

Emendation of the genus *Parascutellinia* (Pezizales) based on phylogenetic, morphological and ecological data, introducing *Fallacidiscus helveticus* gen. and sp. nov., and *Spaniodiscus* gen. nov.

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Abstract: The genus *Parascutellinia* is revised and amended, based on examinations of the type specimens from *Humaria carneosanguinea*, *Lachnea violacea*, *Lachnea iuliana*, *Parascutellinia fuckelii*, and *Peziza arctespora*. In addition, numerous collections of *Parascutellinia carneosanguinea* have been studied and sequenced. Phylogenetic analysis revealed that, contrary to earlier assumptions, it represents one single species. Therefore, *H. carneosanguinea*, *L. violacea*, and *P. arctespora* are considered conspecific. *L. iuliana* is excluded from *Parascutellinia* and considered conspecific with *Trichophaea woolhopeia*. Based on type examination and sequencing (including recent collections) of *Parascutellinia fuckelii*, the latter is also excluded from this genus, and the new genus *Spaniodiscus* is proposed. In addition, a species morphologically similar to *Parascutellinia fuckelii* was examined and found to be morphologically and genetically different from *Spaniodiscus*. For this species, the new genus *Fallacidiscus* is proposed.

Keywords: Ascomycota, carotenoid pigment, phylogeny, Pyronemataceae, taxonomy, *Humaria carneosanguinea*, *Lachnea violacea*, *Lachnea iuliana*, *Peziza arctespora*, *Trichophaea woolhopeia*.

Introduction

The genus *Parascutellinia* was published by SVRČEK (1975) with *Lachnea violacea* Velen. as type, considering this species different from *Scutellinia* (Cooke) Lambotte because of the type of hairs: superficial with a simple base vs. deeply rooted with usually forked base, respectively. SVRČEK (1981) and HUHTINEN (1985) synonymised *L. violacea* with *Humaria carneosanguinea* Fuckel. As the latter has the nomenclatural priority, it is considered as the type species of *Parascutellinia* as *P. carneosanguinea* (Fuckel) T. Schumach. This synonymy has been accepted by DONADINI & SVRČEK (1985). SVRČEK (1981) combined *Lachnea iuliana* Svrček in *Parascutellinia* as *P. iuliana* (Svrček) Svrček, based on a single collection examined in his study of the “Bohemian species of Pezizaceae, subf. *Lachneoideae*” (SVRČEK, 1948).

SCHUMACHER (1979) examined Fuckel’s type collection of *Humaria carneosanguinea* and concluded that *L. violacea* and *H. carneosanguinea* are probably two distinct species. Although they are very similar in most of the morphological features, Schumacher stated that they differ in ascospore ornamentation: the first one with completely smooth ascospores (*H. carneosanguinea*), the second with finely warted ascospores (*L. violacea*).

In 1984, Schumacher examined the type collection of *Peziza arctespora* Cooke & W. Phillips during the preparation of his “*Scutellinia* battle” paper published four years later (SCHUMACHER, 1988). In this paper, he stated also the identity between *Lachnea violacea* and *P. arctespora*, and combined the latter into *Parascutellinia* as *P. arctespora* (Cooke & W. Phillips) T. Schumach. DONADINI (1986a) reevaluated the types of *Humaria carneosanguinea*, *Lachnea violacea*, and *L. iuliana*. He confirmed the synonymy between *L. violacea* and *H. carneosanguinea*, whereas the status of *L. iuliana* within *Parascutellinia* could not be clarified because he did not study the type collection.

In this context, the question remains unanswered to this day: Are *H. carneosanguinea*, *P. arctespora*, and *L. violacea* identical or not? For this paper, we studied again the types of *H. carneosanguinea*, *P. arctespora*, *L. iuliana* and *L. violacea* to clarify their intraspecific and generic relationship.

Furthermore, the recent discoveries of the rarely reported *Parascutellinia fuckelii* Donadini & Svrček in Switzerland and France allowed us to compare the collections with the data provided by VAN VOOREN & MAURUC (2020) dealing with a revision of the type collections of *Pezizomycetes* published by Donadini, including *Parascutel-*

linia fuckelii. The result of the sequencing revealed that *P. fuckelii* does not belong to the same clade as *P. carneosanguinea* (Fuckel) T. Schumach. (VAN VOOREN *et al.*, 2021: Fig. 1). Its isolated position in the */Humaria* lineage, as well as its morphological characters deserve its own genus. We propose here *Spaniodiscus* gen. nov. to accommodate *P. fuckelii*.

Another cup-fungus, morphologically very close to *P. fuckelii* has been collected in two different places in the Swiss Alps by the third author. Our study and comparison with *P. fuckelii* proved its originality which is supported by the phylogenetic analysis. It has also an isolated position in the */Humaria* lineage and deserves its own genus too. It is described here as *Fallacidiscus helveticus* gen. and sp. nov.

Material and methods

Morphological study. — The microscopic studies were based on both fresh and dried specimens, and made with optical microscopes with plan-achromatic objectives. For dried specimens (†), a small piece was placed in water for about two hours before the observation. The following main reagents were used: iodine solution (Melzer’s reagent or Lugol solution), Cotton blue (CB), Congo red, and 3% or 5% KOH. Water mounts were used for the observation of the pigmentation and measurements. At least 25 to 50 ascospores naturally discharged from the asci were measured from studied material. Ascospore measurements are given including ornamentation.

Nomenclature, terminology. — The taxonomic novelties were registered in the MycoBank database (www.mycobank.org), including typifications (MBT number). The nomenclature follows the current version of ICN, Shenzhen Code (TURLAND *et al.*, 2018). The herbarium acronyms are in conformity with the Index Herbariorum (<http://sweetgum.nybg.org/science/ih/>). For specimens housed in personal herbaria, the terms “pers. herb.” are used, followed by the author’s reference.

Locations. — Locations of studied collections are given by countries, in alphabetical order, followed by region (or province or department), town, and more precise location (in native language). The coordinates are given in decimal WGS84 format.

DNA extraction, amplification and sequencing. — Methods are identical to those defined in VAN VOOREN *et al.* (2021).

