fusca* / *H. lesurae* specimens whose average spore length falls within 6.00–6.20 µm.

Material examined: **France**, Lozère, Saint-Etienne-du-Valdonnez, Forêt du Sapet, *A. alba* (fallen branch), 28 Jun. 2022, *Spirin 15562** (H, LY).

Hymenochaete macrochloae Olariaga & M. Prieto, *Persoonia* **39**: 309. 2017.

Typus: **Spain**, Castilla – La Mancha: Toledo, Villarubia de Santiago, Valdelaparrilla, *Macrochloa tenacissima*, 19 Dec. 2016, *Prieto & Olariaga* (**holotype** ARAN07079*, studied).

Hymenochaete macrochloae was described from Spain (Crous *et al.* 2017) as a look-alike of *H. cinnamomea* s. lato occurring on dead grass stems (*Macrochloa tenacissima*). Phylogenetically, it belongs to the *H. laxa* complex (Fig. 4). It differs from other species of this group in having wider, predominantly ellipsoid basidiospores, (4.7–)4.8–7.3(–7.4) × (2.9–)3.0–4.2(–4.3) µm (n = 60/2), L = 5.86–6.54, W = 3.24–3.85, Q = 1.70–1.81. It also has the shortest setae if compared to other species of the *H. rudis* complex, not exceeding 100 µm long (L = 73.3–75.4).

Material examined: **Spain**, Madrid, Arganda del Rey, Dehesa del Carrascal, *M. tenacissima*, 21 Apr. 2017, *Olariaga* (ARAN07134*); Aranjuez, Salobral de Ocaña, *M. tenacissima*, 14 Feb. 2016 *Prieto & Olariaga* (ARAN07132*).

Hymenochaete obsoleta Spirin & Miettinen, ***sp. nov.*** MB 861361. Figs 10C, 11.

Etymology: *Obsoletus* (Lat., adj.) – trivial, banally looking.

Typus: **USA**, Idaho, Bonner Co., Trapper Creek, 48.84252 -116.94618, old-growth conifer forest, *Picea* sp. (decay stage 4/5, 15 cm in diameter), 14 Oct. 2014, *Miettinen 18758** (**holotype** H, isotype – FH).

Basidiocarps perennial, covering a few cm but sometimes more substantial, up to 10 cm in widest dimension, effused, tough, olivaceous- or chocolate-brown, smooth or irregularly cracking, then darkening to fuscous-brown, densely rimose, 0.2–1 mm thick. *Margin* gradually thinning out, in juvenile basidiocarps well-visible, dark brown, then more or less concolourous with the hymenial surface. Section: basidiocarp uniformly coloured or with a slightly darker (ferruginous brown) deeper layer. Monomitic, *hyphae* clampless. Subicular hyphae brown, distinctly thick-walled, tightly interwoven or subparallel, (1.8–)1.9–3.2(–3.8) µm diam. (n = 20/1); some hyphae very thick-walled and rarely septate, thus resembling skeletal hyphae. Subhymenial hyphae brownish, slightly or distinctly thick-walled, tightly arranged, vertically arranged, usually short-celled and slightly inflated, (1.8–)2.0–4.1(–4.6) µm diam. (n = 40/2). *Setae* brown, sharp-tipped, straight, sturdy, not encrusted, (53–)64–89(–102) × (5.8–)6.1–8.8(–9.3) µm (n = 40/2), L = 76.6–77.6, W = 7.14–7.36, Q = 10.40–10.96, projecting up to 60 µm. *Hyphidia* present, simple or sparsely branched, thin- or slightly thick-walled, usually associated with setae, up to 40 × 1–2 µm. *Basidia* four-spored, thin-walled or slightly thick-walled at the base, 13–19 × 3.5–4 µm. *Basidiospores* hyaline, thin-walled, cylindrical to narrowly ellipsoid, straight or slightly curved, longest spores subfusiform, (3.9–)4.0–5.4(–5.6) × (2.0–)2.1–3.0(–3.1) µm (n = 60/2), L = 4.50–4.75, W = 2.33–2.50, Q = 1.82–2.06.

Distribution and ecology: North America (USA – Idaho); decorticated wood of conifers (*Picea*, *Tsuga*).

Remarks: *Hymenochaete obsoleta* is so far known only from the type locality in the Rocky Mountains, where it was collected twice. Morphologically, it is most similar to *H. fusca* and *H. tenuis*, both of which occur in the same area. *Hymenochaete fusca* has longer setae than *H. obsoleta* and *H. tenuis*. In turn, *H. obsoleta* possesses shorter basidiospores than *H. tenuis*. Phylogenetically, *H. obsoleta* is related to *H. fusca* and to the European species *H. furva* and *H. lesurae*, while *H. tenuis* is more distantly related (Figs 1, 3). *Hymenochaete furva* and *H. lesurae* have distinctly longer basidiospores and slightly longer setae than *H. obsoleta*.

Material examined: **USA**, Idaho, Bonner Co., Trapper Creek, *Tsuga heterophylla*, 14 Oct. 2014, *Spirin 8514* (H).

Hymenochaete rudis (P. Karst.) Sacc. & P. Syd., *Syll. Fung.* **14**: 218. 1899. Figs 10D–12.
Basionym: *Hymenochaetella rudis* P. Karst., *Hedwigia* **35**: 173. 1896.

Typus: **Finland**, Etelä-Häme, Tammela, Mustiala, bark of *Alnus* sp., 1 Nov. 1886, *Karsten 1377* (**lectotype** H6049919, studied) (selected here, MBT10029872).

Basidiocarps perennial, normally covering a few cm but sometimes very extensive and reaching up to 40 cm in longest dimension, effused, densely floccose or soft-membranous, light ochraceous or ochraceous-brownish, sometimes with brick-red tints, smooth, then rusty-brown, partly eroded, senescent sterile basidiocarps dark brown, 0.2–2 (3) mm thick. *Margin* first well-differentiated, floccose, adnate, normally darker (rusty brown) than the hymenial surface, then more compact, adnate or partly separating, of more or less the same colour as the hymenial surface. Section: basidiocarp clearly two- or multilayered, with a compact, rather light-coloured hymenial layer and softer, clearly darker last year's layers and subiculum, in older parts distinctly stratified. Monomitic, *hyphae* clampless. Subicular hyphae pale to dark brown, slightly or distinctly thick-walled, rather loosely arranged, mostly interwoven, (4.1–)4.2–8.2(–8.4) µm diam. (n = 140/7). Subhymenial hyphae hyaline to yellowish or brownish, slightly or distinctly thick-walled, rather loosely arranged, interwoven, mostly short-celled, easily collapsing, (2.6–)2.8–5.9(–6.1) µm diam. (n = 140/7). *Setae* brown, sharp-tipped, straight, sturdy, often biradicate, more rarely multiradicate, not encrusted, (59–)60–182(–188) × (5.1–)5.3–11.1(–12.2) µm (n = 220/11), L = 87.2–137.9, W = 7.08–9.06, Q = 12.06–17.31, projecting up to 100 µm. *Hyphidia* present, simple, thin-walled, associated with setae, up to 80 × 1–2.5 µm. *Basidia* four-spored, thin-walled, 10–15 × 4–6 µm. *Basidiospores* hyaline, thin-walled, cylindrical to narrowly ellipsoid, rarely subfusiform, straight or slightly curved, (4.2–)4.8–7.2(–7.7) × (2.0–)2.1–3.1(–3.2) µm (n = 300/10), L = 5.30–6.16, W = 2.34–2.91, Q = 1.86–2.28.