Phylogenetic analyses. — Sequences were first aligned in MEGA X (KUMAR *et al.*, 2011) software with its MUSCLE application (EDGAR, 2004) and then manually corrected. Evolutionary analyses were con-

Table 1 – Collections sequenced for this study. Detailed collecting data of the sequenced samples are listed under “Reconsideration of *Parascutellinia carneosanguinea*”

Name	Coll. ref. / Herb. no.	Collector	Country	GenBank Accession numbers			
				ITS	28S	rpb2	tef1
<i>P. carneosanguinea</i>	B: 70 0003667	D. Benkert	Germany	OM778184	OM778192	–	–
<i>P. carneosanguinea</i>	B: 70 0003668	D. Benkert	Germany	OM778183	OM778191	–	–
<i>P. carneosanguinea</i>	MSTR: P-15597	N. Jukić	Bosnia and Herzeg.	OM778185	OM778193	–	–
<i>P. carneosanguinea</i>	MSTR: P-15599	N. Jukić	Bosnia and Herzeg.	OM778186	OM778194	–	–
<i>P. carneosanguinea</i>	SMNS-STU-F-0002184	A. Gminder	Switzerland	OM778188	OM778195	–	–
<i>P. carneosanguinea</i>	ZT: Myc 64711	U. Roffler	Switzerland	OM778187	–	–	–
<i>P. carneosanguinea</i>	LY: NV 2015.08.23	N. Van Vooren & B. Jeannerot	France	–	OM778189	–	–
<i>P. carneosanguinea</i>	LY: NV 2017.08.08	M. Vega	France	OM778182	OM778190	OM929198	OM929197

ducted in MEGA X with 27 nucleotide sequences for the LSU region (816 positions). The evolutionary history was inferred by using the Maximum Likelihood method based on the General Time Reversible (GTR) model (NEI & KUMAR, 2000) with 1000 bootstrap iterations. Initial tree(s) for the heuristic search were obtained automatically by applying Neighbor-Join and BioNJ algorithms to a matrix of pairwise distances estimated using the Maximum Composite Likelihood (MCL) approach, and then selecting the topology with superior log likelihood value. A discrete Gamma distribution (4 categories) was used to model evolutionary rate differences among sites.

The phylograms were graphically edited with the online software iTOL v6 (<https://itol.embl.de>, LETUNIC & BORK, 2021).

The sequences generated during this study were deposited in GenBank and are listed in Table 1.

Molecular results

The phylogeny based on the LSU region of a set of *Parascutellinia* collections and some allied species is consistent with the topology of the *Humaria* clade obtained with the multigene analysis conducted by VAN VOOREN *et al.* (2021, Fig. 1).

All sequenced collections of *Parascutellinia carneosanguinea* coming from different parts of the world cluster in a strongly supported clade. Only one German collection shows a more significant variation with 7 nucleotide substitutions in the final alignment and a pairwise distance varying between 1.25% to 1.5% with the other sequences (whereas this variation is only 0 to 0.25% between the others). As we did not see any morphological differences between this collection and the others, we do not consider it as a different taxon.

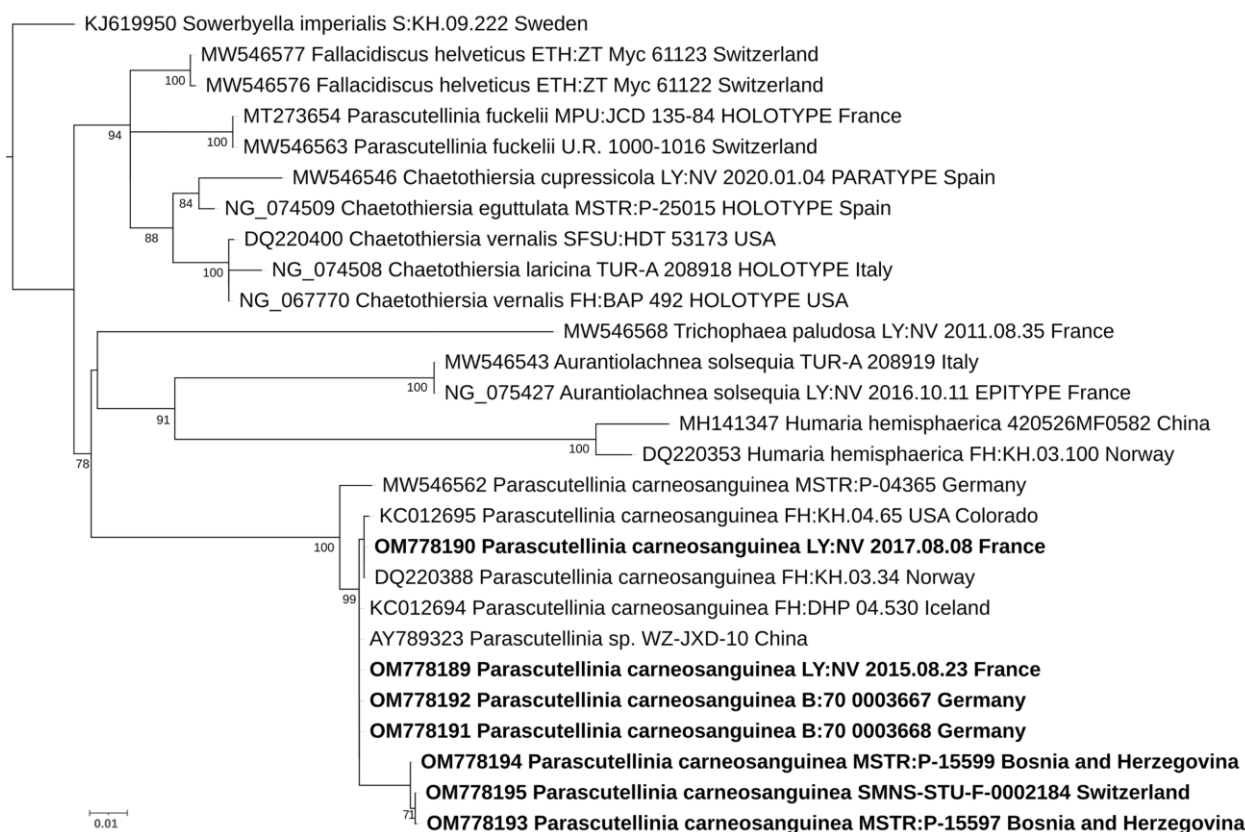


Fig. 1 – Phylogram of maximum likelihood (ML) of *Parascutellinia* based on the LSU region, rooted with *Sowerbyella imperialis*. Nodes with $\geq 70\%$ ML bootstrap support are annotated with their support values. Terminals that represent sequences obtained during this study are in bold.

As previously shown in VAN VOOREN *et al.* (2021, Fig. 1), *Parascutellinia fuckelii* does not belong to *Parascutellinia* and is nested in a rather distant lineage. It belongs to a sister clade of a new genus and species presented herein, *Fallacidiscus helveticus* (formerly “*Pyronemataceae* sp. UR” in VAN VOOREN *et al.*, 2021, Fig. 1). Therefore, we also propose to combine *P. fuckelii* in a new genus (see chapter Taxonomy “3. New Taxa”).

Taxonomy

1. Type studies

Re-examination of type-material of *Humaria carneosanguinea*

Humaria carneosanguinea is typified by the collection no. 2288 in Fuckel's *Fungi rhenani*. SCHUMACHER (1979: 62f.) examined three collections of *H. carneosanguinea* during his type study: two of Fuckel's personal herbarium, which are housed in S, and a third one from the copy of *Fungi rhenani* also in S. The latter was designated by Schumacher as lectotype. We had the opportunity to examine a duplicate of Fuckel's *Fungi rhenani* in M. The sample consists only of a half apothecium but in good condition.