Distribution and ecology: Europe (Estonia, Finland, North-West Russia, Slovenia), Asia (Siberia, Russian Far East), North America (Canada – Quebec, USA – Minnesota); bark and wood of deciduous trees (mostly *Alnus* and *Salix*), more rarely on conifers (*Juniperus*, *Larix*, *Picea*, *Pinus*).

Notes: The species was introduced as *Hymenochaetella rudis* (Karsten 1896) and then combined in *Hymenochaete* (Saccardo & Sydow 1899). Höhnel & Litschauer (1906) studied Karsten's specimens and concluded that they represented *Hymenochaete unicolor*, a species originally described from Cuba. Burt (1918) disagreed and concluded that *H. rudis* is conspecific with *H. cinnamomea*. The lectotype of *H. rudis* designated above is a senile, partly deteriorated specimen collected from alder bark. Nonetheless, it is suitable for microscopic study and possesses sharp, non-encrusted, occasionally bi- or multiradicate setae, (67–)78–158(–163) × (5.2–)5.8–10.2(–12.2) µm (n = 20). A few turgid basidiospores were detected and measuring 4.2–5.2 × 2.1–2.4 µm (n = 4). These characters preclude *H. arida*, also occurring on bark of *Alnus* spp.; the latter species produces blunt setae alongside the sharp ones, and it has longer basidiospores. *Hymenochaete fibrillosa*, occasionally collected from *Alnus*, differs from *H. rudis* in having narrower and shorter, partially encrusted setae.

As re-established here, *H. rudis* is a boreal species usually occurring in riverside areas and inhabiting mainly fallen, corticated branches of *Alnus* and *Salix*. In the central part of Europe, it seems to be restricted to highland areas. Differences of *H. rudis* from *H. arida* occurring in the same habitats are listed above. Another macroscopically similar species in Europe is *H. laxa* (see remarks to the latter species). Differences of *H. rudis* from the East Asian *H. tenebraria* are explained under the latter species.

Material examined: **Canada**, Quebec, Nord-du-Québec, Poste-de-la-Baleine, *Alnus crispa*, 23–29 Jul. 1982, *Niemelä 2517*, *2570* (H). **Estonia**, Lääne-Virumaa, Väike-Maarja, Liigvalla, *Salix* sp., 15 Nov. 2015, *Saitta* (TUF124367*). **Finland**, Uusimaa, Artjärvi, Hiitelä, *Padus avium*, 17 Apr. 1993, *Haikonen 15141* (H); Helsinki, Haltiala, *Salix* sp., 12 Oct. 2020, *Miettinen 24277** (H); *Betula?*, 1 Jun. 2021, *Miettinen 24548* (H); Haltingberget, *Populus tremula*, 17 Oct. 2022, *Spirin 15886* (H); Talosaari, *Prunus padus*, 19 Oct. 2021, *Miettinen 24927* (H); Lapinjärvi, Heikinkylä, *Salix phylicifolia*, 23 May 1993, *Haikonen 15230* (H); Orimattila, Kolunsuo, *Salix caprea*, 5 Oct. 1994, *Haikonen 16690* (H); Tuusula, Lahela, *Salix* sp., 10 Sep. 1988, *Saarenoksa 31888* (H); Etelä-Häme, Heinola, Härkälä, *P. tremula*, 23 Oct. 1988, *Haikonen 10023* (H); Löysinlahti, *A. incana*, 12 Jun. 1984, *Haikonen 4460* (H); Makkaramäki, *S. phylicifolia*, 19 Feb. 1983, *Haikonen 3383* (H); Hollola, Isosaari, *Sorbus aucuparia*, 14 May 1998, *Haikonen 19135* (H); Sysmä, Karilanmaa, *A. glutinosa*, 25 May 1985, *Haikonen 5669* (H); Pohjois-Savo, Heinavesi, Rummukkala, *P. avium*, 29 Jun. 1993, *Haikonen 15274* (H); Kangaslampi, *A. incana*, 27 Dec. 1986, *Haikonen 8040* (H); Inarin Lappi, Utsjoki, Kevo, *Juniperus communis*, 23 Sep. 2009, *Kotiranta 23159** (H6035958). **Russia**, Khabarovsk Reg., Solnechnyi Dist., Igdomi, *Picea ajanensis*, 3 Sep. 2016, *Spirin 10919** (H); Khakassia, Abakan, Gora Spasatelei, *Salix* sp., 12 Aug. 2011, *Kotiranta 23053** (H7019270); Leningrad Reg., Boksitogorsk Dist., Radogosch, *Alnus incana*, 20 Aug. 2018, *Spirin 12201** (H); Talitsa, *S. aucuparia*, 17 Aug. 2018, *Spirin 12151** (H). **Slovenia**, Gorenjska, Bohinj, Lipanca, *Pinus mugo*, 26 Sep. 2019, *Spirin 13306* (H); *Salix* sp., 26 Sep. 2019, *Spirin 13307** (H); *Alnus viridis*, 29 Jul. 2020, *Spirin 13952** (H); Ravne v Bohinju, *Larix decidua*, 28 Jul. 2020, *Spirin 13940** (H); *A. viridis*, 28 Jul. 2020, *Spirin 13944** (H).

USA, Minnesota, Clearwater Co., Itasca Lake, fallen log, 16 Sep. 1977, *Ryvarden 14292* (O, H).

Hymenochaete scabra Miettinen & Spirin, ***sp. nov.*** MB 861362. Figs 10E–12.

Etymology: *Scabrus* (Lat., adj.) – rough.

Typus: **USA**, Massachusetts, Worcester Co., Worcester, 42.25608 -71.82808, middle-aged urban forest, log of *Acer* sp. (decay stage 2/5, 48 cm in diameter), 25 Sep. 2011, *Miettinen 14801** (**holotype** H, isotype–FH).

Basidiocarps annual, covering a few cm but sometimes more substantial, up to 10 cm in widest dimension, effused, membranous, smooth or occasionally cracking, rusty- to chocolate-brown, 0.1–0.5 mm thick. *Margin* gradually thinning out, first floccose and partly detaching, then compact and adnate, of more or less the same colour as the hymenial surface. Section: basidiocarp uniformly coloured or with a slightly darker subiculum. Monomitic, *hyphae* clampless. Subicular hyphae brown, slightly or distinctly thick-walled, rather loosely arranged, interwoven, (2.9–)3.0–5.3(–5.4) µm diam. (n = 60/3). Subhymenial hyphae brownish, slightly or distinctly thick-walled, rather loosely arranged, vertically arranged or interwoven, often short-celled and slightly inflated, (2.8–)3.0–5.1(–5.2) µm diam. (n = 60/3). *Setae* brown, sharp-tipped, straight or slightly curved, sturdy, often biradicate, not encrusted, (68–)72–136(–158) × (6.0–)6.2–9.4(–10.1) µm (n = 62/3), L = 100.7–103.5, W = 7.87–8.09, Q = 12.68–13.15, projecting up to 110 µm. *Hyphidia* present, simple, thin- or slightly thick-walled, scattered among basidia or associated with setae, up to 65 × 1–1.5 µm. *Basidia* four-spored, thin-walled or slightly thick-walled and brownish at the base, 12.5–17.5 × 4–6 µm. *Basidiospores* hyaline, thin-walled, cylindrical to broadly cylindrical or narrowly ellipsoid, straight or slightly curved, longest spores subfusiform, (4.3–)4.8–6.9(–7.0) × (2.3–)2.4–3.1(–3.2) µm (n = 90/3), L = 5.27–5.76, W = 2.70–2.89, Q = 1.85–2.03.

Distribution and ecology: Europe (France), North America (USA – Massachusetts, Tennessee); bark and wood of deciduous trees.

Notes: Anatomically, *H. scabra* is a look-alike of *H. laxa* and *H. rudis* with long, non-encrusted setae and loosely arranged hyphae. Unlike the two latter species, hyphae of *H. scabra* are approximately of the same diameter in subhymenium and subiculum. In contrast, both *H. laxa* and *H. rudis* have subicular hyphae considerably wider than subhymenial ones.

Material examined: **France**, Pyrénées-Orientales, Saint-Jean-Pla-de-Cort, old unmanaged deciduous riverside stand, branch of *Alnus glutinosa*, 31 Dec. 2019, *Miettinen 23404** (H). **USA**, Massachusetts, Worcester Co., Wachusett Mt. State Reservation, *Quercus* sp., 28 Oct. 2014, *Miettinen 19072* (H); Tennessee, Sevier Co., Ramsey Cascade trail, *Tilia americana*, 30 Sep. 2015, *Miettinen 19583.2* (H); West Virginia, Fayette Co., Nuttallburg, Oct. 1893, *Nuttall* (H ex Ellis & Everhart's North American Fungi #3304).

Hymenochaete similis Miettinen & Spirin, ***sp. nov.*** MB 861363. Figs 10F, 11.

Etymology: *Similis* (Lat., adj.) – similar.

Typus: **USA**, Washington, Jefferson Co., Hoh River, 47.86403 -123.92888, primeval coastal rainforest, *Tsuga heterophylla* (decay stage 3/5, diameter 2 m), 20 Oct. 2014, *Miettinen 18971** (**holotype** H, isotype FH).

Basidiocarps annual, covering a few cm, effused, compact, first clay-coloured to ochraceous-brownish, smooth, older basidiocarps rusty-brown and partly cracking, 0.2–0.5 mm thick. *Margin* gradually thinning-out, adnate, of more or less the same colour as the hymenial surface. Section: basidiocarp uniformly coloured or with a slightly darker subicular layer. Monomitic, *hyphae* clampless. Subicular hyphae brownish, slightly or distinctly thick-walled, rather tightly arranged, mostly interwoven, almost indiscernible, 3–5 µm diam. Subhymenial hyphae yellowish or brownish, slightly thick-walled, rather loosely arranged, interwoven or vertically arranged, often short-celled and slightly inflated, (3.1–)3.3–4.3(–4.8) µm diam. (n = 20/1). *Setae* brown, sharp-tipped, straight, sturdy, occasionally biradicate, as a rule encrusted by small-sized, densely arranged crystals, (80–)81–114(–122) × (5.0–)5.1–7.9(–8.0) µm (n = 60/3), L = 91.3–103.8, W = 6.24–6.75, Q = 14.05–15.56, projecting up to 80 µm. *Hyphidia* present, simple, thin-walled, associated with setae, up to 60 × 1–2 µm. *Basidia* four-spored, thin-walled or slightly thick-walled and brownish at the base, 14–20 × 3.5–5 µm. *Basidiospores* hyaline, thin-walled, broadly cylindrical to narrowly ellipsoid, longest spores subfusiform, (4.1–)4.2–6.0(–6.3) × (2.4–)2.6–3.1(–3.2) µm (n = 93/3), L = 4.84–5.19, W = 2.85–2.86, Q = 1.70–1.82.

Distribution and ecology: Asia (Russian Far East), North America (Canada – British Columbia; USA – Washington); bark and wood of conifers and angiosperm trees.

Notes: *Hymenochaete similis* belongs to the *H. cinnamomea* clade where all known species possess encrusted setae. It differs from *H. spreta*, another North American representative of this complex, in having slightly longer setae and wider basidiospores. So far, *H. similis* is known from two records in the north-western part of North America and one specimen from Kuril Islands in East Asia. In turn, *H. spreta* was found only in the eastern part of North America. However, more data are needed to confirm that these species are geographically isolated.

Material examined: **Canada**, British Columbia, [no locality indicated], rotten wood, May 1887, *Macoun* (H ex Ellis & Everhart's North American Fungi #1936). **Russia**, Sakhalin Reg., Kunashir, Ruruj, *Alnus* sp., 12 Aug. 2008, *Kotiranta 30617* (H).

Hymenochaete spreta Peck, *Ann. Rep. New York State Mus. Nat. History* **30**: 47. 1878. Figs 10G, 11.

Typus: **USA**, New York, Albany Co., Helderberg Mts., *Acer* sp. (decayed wood), Oct. 1875, *Peck* (**isotype** NY00742942, studied).