The complete apothecium would have the size of 1 mm diam. in dried state. It is disc-shaped with an enrolled margin. The receptacle surface is scattered with hairs; at the margin brown straight hairs are present. The colour of the hymenium is yellowish brownish in dried state. The receptacle surface has a similar colour. The apothecium is on loamy-sandy soil, interspersed with small roots.

The label indicates: “*Humaria carneosanguinea*. *Ad terram nudam humosam, raro. Ad Rheni ripas ca. Hostrichiam* [Oestrich (Rheingau), Germany]. Fuckel. *Fungi rhenani* 2288. Botanische Staatssammlung München M-0308408”. No collection date is given. Two handwritten notes accompany the sample: “*Humaria carneosanguinea* Fckl. / *Lachnea [carneosanguinea]*” and “*Parascutellinia carneosanguinea* (Fuckel) T. Schumach.”, both without indication of the writer.

Description (†) of microscopic characters (Pl. 1): **Medullary excipulum** not distinguishable. **Ectal excipulum** of *textura globulosa*, composed of hyaline, thin-walled cells, the outermost layer consists of brown, slightly thick-walled cells. **Excipular and marginal hairs** brown, mostly straight to slightly flexuous, some with blunt ends, some sharply pointed, multiseptate, thick-walled, with a simple base; marginal hairs up to 200 µm in length, 11–13 µm wide. **Asci** operculate, cylindrical, 8-spored, base not observed, inamyloid (all asci deformed; therefore, a reasonable measurement was not possible). **Paraphyses** filiform, straight, multiseptate, hyaline, with inclusions, 3–4.5 µm wide, up to 5.5–6 µm at the top. **Ascospores** 23–26.5 × 11.3–14.1 µm, X = 24.7 × 12.9 µm, Q = 1.6–2.1, Qm = 1.9 (in water); 25.7–29.1 × 14–15.5 (16.1) µm, X = 27.1 × 14.7 µm, Q = 1.7–2.0, Qm = 1.9 (in KOH), uniseriate, ellipsoid to subfusoid, thick-walled, hyaline, finely warted, mostly with two large drops, sometimes with 4–5 small ones.

Comments: The observations made during the re-examination of the isoelectotype material are mainly consistent with the type revision in SCHUMACHER (1979: 62f.), except of some small differences: The hairs are somewhat shorter (Schumacher measured hairs up to 380 µm), the ascospores are smooth in Schumacher's examination, whereas we observed a finely warted surface.

The main differences with Fuckel's description (FUCKEL, 1870), in which many measurements are missing, are the content of the ascospores (only one large oil drop) and their size, which is given as 20 × 10 µm. REHM (1896: 1053), who obviously examined Fuckel's type material, gave a much more precise description: ascospores 20–24 × 10–12 µm and hairs up to 150 µm long, up to 15 µm broad at the base. These measurements fit very well with our own obser-

ations. Rehm also described the surface of the ascospores as smooth. BENKERT (1985) discussed in detail the question of the ascospore surface of *P. carneosanguinea* and stated that a smooth or finely warted spore surface is not suitable for species differentiation if all other characters match. We agree with his opinion.

Due to the small amount of material and the age of the specimen, we refrained from a sequencing attempt of the isoelectotype.

Re-examination of type-material of *Lachnea violacea*

Lachnea violacea is typified by the collection PRM 151431 from which we have been examined only a part. This part contains four dried apothecia measuring 0.5–1 mm diam., in good condition.

The apothecia are cupulate to disc-shaped with enrolled margin. The receptacle surface is scattered with hairs; at the margin there are brown straight hairs. The colour of the hymenium is brownish with a slightly purple tint in dried state. The receptacle surface has a similar colour. At the bottom of the apothecia are remnants of sandy soil and brown anchor hyphae. The label indicates: “*LACHNEA violacea* Vel.; Habitat: Mnichovice, Kunice; *ad terram (ad rivum)*; Die: VIII. 1928. Leg. et det. J. Velenovský. LECTOTYPE. Herb. Kryptogamicum Musei Nat. Pragae. Collectio Fungorum J. Velenovský Acc. No. 29/1947. Flora bohemica No. 151431”.

Description (†) of microscopic characters (Pl. 2): **Medullary excipulum** not distinguishable. **Ectal excipulum** of *textura globulosa*, composed of hyaline, thin-walled cells, the outermost layer consists of brown, slightly thick-walled cells. **Excipular and marginal hairs** brown, mostly straight to slightly flexuous, never sharply pointed, mostly with blunt ends, multiseptate, thick-walled, with a simple base; marginal hairs up to 160 µm in length, 12–17 µm wide. **Asci** operculate, cylindrical, 8-spored, base not observed, inamyloid (all asci deformed; therefore, a reasonable measurement was not possible). **Paraphyses** filiform, straight, multiseptate, hyaline, with small colourless inclusions, 3.5–5 µm wide, up to 5–7 µm at the top. **Ascospores** 21.5–25.2 × 12.5–13.7 µm (in water¹), uniseriate, ellipsoid to subfusoid, thick-walled, hyaline, slightly warted, mostly with two large oil drops, sometimes with 4–5 small ones.

Comments: Our observations are mainly consistent with the description and drawings of the type in VELENOVSKÝ (1934: 309; tab. VI, fig. 4) as well as in SVRČEK'S revision (1948: 32f.), except some small differences. The hairs are measured up to 160 µm in length and 12–17 µm wide (VELENOVSKÝ: 100 × 8–10 µm; SVRČEK: 100–250 × 8–14 µm). The ascospore size is somewhat smaller, i.e. our measurement: 21.5–25.2 × 12.5–13.7 µm, VELENOVSKÝ: 25–28 µm in length (width not mentioned), SVRČEK: 24–29 × 12.5–14.5 µm.

SVRČEK (1948: 33) already pointed out a possible synonymy between *L. violacea* and *Humaria* (= *Parascutellinia*) *carneosanguinea*, without asserting this with an absolute certainty. BENKERT (1985) classified *L. violacea* as a form (“*forma*”) of *P. carneosanguinea*. Last but not least, DONADINI (1986a: 274f.) treated in detail the morphology of *L. violacea* and *P. carneosanguinea*, and synonymised both species.

We would like to support genetically Donadini's conclusion, but unfortunately the sequencing of the type of *L. violacea* failed. Nevertheless, we follow Donadini's conclusion and synonymization.

Re-examination of type-material of *Lachnea iuliana*

Lachnea iuliana is typified by the collection PRM 178823 (ex herbarium mycologicum J.A. Herink, *Flora bohemica* 178823) from which we have been examined only one apothecium measuring 0.5 mm diam., in good condition.

The apothecium is disc-shaped with an enrolled margin. The receptacle surface is densely hairy; at the margin there are brown

¹ Only few ascospores are not deformed after rehydration, therefore the data set is too small to give significant mean values.