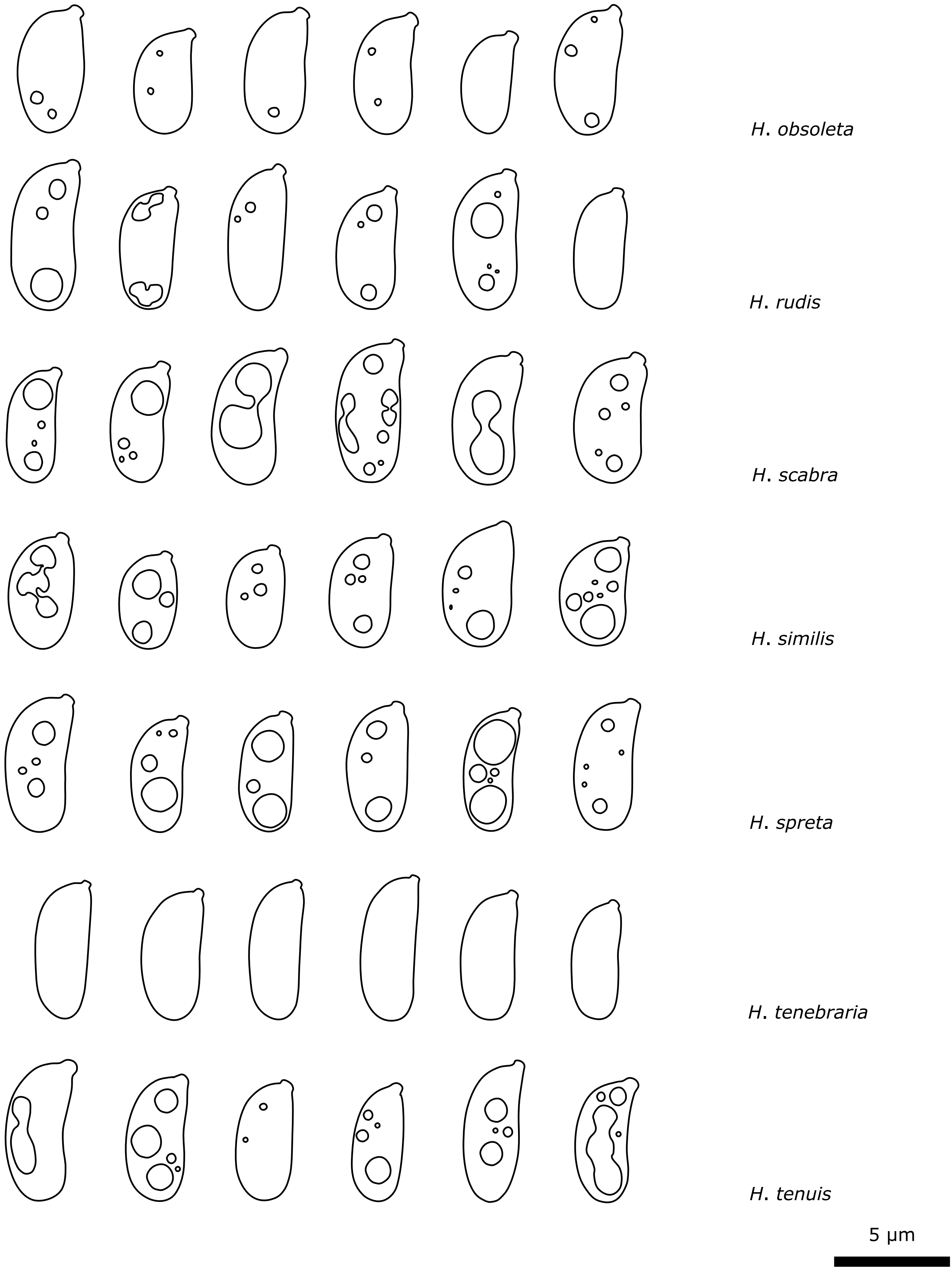

Fig. 11. Basidiospores of *Hymenochaete* spp.: *H. obsoleta* (holotype), *H. rudis* (*Spirin 13307*), *H. scabra* (holotype), *H. similis* (holotype), *H. spreta* (*Miettinen 19594*), *H. tenebraria* (holotype), *H. tenuis* (*Miettinen 21644.1*).

Basidiocarps perennial, covering a few cm but sometimes more substantial, up to 20 cm in widest dimension, effused, compact but rather soft, light brown, sometimes with greyish hues, smooth, then rusty- to chocolate-brown, as a rule cracking, 0.1–1 mm thick. *Margin* gradually thinning out, in juvenile basidiocarps well-visible, rusty-brown, later of more or less the same colour as the hymenial surface. Section: basidiocarp uniformly coloured or with a slightly darker deeper layer. Monomitic, *hyphae* clampless. Subicular hyphae brownish to dark brown, slightly or distinctly thick-walled, rather tightly arranged, mostly interwoven, hardly discernible, 2–5 µm diam. Subhymenial hyphae brownish, slightly or distinctly thick-walled, rather loosely arranged, vertically arranged or interwoven, often short-celled and slightly inflated, (2.6–)2.8–4.8(–5.0) µm diam. (n = 40/2). *Setae* brown, sharp-tipped, straight or slightly curved, sturdy, occasionally biradicate, as a rule encrusted by small-sized, densely arranged crystals, (69.5–)75–104.5(–110) × (5.8–)6.0–8.9(–9.2) µm (n = 80/4), L = 86.6–89.8, W = 7.26–7.53, Q = 11.92–12.25, projecting up to 70 µm. *Hyphidia* present, simple, thin- or slightly thick-walled, occasionally encrusted, scattered among basidia or associated with setae, up to 50 × 1–2 µm. *Basidia* four-spored, thin-walled or slightly thick-walled and brownish at the base, 11–17.5 × 4–5 µm. *Basidiospores* hyaline, thin-walled, cylindrical to broadly cylindrical, often slightly curved, (4.2–)4.3–6.4(–6.8) × (2.0–)2.1–3.0(–3.1) µm (n = 110/4), L = 5.12–5.42, W = 2.36–2.59, Q = 1.99–2.28.

Distribution and ecology: North America (USA – New York, North Carolina, Tennessee, Vermont); bark and wood of deciduous trees, rarely conifers (*Thuja*).

Notes: *Hymenochaete spreta* is macroscopically and anatomically most similar to *H. cinnamomea* s. str. Some authors recognized it as a separate species (Burt 1918) while others considered it a subspecies of *H. cinnamomea* distributed in North America (Parmasto 2001). Our data show that it must be treated as a species of its own. In addition to genetic differences and geographic distribution, *H. spreta* can be distinguished from *H. cinnamomea* in having slightly shorter setae. Another similar species in North America is *H. similis* (see above).

Material examined: **USA**, New York, Cascadeville, *Thuja occidentalis*, [no collecting date], *Peck* (NYSf 3153.2, packet A); North Carolina, Swain Co., Clingmans Dome, deciduous tree, 1 Oct. 2015, *Miettinen 19610.1* (H); Tennessee, Sevier Co., Ramsey Cascade trail, deciduous tree, 30 Sep. 2015, *Miettinen 19594** (H); Vermont, Addison Co., Middlebury, *Juglans* sp., Aug. 1896, *Burt* (H).

Hymenochaete tenebraria Spirin, ***sp. nov.*** MB 861364. Figs 11, 12.

Etymology: *Tenebrarius* (Lat., adj.) – dark, obscure.

Typus: **Russia**, Khabarovsk Reg., Khabarovsk, City Arboretum, 48.4645 135.0871, *Ulmus pumila* (bark of living tree), 13 Aug. 2014, *Spirin 7282** (**holotype** H, isotype – TUF).

Basidiocarps annual or short-living perennial, covering a few cm, effused, densely floccose or soft-membranous, light ochraceous or light brown, smooth, 0.2–1 mm thick. *Margin* first well-differentiated, felty, partly detaching, normally darker (rusty brown) than the hymenial surface, then more compact, adnate or partly separating, of more or less the same colour as the hymenial surface. Section: basidiocarp clearly two-layered, with a compact, rather light-coloured hymenial layer and a softer, clearly darker deeper layer. Monomitic, *hyphae* clampless. Subicular hyphae brown, thin- or slightly thick-walled, easily collapsing, rather loosely arranged, mostly interwoven, (4.2–)4.8–6.1(–6.2) µm diam. (n = 20/1). Subhymenial hyphae brownish, slightly thick-walled, rather loosely arranged, interwoven, short-celled and slightly inflated, (2.2–)2.4–4.1(–4.8) µm diam. (n = 20/1). *Setae* brown, sharp-tipped, straight, sturdy, occasionally biradicate, not encrusted, (61–)63–124(–125) × (5.6–)6.0–8.1(–8.6) µm (n = 20/1), L = 85.8, W = 6.75, Q = 12.76, projecting up to 70 µm. *Hyphidia* present, simple, thin-walled, associated with setae, up to 30 × 1.5–2 µm. *Basidia* four-spored, thin-walled, 9.5–13 × 3.5–4.5 µm. *Basidiospores* hyaline, thin-walled, cylindrical to subfusiform, straight or slightly curved, (4.9–)5.1–6.6(–7.2) × (2.0–)2.1–2.9(–3.0) µm (n = 30/1), L = 5.69, W = 2.34, Q = 2.45.

Distribution and ecology: Asia (China, Russian Far East), North America (USA); bark and wood of deciduous trees.