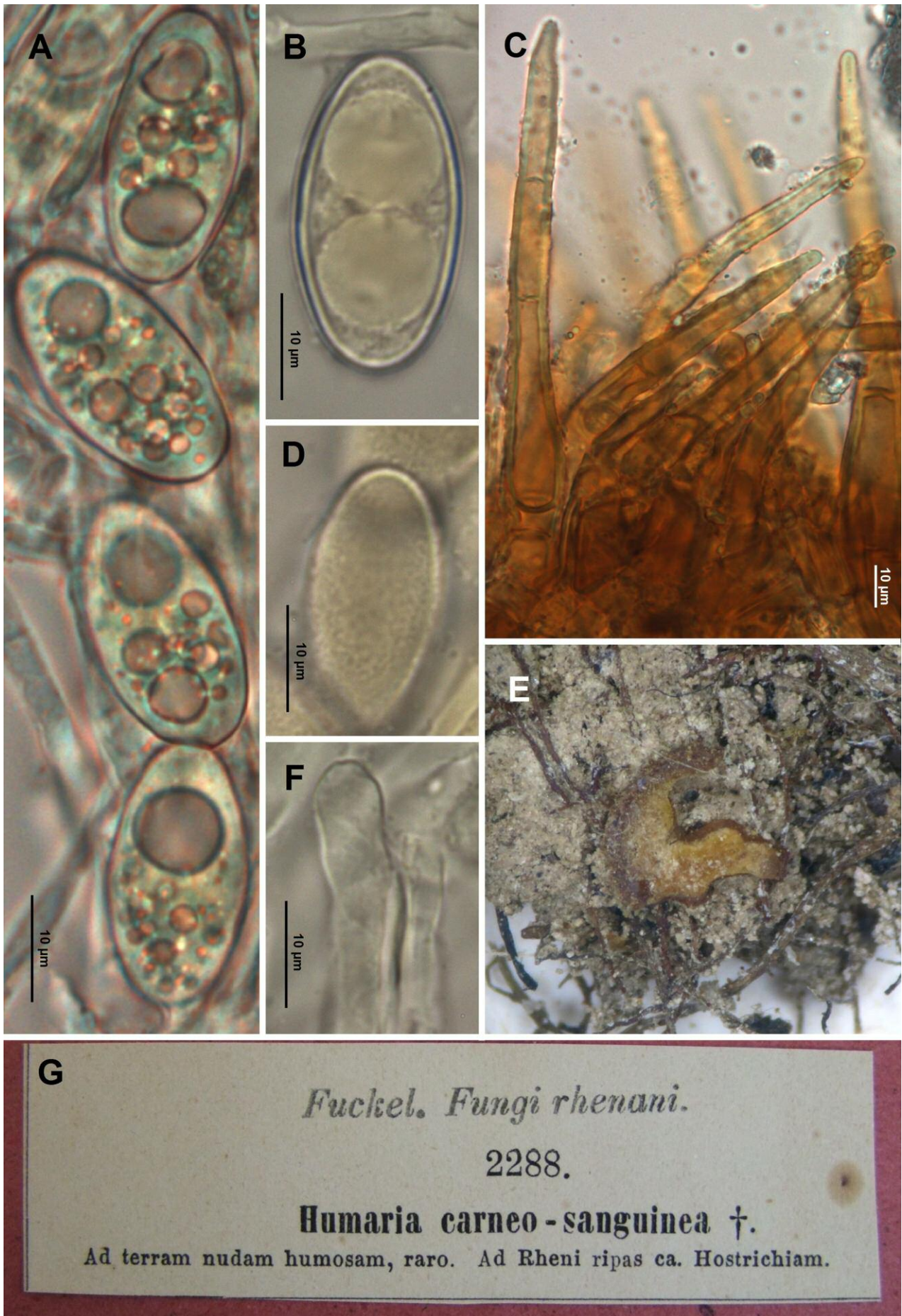


Plate 1 – *Humaria carneosanguinea* (duplicate of the lectotype from *Fungi rhenani*, no. 2288, deposited in M).
 A: Ascospores (rehydrated) in H₂O. B: Ascospore (rehydrated) in 3% KOH. C: Marginal hairs in H₂O. D: Ascospore (rehydrated) in 3% KOH, surface finely verrucose. E: Paraphyses (rehydrated) in 3% KOH. F: Dried apothecium of the duplicate. G: Label of the type collection. All photos by U. Lindemann.