Notes: Loose basidiocarps of *H. tenebraria* with pale hymenial layer and dark-coloured subiculum, as well as rather long, non-encrusted setae are strongly reminiscent of *H. laxa* and *H. rudis*. *Hymenochaete tenebraria* lacks dark-coloured, loose patches of sterile hymenium at the marginal area so characteristic for *H. laxa*. In turn, *H. rudis* usually produces larger, thicker and more brightly coloured basidiocarps than those of *H. tenebraria*. Moreover, *H. tenebraria* has narrower subicular hyphae and slightly shorter setae than *H. rudis*.

Hymenochaete tenuis Peck, *Rep. (Annual) New York State Mus. Nat. Hist*. **40**: 57. 1886. Figs 10H–12.

Typus: **USA**, New York, Cascadeville, *Thuja occidentalis*, [no collecting date], *Peck* (**lectotype** NYSf 3153.3, packet B) (selected by Léger 1998: 278).

Basidiocarps perennial, covering a few cm but sometimes more substantial, up to 15 cm in widest dimension, effused, tough, first olivaceous- or chocolate-brown, smooth or irregularly cracking, then darkening to fuscous-brown, densely rimose, 0.2–1.5 mm thick. *Margin* gradually thinning out, in juvenile basidiocarps well-visible, dark brown, then more or less concolourous with the hymenial surface, occasionally slightly elevated. Section: basidiocarp uniformly coloured or with a slightly darker (ferruginous-brown) deeper layer. Monomitic, *hyphae* clampless. Subicular hyphae brownish, slightly or distinctly thick-walled, tightly arranged and almost indiscernible, 3–4 µm diam. Subhymenial hyphae brownish, slightly or distinctly thick-walled, tightly arranged, vertically arranged, short-celled and slightly inflated, (2.2–)2.9–4.8(–5.0) µm diam. (n = 60/3). *Setae* brown, sharp-tipped, straight, sometimes slightly swollen at the base, sturdy, not

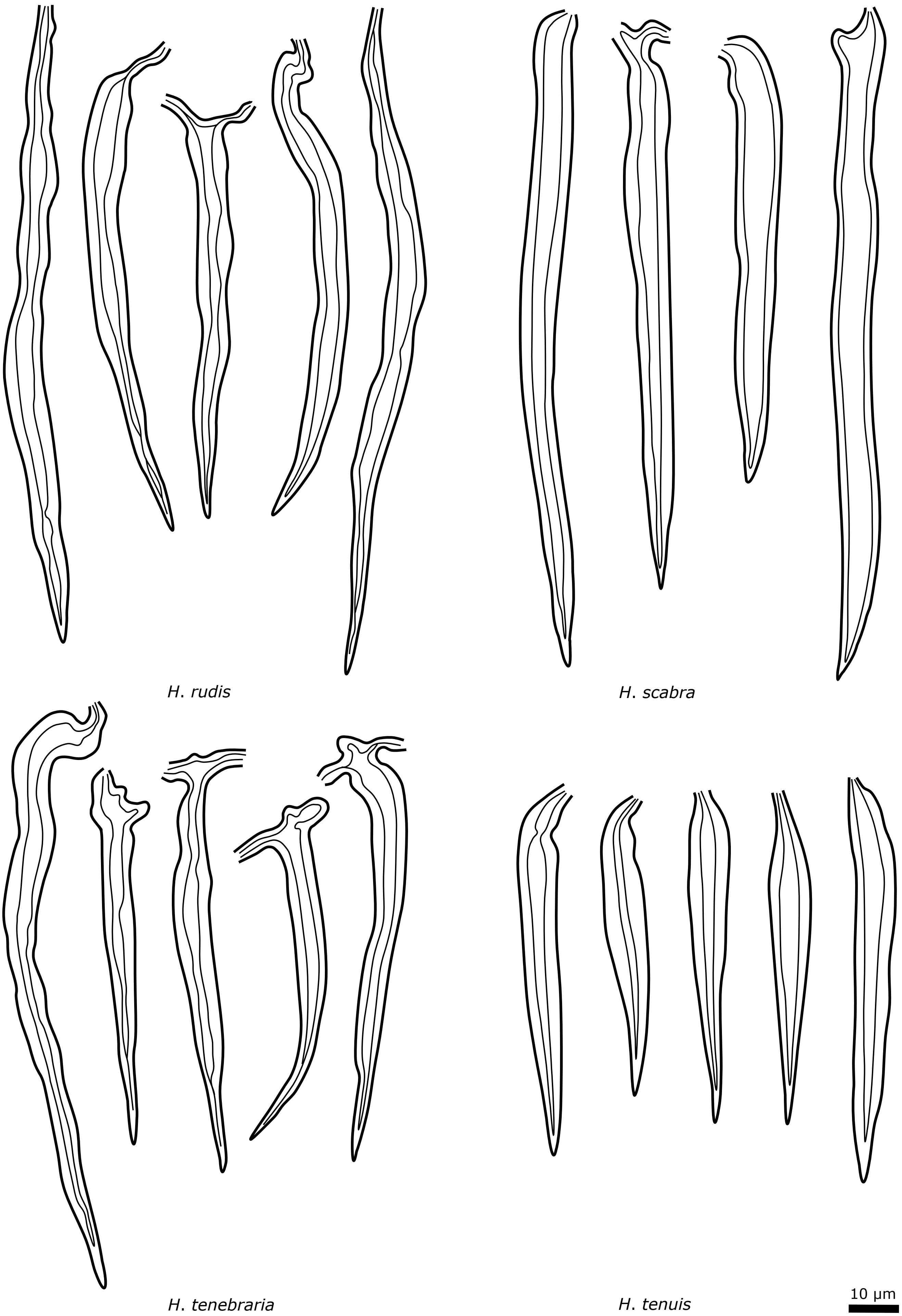

Fig. 12. Setae of *Hymenochaete* spp.: *H. rudis* (lectotype), *H. scabra* (holotype), *H. tenebraria* (holotype), *H. tenuis* (*Miettinen 21644.1*).

Fig. 13. *Hymenochaete corticolor* basidiocarps on bark of a living *Quercus prinus*, US-TN (*Miettinen 19567*).

encrusted, (50–)51–86(–93) × (5.2–)5.7–9.0(–9.8) µm (n = 260/13), L = 60.2–77.7, W = 6.58–7.79, Q = 8.03–10.78, projecting up to 60 µm. *Hyphidia* present, simple, thin- or slightly thick-walled, usually associated with setae, up to 40 × 1–1.5 µm. *Basidia* four-spored, thin-walled or slightly thick-walled at the base, 9.5–20 × 3.5–5 µm. *Basidiospores* hyaline, thin-walled, cylindrical to narrowly ellipsoid, straight or slightly curved, longest spores somewhat subfusiform, (4.1–)4.3–6.8(–7.2) × 2.0–3.1 µm (n = 360/12), L = 4.98–5.78, W = 2.17–2.83, Q = 2.00–2.42.

Distribution and ecology: Europe (Austria, Estonia, Finland, Germany, Norway, North-West Russia, Sweden), Asia (Siberia, Russian Far East), North America (USA – New York, Idaho, Washington); bark and wood of conifers (*Abies*, *Picea*, *Pinus*, *Thuja*), very rarely angiosperm trees and shrubs (*Betula*, *Calluna*, *Salix*).