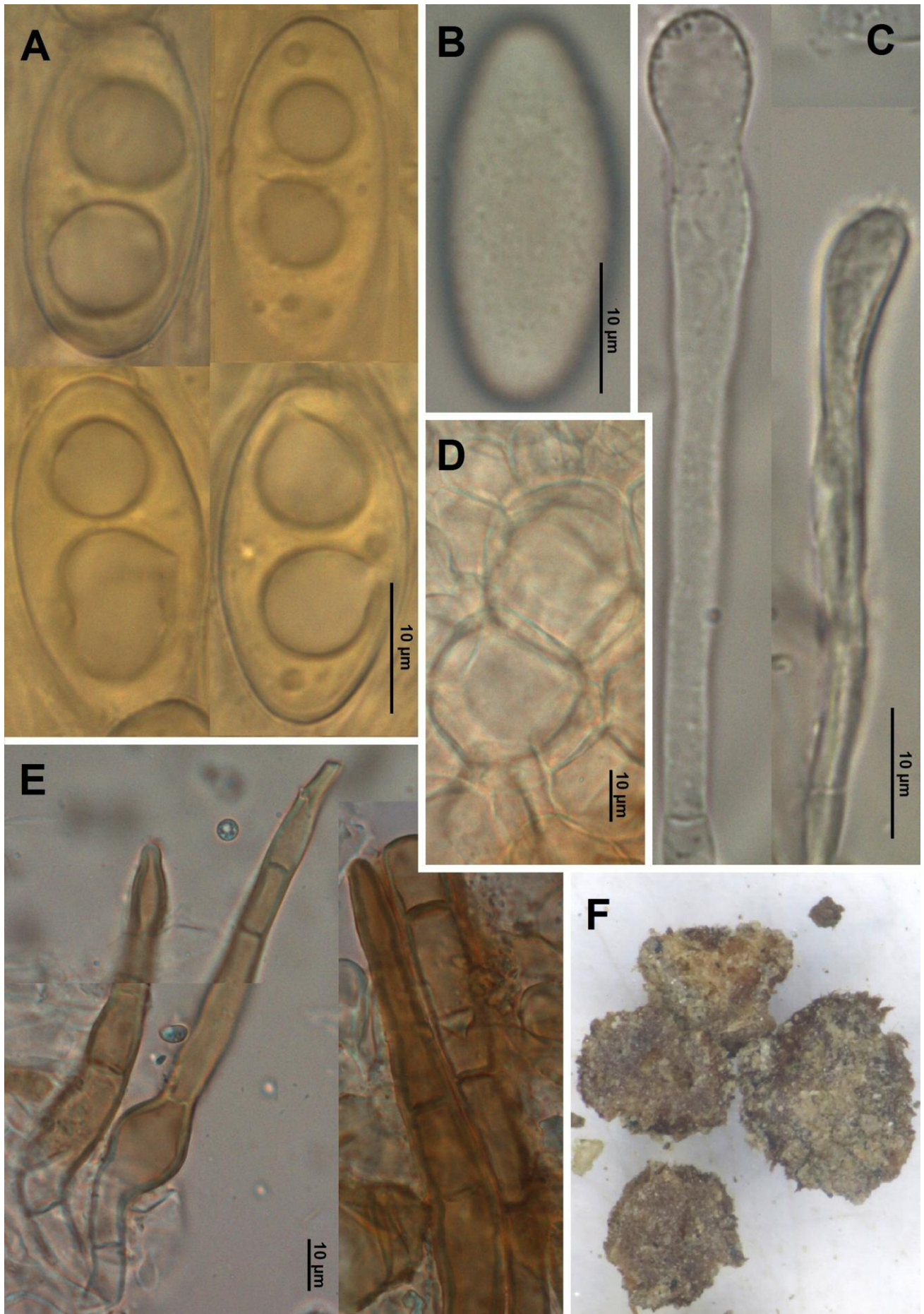


Plate 2 – *Lachnea violacea* (lectotype, PRM 151431)

A: Ascospores (rehydrated) in H₂O. B: Ascospore (rehydrated) in 3% KOH, surface finely verrucose. C: Paraphyses (rehydrated) (left in 3% KOH, right H₂O). D: Ectal excipulum (rehydrated) in 3% KOH. E: Hairs (left in 3% KOH, right in H₂O). F: Dried apothecia of the type collection. All photos by U. Lindemann.

straight pointed hairs. The colour of the hymenium is brownish with a slightly reddish tint in dried state. The receptacle surface has a similar colour. At the bottom of the apothecia are remnants of sandy soil and brown anchor hyphae. The label indicates: "*Lachnea iulialis* Svrček = *Lachnea iuliana* Svrček, *Lachneoideae* p. 34, 1948. Habitat: Kožová hora pr. KLADNO. Substratum: ad terram fossae ad marg. silvae: *Quercus*, *Picea*, *Betula*. Adnotatio: Apothecia plana, parvula, intus violacea, extus fusca, villosa. Legit: J.A. Herink. Determ. M. Svrček. Die. 26. VII. 1942. No. 361/42."

Description (†) of microscopic characters (Pl. 3): **Medullary excipulum** of *textura intricata*, composed of hyaline, thin-walled hyphae. **Ectal excipulum** of *textura globulosa/angularis*, made of hyaline,

thin-walled cells, the outermost layer consists of yellowish brown, slightly thick-walled cells. **Margin** of *textura prismatica*. **Excipular and marginal hairs** brown, mostly straight to slightly flexuous, mostly sharply pointed, multiseptate, thick-walled, with a simple base; marginal hairs up to 220 µm in length, the last cell near the base up to 15 µm wide. **Asci** operculate, cylindrical, 8-spored, arising from crozier, inamyloid (all asci deformed; therefore, a reasonable measurement was not possible). **Paraphyses** filiform, straight, multiseptate, hyaline, without any inclusions, 1.2–1.4 µm wide, up to 2–2.3 µm at the top. **Ascospores** (17.8) 19–21 × 14–15.4 µm (in water²), uniseriate, broadly ellipsoid, thick-walled, hyaline, smooth (tested in Cotton Blue with and without previous heating), mostly with one oil drop.

² Only few ascospores are not deformed after rehydration, therefore the data set is too small to give significant mean values.

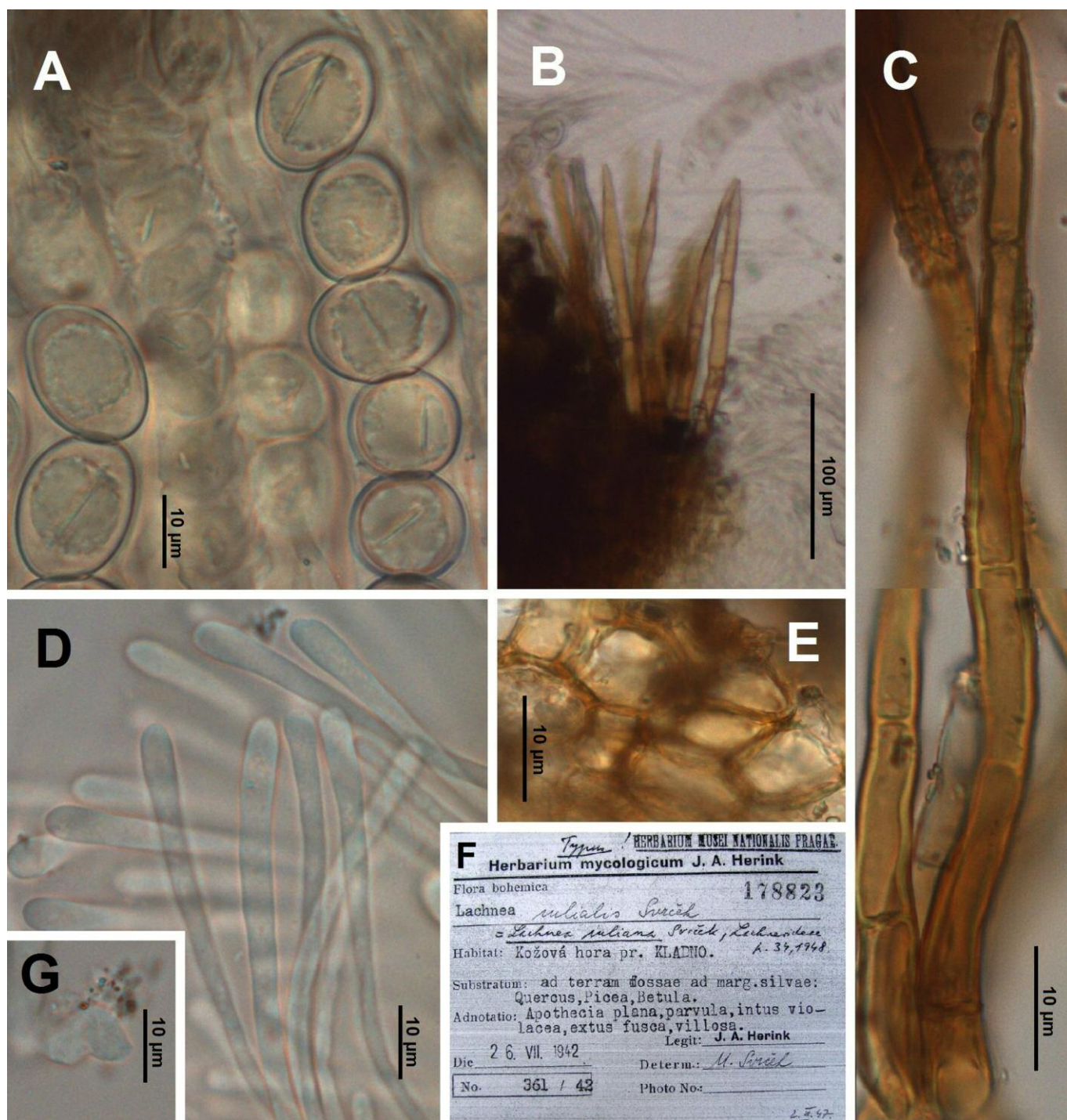


Plate 3 – *Lachnea iuliana* (holotype, PRM 178823)

A: Ascospores (rehydrated) in 3% KOH. B + C: Marginal hairs in H₂O. D: Paraphyses (rehydrated) in 3% KOH. E: Ectal excipulum (rehydrated) in H₂O. F: Label of the type collection. G: Ascus base in 3% KOH. All photos by U. Lindemann.

Comments: Our observations are mainly consistent with SVRČEK's description (1948: 34), except for the ascospore size, 17–19 × 12–13 µm in the protologue, whereas our own measurement gives (17.8) 19–21 × 14–15.4 µm. The purple colour of the hymenium ("*thecio pulchre violaceo*") could not be observed in the rehydrated exsiccates.

Due to the lack of ornamentation of the ascospores, the absence of coloured droplets in the paraphyses, the different hair type (less thick-walled, not sharply pointed), we do not believe that *Lachnea iuliana* belongs to the genus *Parascutellinia*.

SVRČEK (1981: 88) combined *L. iuliana* in *Parascutellinia* without any comment. DONADINI (1986a: 280) already suspected that, based on the morphological characteristics, *L. iuliana* cannot belong to *Parascutellinia*. We rather suspect that *L. iuliana* belongs to *Trichophaea s. lato*. The unusually large, broadly ellipsoidal, thick-walled ascospores with one large oil drop point to *Trichophaea woolhopeia* (Cooke & W. Phillips) Arnould which shares with *L. iuliana* almost all features. Only the purple colour of the hymenium is different, but an Internet search for photographs of *T. woolhopeia* quickly shows that the hymenium is not only pale whitish (as often mentioned in the literature), but can also show a strong purple tint, maybe due to bacteria.

We also tried to sequence the type of *L. iuliana*. Unfortunately, we obtained only a noisy ITS sequence which usually has a limited informative value. Nevertheless, we were very surprised when we tested this sequence with BLAST. The best hits were sequences from *T. woolhopeia* (81% identity) beside some "uncultured fungus clones".

All this leads us to the conclusion that *L. iuliana* and *T. woolhopeia* represent the same species. Even though we do not have a solid genetic confirmation, we propose to synonymize both taxa due to the morphological similarities.

Partial re-examination of the type-material of *Peziza arctespora*

We had the opportunity to use the notes of the type study of *Peziza arctespora* written by Trond Schumacher in October 1984, including two slides, prepared from type material. The results of Schumacher's examination are published in SCHUMACHER (1988: 153) but without any morphological details. Therefore, we present here our own observations, based on Schumacher's notes and the re-examination of the slides.

Description (†) of microscopic characters (Pl. 4): **Medullary excipulum** not distinguishable. **Ectal excipulum** of *textura globulosa*, composed of hyaline, thin-walled cells, the outermost layer consists of brown, thick-walled cells. **Excipular and marginal hairs** brown, mostly straight to slightly flexuous, some with blunt ends, some sharply pointed, multiseptate, thick-walled, with a simple base; marginal hairs up to 240 µm in length, up to 15 µm broad. **Asci** operculate, cylindrical, 8-spored, base not observed, inamyloid (all asci deformed; therefore, a reasonable measurement was not possible). **Paraphyses** filiform, straight, multiseptate, hyaline, up to 3.8–4.6 µm at the top. **Ascospores** 20.6–23.7 × 10–11.1 µm, X = 21.9 × 10.6 µm, Q = 2–2.2, Qm = 2.1 (n = 10) (in water); 22–24.9 × 9.8–11.6 µm, X = 23.2 × 10.7 µm, Q = 1.9–2.4, Qm = 2.2 (n = 20) (in KOH), uniseriate, ellipsoid to subfusoid, more or less thick-walled, hyaline, smooth (in water, KOH and CB), mostly with 2–3 guttules (in water), filled with many little guttules (in KOH).

Comments: The original description of *Peziza arctespora* by COOKE & PHILLIPS (1881, p. 104 + plate 33, fig. 107) is short and contains few data: "*Gregaria, fusca, sessilis. Cupulis hemisphericis* (2–4 mm.), *extus margineque strigosis. Pilis gracilibus, acutis, brunneis. Hymenio rubro.*

Asci cylindricis. Sporibus sublanceolatis, utrinque obtusis, uni-guttulatis, hyalinis (.022 × .005–.008 mm.). *Paraphysibus leniter clavatis.* / On ground under fir trees." The plate 33 ("Pezizae VII") shows an ascus with uniseriate ascospores, containing one large guttule in the centre and two small at the poles. The base of the asci is not specified. LAMBOTTE (1887: 300) placed the species in *Scutellinia*, without new data. SACCARDO (1889: 177) combined it in *Lachnea* (Fr.) Gillet, without new data. The same can be stated regarding BOUDIER (1907: 62) with his new combination in *Ciliaria* QuéL. ex Boud. REHM (1896: 1053) translated Cooke's & Phillips' description into German and commented it as follows: "Nur aus obiger Beschreibung bekannt und durch schmale Sporen von den Verwandten verschieden" which means "Only known from the above description [by Cooke & Phillips] and distinguished from related species by narrow spores". The taxon was forgotten until Schumacher brought it back in the light of his studies on *Scutellinia*.

The observations made during the re-examination of the type by Schumacher and by ourselves are mainly consistent with the description of Cooke & Phillips except of the ascospores width which is significantly wider. We agree with Schumacher's synonymisation of *P. arctespora* and *Lachnea violacea* (SCHUMACHER, 1988), but we do not think that a differentiation between *P. arctespora* and *H. carneosanguinea* is possible because no other morphological features except the different type of ascospore ornamentation can be found that clearly distinguish both species (SCHUMACHER, 1979). During our studies of fresh material of *Parascutellinia carneosanguinea*, we observed collections with ornamented ascospores and some others without. Our phylogenetic analyses of *P. carneosanguinea* from samples collected in different parts of Europe shows only one lineage with a small variation (see chapter "Molecular results"). Unfortunately, as we could not sequence the types of *H. carneosanguinea*, *L. violacea*, and *P. arctespora*, our assumption cannot be genetically validated. Nevertheless, we propose here a synonymisation of *P. arctespora* and *L. violacea* with *H. carneosanguinea*, the latter name having priority.