Notes: *Hymenochaete tenuis* is the most common conifer-dwelling *Hymenochaete* species in North Europe. Most collections labelled as *H. fuliginosa* in Nordic herbaria belong to this species. Basidiocarps of *H. tenuis* are often sterile but the species can be easily recognized due to its setae which are clearly shorter than in *H. furva* and *H. fusca*, two other species inhabiting gymnosperm hosts in boreal forests. Like the latter two species, *H. tenuis* may also occur on angiosperms. However, these records are exceptionally rare, and they all came from boreal coniferous forests. In Central Europe, *H. tenuis* is evidently rare and so far known from two recent specimens from Austria and one historical collection from Germany. The species is present in Asia (Siberia and Russian Far East) and North America although it seems to be uncommon there. In the north-western part of North America *H. tenuis* can be confused with *Hymenochaete obsoleta*. The only reliable difference is the basidiospore length: basidiospores of *H. tenuis* are on average longer than the spores of *H. obsoleta*.

Material examined: **Austria**, Steiermark, Bruck-Mürzzuschlag, St. Barbara im Mürztal, *Pinus sylvestris*, 16 Jun. 2020, *Friebes** (GJO); Liezen, Altaussee, *Picea abies*, 20 Jun. 2016, *Friebes* (GJO 0086968). **Estonia**, Viljandimaa, Tipu, Kikepera, *P. abies*, 16 Sep. 2018, *Spirin 12338** (H, TUF114810); Lemmjõe, *P. abies*, 17 Sep. 2018, *Spirin 12348** (H, TUF114818). **Finland**, Uusimaa, Helsinki, Haltingberget, *P. abies*, 14 Oct. 2022, *Spirin 15835* (H); 17 Oct. 2022, *Spirin 15881*, *15885* (H); Östersundom, *P. abies*, 28 Oct. 2022, *Spirin 16037* (H); 31 Oct. 2022, *Spirin 16088* (H); Hyvinkää, Kaukas, Ilola, *P. sylvestris*, 26 Apr. 2006, *Miettinen 12605** (H); Vantaa, Vestra, *P. abies*, 10 May 2014, *Spirin 6851* (H); Etelä-Häme, Evo, Kotinen, *P. abies*, 25 Sep. 2014, *Spirin 8094* (H); Lammi, Metsäksensoidinmaa, *P. abies*, 4 Sep. 2014, *Miettinen 18512* (H); Pohjois-Häme, Jyväskylä, Vuoritsalo, *P. sylvestris*, 22 Jul. 2018, *Miettinen 21635** (H); *Miettinen 21644.1** (H); Kainuu, Hyrynsalmi, *P. abies*, 28 Jun. 2017, *Miettinen 20815.1** (H); 29 Sep. 2018, *Miettinen 21854* (H); Kuusamo, Salla, Värriö, Kynsikuru, *P. abies*, 27 Aug. 1988, *Renvall 1273* (H); Inarin Lappi, Inari, Piekanavaara, *P. sylvestris*, 28 Aug. 2008, *Miettinen 13311.1*, *13332* (H); Utsjoki, Kevo Nat. Park, *P. sylvestris*, 19 Sep. 2009, *Kotiranta 22990* (H); Sompion Lappi, Sodankylä, Tuore Naakiselkä, *P. abies*, 2 Sep. 2020, *Spirin 14070*, *14101* (H); Kolholaki, *P. abies*, 3 Sep. 2020, *Spirin 14120** (H); Nuttion Tuorelaki, *S. caprea*, 4 Sep. 2020, *Miettinen 24031** (H); Iso Palovaara, *Betula pubescens*, 5 Sep. 2020, *Spirin 14183* (H). **Germany**, Saxony, [no locality and collecting date], *Calluna vulgaris*, *Krieger* (H ex Fungi Saxonici #717). **Norway**, Vestfold, Larvik, Vemannsås, *P. abies*, 30 Sep. 2018, *Spirin 12526* (O); Buskerud, Lier, Stokkerinden, *P. abies*, 29 Sep. 2018, *Spirin 12479* (O); Hedmark, Løten, Gitvola, *P. abies*, 26 Sep. 2018, *Larsson 17854** (O, H), *Spirin 12402* (O). Finnmark, Kárášjohka, Guorrasvuovdi, *P. sylvestris*, 30 Aug. 2008, *Miettinen 13366.1* (H); Porsanger, Stabbursdalen Nat. Res., *P. sylvestris*, 10 Aug. 2018, *Spirin 12092* (O). **Russia**, Kamchatka, Yelizovo Dist., Zhupanovo, *Abies gracilis*, 21 Aug. 1997, *Kotiranta 13132*, *13151* (H); Khabarovsk Reg., Khabarovsk Dist., Malyi Kukachan, *Picea ajanensis*, 20 Aug. 2012, *Spirin 5454* (H); Solnechnyi Dist., Igdomi, *Abies nephrolepis*, 4 Aug. 2011, *Spirin 3773** (H); *Pinus pumila*, 2 Sep. 2016, *Spirin 10789** (H); Leningrad Reg., Boksitogorsk Dist., Chagoda, *P. abies*, 21 Aug. 2018, *Spirin 12222* (H); Vadozero, *P. abies*, 16 Aug. 2018, *Spirin 12108*, *12125* (H); Ostrechka, *P. abies*, 18 Aug. 2018, *Spirin 12175* (H), Podporozhie Dist., Grishino, *P. abies*, 27 May 2017, *Miettinen 20706** (H); Nemzha, *P. sylvestris*, 22 Sep. 2009, *Spirin 3295* (H); Perm' Reg., Krasnovishersky Dist., Kvarkush, *Abies sibirica*, 6 Aug. 2005, *Kotiranta 20812* (H); Primorie, Krasnoarmeiskii Dist., Melnichnoe, *Pinus koraiensis*, 21 Aug. 2013, *Spirin 6233* (H). **Sweden**, Västergötland, Alingsås, Valsjön, *P. sylvestris*, 22 Apr. 1968, *Hjortstam* (GB-0093405). Bohuslän, Öckero, Hönö, Ersdalen, *C. vulgaris*, 12 Aug. 2024, *Spirin 17355* (GB); Resteröd, Ulvön, *C. vulgaris*, 11 Sep. 1988, *Larsson 7016* (GB-0151345); Dalarna, Malung, Lybergsgnupen, *P. abies*, 24 Aug. 2024, *Spirin 17483* (GB); Särna, Göljån, *P. abies*, 21 Aug. 2024, *Spirin 17424*, *17439* (GB); Svartasvållen, *Juniperus communis*, 20 Aug. 2024, *Spirin 17409*, *17410* (GB); *P. sylvestris*, 20 Aug. 2024, *Spirin 17419* (GB); Transtrand, Bredvallen, *P. abies*, 22 Aug. 2024, *Spirin 17444*, *17449*, *17457* (GB); Venjan, Lybergsgnupen, *P. abies*, 23 Aug. 2024, *Spirin 17477* (GB); Älvdalen, Rödberg, *P. abies*, 19 Aug. 2024, *Spirin 17381*, *17399* (GB). **USA**, Idaho, Bonner Co., Trapper Creek, *Thuja plicata* (bark of living tree), 14 Oct. 2014, *Spirin 8454**, *8500* (H); Boundary Co., Upper Priest River, *T. plicata* (bark of living tree), 16 Oct. 2014, *Spirin 8643* (H); New York, Albany Co., Altamont, *Tsuga canadensis*, 7 Apr. 1900, *Burt* (H); Hamilton Co., Huntington Wildlife Forest, *Thuja occidentalis*, 19 Sep. 2013, *Miettinen 17006.3** (H); Washington, Clallam Co., Hurricane Ridge, *Abies lasiocarpa*, 19 Oct. 2014, *Spirin 8737* (H).

Additional species studied

Hymenochaete canescens Corfixen, *Karstenia* **57**: 52. 2017.

Typus: **Spain**, Balearic Ids., Mallorca, Cala de San Vicente, *Quercus* sp., 23 Nov. 1970, *Macholm & Onsberg* (**holotype** C-F-10289, studied).

Notes: This species was described by Corfixen & Parmasto (2017) based on a large set of specimens from Europe. We studied the holotype and two other specimens (paratypes, Fungi Saxonici #717 and *K.H. Larsson 7016*) cited in the original description. We concluded that the paratypes, both collected from *Calluna*, belong to *H. tenuis*. The holotype originated from Balearic Ids., where it was collected from *Quercus*. As far as we know, *H. tenuis* is a boreal species, and the few records from Central Europe are limited to highland areas (see above). No verified specimens of *H. tenuis* from the Mediterranean are known to us. Morphologically, the holotype of *H. canescens* differs from all *H. tenuis* specimens we studied in having slightly shorter setae, 44–61 µm long, L = 51.8. It is therefore possible that it represents a good species. However, the identity of *H. canescens* deserves closer study.

Hymenochaete carpatica Pilát, *Hedwigia* **70**: 124. 1930.

Notes: Here we provide the first ITS sequence of *H. carpatica*. Based on morphological evidence, Spirin *et al.* (2015) suggested that the North American specimens earlier identified as *H. carpatica* by Parmasto (2001) belong to another species, *H. corticolor*. DNA data confirm this suggestion and *H. corticolor* is reintroduced below. A modern description of *H. carpatica* can be found in Baici & Léger (1988). The species is restricted to the bark of still living or just fallen trees of *Acer pseudoplatanus* (Europe and Caucasus).

Material examined (all on *Acer pseudoplatanus*): **Austria**, Steiermark, Wolfsgraben, 7 Nov. 1998, *Maurer* (H ex GZ). **Germany**, Bavaria, Allach, 23 May 2000, *Beeneken* (H). **Slovenia,** Kočevje, Borovec pri Kočevski Reki, Krokar Forest Reserve, 18 Aug. 2021, *Spirin 14656** (H).

Hymenochaete corticolor Berk. & Ravenel, *Grevillea* **1**(11): 165. 1873. Figs 7, 13.

Typus: **USA**, South Carolina, [no collecting date indicated], *Ravenel* (**isotype** H ex Fungi Caroliniani Exsiccati 3: 30, 1855, studied).

Basidiocarps perennial, patch-like, gregarious, up to 1.5 cm in widest dimension, effused, compact, light brown, smooth, occasionally cracking, 0.1–0.5 mm thick. *Margin* first well-visible, cream-coloured to pale ochraceous, adnate, sharply delimited, later of more or less the same colour as the hymenial surface, slightly elevated. Section: basidiocarp uniformly coloured or with a slightly darker deeper layer, in older parts clearly stratified. Monomitic, *hyphae* clampless. Subicular hyphae brownish, slightly or distinctly thick-walled, tightly arranged and hardly discernible, mostly interwoven, 3–4 µm in diam; setoid hyphae occasionally present, up to 100 × 8 µm. Subhymenial hyphae hyaline to brownish, thin- or slightly thick-walled, tightly arranged, predominantly vertically arranged, often short-celled and slightly inflated, (2.2–)2.4–3.7(–4.0) µm diam. (n = 20/1). *Setae* brown, sharp- to rather blunt-tipped, straight or slightly curved, sturdy, occasionally biradicate, smooth or accidentally encrusted by sparse angular crystals, (41.5–)48–79(–83.5) × (6.2–)6.3–9.0(–9.2) µm (n = 60/3), L = 60.9–65.4, W = 7.48–8.24, Q = 7.61–8.59, projecting up to 40 µm. *Hyphidia* present, simple, thin-walled, scattered among basidia or associated with setae, up to 40 × 0.5–2 µm. Angular or rhomboid crystals abundant in subhymenial layer, up to 10 µm in widest dimension. *Basidia* four-spored, thin-walled or slightly thick-walled and brownish at the base, 10.5–18.5 × 3.5–4.5 µm. *Basidiospores* hyaline, thin-walled, narrowly ellipsoid to ellipsoid, (4.7–)4.8–6.3(–6.4) × (3.0–)3.1–3.8(–3.9) µm (n = 90/3), L = 5.18–5.59, W = 3.24–3.31, Q = 1.60–1.69.

Distribution and ecology: North America (USA – Maryland, New York, South Carolina, Tennessee); bark of living *Quercus* spp.

Notes: *Hymenochaete corticolor* is redescribed here based on historical collections (including the type material distributed in Ravenel's exsiccata) as well as newly collected and sequenced specimens from the United States. It is so far the only bark-dwelling *Hymenochaete* species detected on angiosperm trees in North America. Differences of *H. corticolor* from the outwardly similar *H. cervicolor* and *H. carpatica* were discussed in Spirin *et al.* (2015). The distribution area of *H. corticolor* seems to be limited to the eastern part of North America. The single report of this species from Europe (Corfixen & Parmasto 2017) is a misidentification; Romell's specimen from Sweden (Upland, Rimbo, Ekebyholm, ?*Quercus robur*, 18 Nov. 1917, *Romell 3017*, H) labelled as *H. corticolor* belongs to *Hydnoporia tabacina*.

Material examined: **USA**, Maryland, Takoma Park, *Quercus alba*, Dec. 1901, *Shear 1103* (H); New York, Greene Co., Green Lake, *Q. alba*, 3 Sep. 1914, *Wilson* (NY); Ulster Co., Glasco, *Q. alba*, 25 Aug. 1914, *Wilson* (NY); Westchester Co., Scarsdale, *Q. alba*, 26 Jul. 1914, *Wilson* (NY); Tennessee, Sevier Co., Ramsey Cascade trail, *Quercus prinus*, 30 Sep. 2015, *Miettinen 19567**, *19569* (H).

Hymenochaete jaapii Corfixen, *Karstenia* **57**: 60. 2017.

Typus: **Germany**, Brandenburg, Prignitz, Triglitz, *Rubus plicatus*, 11 Apr. 1906, *Jaap* (Fungi Selecti Exsiccati #340) (**holotype** C F-13244, studied).

Notes: In addition to the holotype of *H. japii* cited above, we studied two other specimens, Fungi Saxonici #1422 (isoparatype in H) and GB-0093405 (paratype), ascribed to *H. jaapii* in the original description (Corfixen & Parmasto 2017). The second specimen, collected on *Pinus* in Sweden, is undoubtedly *H. tenuis*. The first and second specimens are in poor condition; morphological traits point to *H. epichlora* as a possible relative. However, the latter species has much paler basidiocarps and it is so far known from North America only. The identity of *H. jaapii* must be further studied based on newly collected and sequenced material.