Last but not least, we have also to cite *Lachnea rosea* Schweers, a species synonymized by HUHTINEN (1985) to *P. carneosanguinea*. Based on the description and illustrations of SCHWEERS (1940), we agree with Huhtinen.

Parascutellinia carneosanguinea (Fuckel) T. Schumach., *Norw. J. Bot.*, 26(1): 62 (1979).

Basionym: *Humaria carneosanguinea* Fuckel [as '*carneo-sanguinea*'], *Jahrb. nassau. Ver. Naturk.*, 23–24: 323 (1870).

Homotypic synonyms: *Peziza carneosanguinea* (Fuckel) Cooke, *Mycogr.*, 1(2): 75 (1876); *Lachnea carneosanguinea* (Fuckel) W. Phillips, *Man. Brit. Discomyc.*: 222 (1887); *Scutellinia carneosanguinea* (Fuckel) Kuntze, *Revis. gen. pl.*, 2: 869 (1891); *Ciliaria carneosanguinea* (Fuckel) Boud., *Hist. Class. Discom. Eur.*: 62 (1907).

Taxonomical synonyms: *Peziza arctespora* Cooke & W. Phillips, *Grevillea*, 9(51): 104 (1881); *Scutellinia arctespora* (Cooke & W. Phillips) Lambotte, *Mém. Soc. roy. Sci. Liège, sér. 2*, 14: 300 (1888); *Lachnea arctespora* (Cooke & W. Phillips) Sacc., *Syll. fung.*, 8: 177 (1889) [as '*arctispora*']; *Ciliaria arctespora* (Cooke & W. Phillips) Boud., *Hist. Class. Discom. Eur.*: 62 (1907) [as '*arctispora*']; *Parascutellinia arctespora* (Cooke & W. Phillips) T. Schumach., *Mycotaxon*, 33: 153 (1988).

Lachnea violacea Velen., *Monogr. Discom. Bohem.*: 309 (1934); *Parascutellinia violacea* (Velen.) Svrček, *Česká Mykol.*, 29(3): 129 (1975); *Parascutellinia carneosanguinea* f. *violacea* (Velen.) Benkert, *Gleditschia*, 13(1): 150 (1985).

Lachnea rosea Schweers, *Rev. mycol. (Paris)*, 5(1): 20 (1940) [as '*Lachnella rosea*'], after HUHTINEN (1985).

? *Lachnea violacea* var. *rosella* Velen., *Novit. mycol. novis.*: 144 (1947)³.

³ Based on the short description of SVRČEK (1948), it seems very probable that this variety falls in synonymy with *P. carneosanguinea* but we did not revise the original material (if it exists).

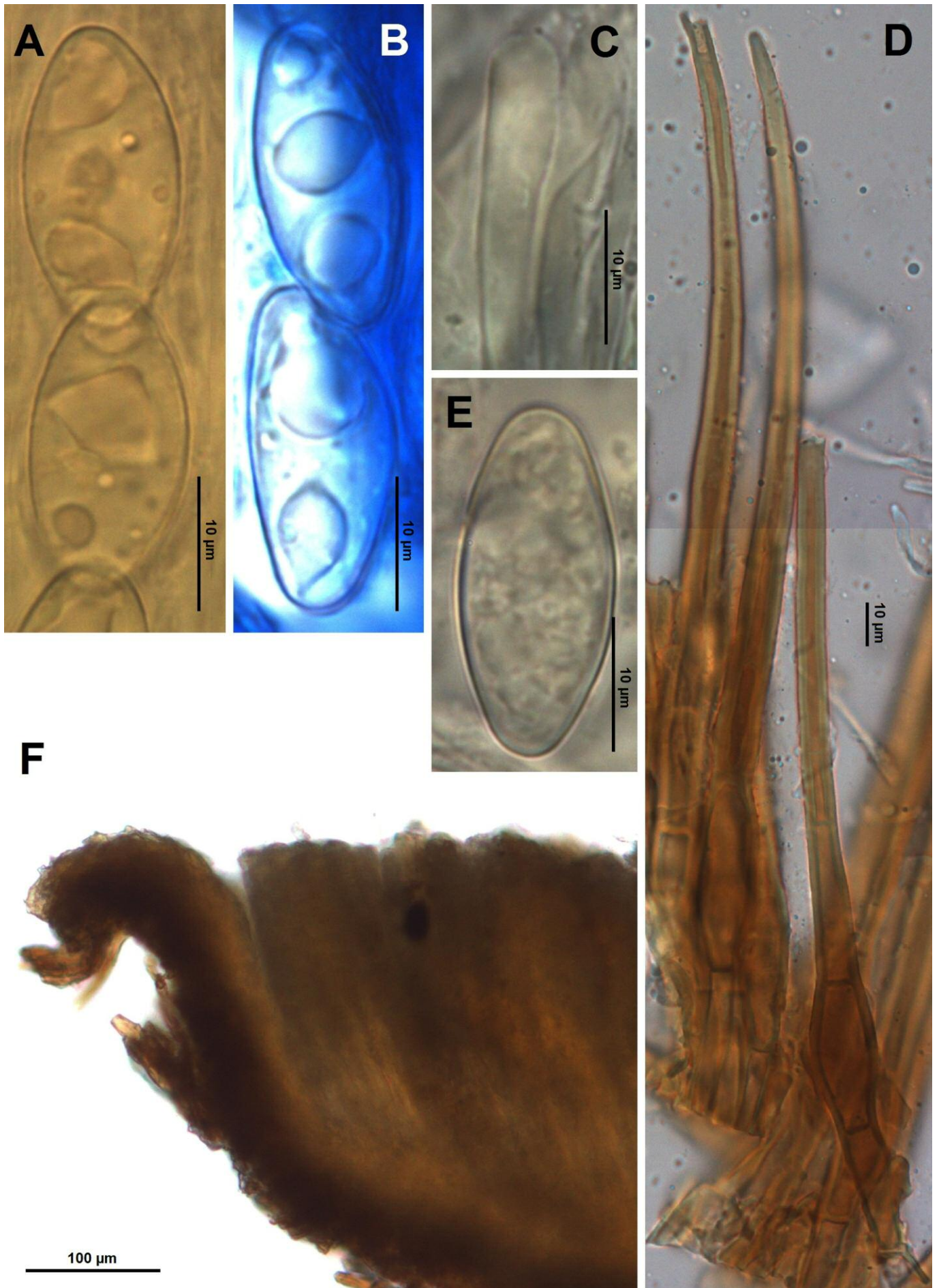


Plate 4 – *Peziza arctespora* (slides from type material: Libert no. 888; K – ex Phillips)

A: Ascospores (rehydrated) in H₂O. B: Ascospores (rehydrated) in CB. C: Paraphyses (rehydrated) in 3% KOH. D: Marginal hairs in 3% KOH. E: Ascospore (rehydrated) in 3% KOH, with a smooth surface. F: Vertical section of apothecium. All photos by U. Lindemann.