Material examined: **Germany**, Saxony, [no locality and collecting date], *Rubus* sp., *Krieger* (isoparatype H ex Fungi Saxonici #1422).

Key for the species of the *H. cinnamomea – H. fuliginosa* complex distributed in the temperate-boreal Northern Hemisphere

1. At least some setae encrusted by densely arranged crystals 2
(1). Setae smooth; crystals accidentally present in senescent hymenium, scattered 5

2. Basidiospores predominantly cylindrical, 3.9–5.8 × 2.1–3.1 µm, L = 4.37–5.04, W = 2.26–2.79. European species .... *H. fibrillosa*
(2). Basidiospores either longer (L > 5.1) or slightly wider (W > 2.8), broadly cylindrical to narrowly ellipsoid 3

3. Setae 80–115 µm long. Basidiospores broadly cylindrical to narrowly ellipsoid, 4.2–6.0 × 2.6–3.1 µm, L = 4.84–5.19, W = 2.85–2.86. The North American North-West and East Asia .... *H. similis*
(3). Eurasia and the North American North-East 4

4. Setae 75–105 µm long. Basidiospores 4.3–6.4 × 2.1–3.0 µm, L = 5.12–5.42, W = 2.36–2.59. North American North-East .... *H. spreta*
(4). Setae 75–120 µm long. Basidiospores 4.4–6.8 × 2.2–3.2 µm, L = 5.31–5.86, W = 2.41–2.89. Eurasia .... *H. cinnamomea*

5. Basidiocarps tough. Hyphae densely packed, sturdy, of more or less the same diameter in subhymenium and subiculum 6
(5). Basidiocarps rather loose. Hyphae more or less spaced, easily collapsing, subicular hyphae usually wider than subhymenial ones 11

6. Setae up to 90 µm long, L < 78.0 7
(6). Setae up to 120 µm long, L > 81.0 9

7. Basidiospores 3–5.5 × 2–3 µm, L < 4.8 8
(7). Basidiospores 4.5–7 × 2–3 µm, L > 4.9 .... *H. tenuis*

8. Setae often sinuous. Basidiospores 3–4 µm long. On *Rhododendron dauricum* in East Asia .... *H. daurica*
(8). Setae straight. Basidiospores 4–5.5 µm long. On conifers in the Rocky Mountains .... *H. obsoleta*

9. Basidiospores 4.2–6.7 × 2.1–3.2 µm, L = 4.56–6.11. Holarctic .... *H. fusca*
(9). Basidiospores 5.3–7.2 × 2.2–3.2 µm, L = 6.08–6.72. Europe 10

10. On *Picea* and *Salix* in North Europe .... *H. furva*
(10). On *Abies* in Central Europe .... *H. lesurae*

11. Setae sharp or blunt, 64–145 × 7–13 µm, usually with a long root-like base. On corticated wood in inundated habitats .... *H. arida*
(11). Setae sharp, normally up to 11 µm wide, occasionally bi- or multiradicate 12

12. Setae 40–65 µm long. Basidiospores 4–5 µm long, L < 4.9 13
(12). Setae more than 60 µm long. Basidiospores 5–8 µm long, L > 5 15

13. Basidiocarps yellowish-ochraceous to light yellowish-brown. North America .... *H. epichlora*
(13). European species 14

14. Basidiocarps compact, greyish. On *Quercus* in the Mediterranean .... *H. canescens*
(14). Basidiocarps loose, brown. On *Rubus* in Central Europe .... *H. jaapii*

15. Dark-coloured, fluffy mycelial patches present at the marginal areas of basidiocarps .... *H. laxa*
(15). Patches of sterile mycelium absent 16

16. Basidiospores 3–4 µm wide, W = 3.5–3.8. On grass stems in South Europe .... *H. macrochloae*
(16). Basidiospores 2–3.3 µm wide, W < 3 17

17. Basidiocarps more or less uniformly coloured 18
(17). Basidiocarps clearly two-layered or stratified 19

18. Basidiocarps pale, 0.05–0.1 mm thick. Some setae bifurcate. East Asia .... *H. floccula*
(18). Basidiocarps brown to chocolate-brown, 0.1–0.5 mm thick. Setae simple. North America and the southern part of Europe .... *H. scabra*

19. Subicular hyphae 4–8 µm diam. Holarctic .... *H. rudis*
(19). Subicular hyphae 4–6 µm diam. East Asia and North America .... *H. tenebraria*

DISCUSSION

In the present paper, we revised the taxonomy of specimens identified as *H. cinnamomea* and *H. fuliginosa*. As a result, six older names associated with *H. cinnamomea* (*H. arida*, *H. cinnamomea*, *H. fibrillosa*, *H. laxa*, *H. rudis*, and *H. spreta*) and two names previously connected to *H. fuliginosa* s. auct. (*H. fusca*, *H. tenuis*) are reinstated as representing good species. Additionally, nine new species are described from the temperate-boreal Northern Hemisphere, and the identity of *H. epichlora*, *H. carpatica*, and *H. corticolor* is clarified via newly obtained DNA sequences. The identity of two species, *H. canescens* and *H. jaapii*, recently described from Europe, remains obscure.

Only three species treated above, i.e. *H. macrochloae*, *H. carpatica*, and *H. corticolor*, seem to be restricted to particular geographic areas and to specific hosts. Almost all other species dealt with are quite flexible in their host preferences, inhabiting angiosperm hosts but occasionally occurring also on conifers, or vice versa; *Hymenochaete fusca* occurs with the same frequency on angiosperm and gymnosperm wood in suitable habitats. The known exceptions are *H. furva*, which is seemingly distributed only in North Europe, *H. spreta* occurring in the North American North-East, and *H. floccula*, *H. lesurae*, and *H. obsoleta*, so far known from one to two records from their type localities. Available DNA sequences point at a higher species diversity in *H. cinnamomea* and *H. laxa* clades yet to be uncovered.

According to our experience, measuring ten fully developed setae and 15 to 20 mature basidiospores is usually enough for the species recognition in the studied group. Combined with macroscopic traits, ecology, and host data, as well as the presence or absence of encrustation on the setae, these measurements allow one to identify a sample at hand. The setal length / width ratio (the so-called setal index) was shown to be an important feature to distinguish among *Phellinus* s. lat. species with nearly identical basidiospores (Niemelä 1972, 1975, Spirin *et al.* 2014). Unfortunately, this trait was almost totally neglected in *Hymenochaete* s. lat., and this publication, as well as two previous ones (Spirin *et al.* 2015, Miettinen *et al*. 2019), stresses its importance for future studies of the genus. It is particularly important in the separation of the two most common *Hymenochaete* species in North Europe, *H. fusca* and *H. tenuis*, both of which are widely distributed in coniferous forests and possess almost identical basidiospores as well as being often sterile. However, in at least two cases known to us, anatomic characters provide little or no help for the species identification. In the case of *H. laxa* and *H. rudis*, attention should be paid to macroscopic features and the habitat. In turn, *H. furva* and *H. lesurae* can be separated only by their different distribution areas and substrate preferences.

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Supplementary Material: http://fuse-journal.org/

Table S1. INSDC accession numbers for DNA sequences used in this study. Specimens sequenced for this study are in bold, the rest retrieved from the INSDC and UNITE databases. Holo- and neotypes have been marked with an asterisk (*).