2. Reconsideration of *Parascutellinia carneosanguinea*

Parascutellinia carneosanguinea has been described comparatively frequently despite or perhaps because of its rarity. Apart from the systematic works of DONADINI (1986a, 1986b) and DONADINI & SVRČEK (1985), detailed documentations of the species can be found in BENKERT (1985), GMINDER *et al.* (1991: 38f.), HUHTINEN (1985), OMEROVIĆ & JUKIĆ (2015: 119ff.), SCHUMACHER (1979: 62f.), SCHUMACHER & JENSSEN (1992: 45f. as *Parascutellinia arctespora*), TRIGAUX (1982), RUBIO *et al.* (2010: 303 as *Parascutellinia violacea*), VAN VOOREN (2008), and VAN VOOREN (2014: 6, 118). However, we propose here a synthetic description based on the studied collections.

Description (Pl. 5): **Ascomata** gregarious or isolated. **Apothecia** 3–5 mm diam., sessile, cupuliform, spreading at the end, hymenium dark pink, pinkish red, sometimes with purplish tinges, with blackish brown hairs at margin; outer surface subconcolorous, scattered by small dark brown hairs.

Medullary excipulum of *textura intricata*, with hyaline hyphae. **Ectal excipulum** of *textura angularis/subglobulosa*, with cells 15–40 µm diam. **Marginal hairs** superficial, more or less fasciculate,

130–700 × 6–15 µm, brownish, sharp or blunt at the top, with a simple narrowed base, septate, 1–2 µm thick-walled. **Excipular hairs** similar but shorter. **Asci** cylindrical, (280) 330–350 × (15) 17–23 µm, narrowed at the base, arising from free croziers, 8-spored. **Paraphyses** widened or subcapitate at the top, up to 5.5–8 (10) µm diam., containing a pinkish to reddish non-crystalline carotenoid pigment, turning green in iodine solution. **Ascospores** ellipsoid with tapered ends to subfusoid, 24–28.5 × (11) 12–14 (15) µm, X = 26 × 13.2 µm, Q = 1.7–2.2 (2.4), Qm = 2.0, hyaline, containing two large oil drops and numerous droplets, thick-walled, smooth in water, but ornamented with very fine isolated warts, visible in Cotton blue.

Comments: Due to its pinkish red hymenium, often with slightly violet tones, as well as the brown-hairy margin, *P. carneosanguinea* can macroscopically be confused with a *Scutellinia* species. However, microscopically, it can be quickly and unambiguously identified thanks to the combination of following characters: red-violet pigmented paraphyses, non-rooting, brown, mostly pointed marginal hairs, ellipsoid to subfusiform, thick-walled ascospores, containing two large oil drops.



Plate 5 – *Parascutellinia carneosanguinea* (various collections *in situ*).

A. Coll. NV 2015.08.13. B. Coll. NV 2007.09.26. C. Coll. NV 2017.08.08.

A Georgian collection (B 70 0003666, *leg.* D. Benkert) presents 4-spored asci. Despite that, the other features are very similar to the 8-spored collections. Unfortunately, a sequencing attempt failed. Thus, we did not know whether it is only a variation of the 8-spored collections or it should be considered as a distinct species. Further research is needed.

Distribution: The species is known from most parts of Europe as well as from China, Canada, Georgia, and USA. The phylogenetic analysis suggests that *P. carneosanguinea* is worldwide distributed, although the species is not known until now from Africa and South America.

Trophic status and ecology: The species seems to prefer creek and riverbanks with *Salix* spp. around. Indeed, it seems that *P. carneosanguinea* forms ectomycorrhizae with *Salix* spp. (TEDERSOO *et al.*, 2013, table S3; ARRAIANO-CASTILHO *et al.*, 2021). It occurs from the lowlands to montaneous areas. Two collections from France was made at the alpine stage, at an elevation above 2100 metres (LY:NV 2017.08.08 and LY:NV 2020.08.24).

Studied collections: BOSNIA AND HERZEGOVINA. National Park Sutjeska, camp Tjentište, River Sutjeska, 18 km NE from Foča, 43.35393° N 18.68979° E, elev. 560 m, on sandy riverbanks of river Sutjeska, under the mixed willow population, 14 Aug. 2014, *leg.* N. Jukić, herb. MSTR P-15597 [ex pers. herb. N.J./ 140814-27]. National Park Sutjeska, camp Tjentište, River Hrčavka (Radilište), 21 km NE from Foča, 43.35081° N 18.63785° E, elev. 940 m, on muddy riverbanks of Hrčavka under the willows in a mixed forest, 31 Aug. 2014, *leg.* N. Jukić, herb. MSTR P-15598 [ex pers. herb. N.J./ 310814-07]. 10 km N from Mostar, near the mouth of the River Buna, flowing into the River Neretva, 43.24144° N 17.83478° E, elev. 50 m, on a sandy riverbank under willow with the presence of *Platanus orientalis*, *Fraxinus angustifolia*, *Alnus glutinosa*, *Ulmus canescens*, *Ficus carica*, and other, 21 Oct. 2018, *leg.* N. Jukić, herb. MSTR P 15599 [ex pers. herb. N.J./ 21102018-Y3].

FRANCE. Jura, Les Rousses, lac des Rousses, 46.5006207° N 6.091457° E, elev. 1060 m, in a bog, along a rivulet, among small mosses (*Mnium* sp.), under *Picea abies*, *Betula* sp. and other hygrophilous trees, 18 Sept. 2007, *leg.* N. Van Vooren, herb. LY:NV 2007.09.26. Savoie, Bessans, along the river Arc, between Chantelouve and l'Ilaz, 45.30535° N 6.96518° E, elev. 1670 m, on sandy soil, under *Alnus incana* and *Salix* sp., 26 Aug. 2015, *leg.* N. Van Vooren & B. Jeannerot, herb. LY:NV 2015.08.13 [duplicate in pers. herb. BJ 2015-404]. Savoie, Aime-la-Plagne, Cormet d'Arêches, 45.6159° N 6.60369° E, elev. 2110 m, on soil in alpine zone, 28 Aug. 2017, *leg.* M. Vega, LY:NV 2017.08.08. Alpes-de-Haute-Provence, Castellane, la Ferme, 43.8376° N 6.54244° E, elev. 760 m, along a rivulet, under *Alnus* sp., *Salix* sp. and *Pinus sylvestris*, 9 Sept. 2017, *leg.* M. Vega, herb. LY:NV 2017.09.14. Isère, Mizoën, le Moulin de Mizoën, along the river "le Ferrand", 45.058593° N 6.148314° E, elev. 1175 m, on sandy riverbank, 29 Aug. 2019, *leg.* M. Vega, not kept. Savoie, Les Allues, refuge du Saut, along the river "Doron des Allues", 45.334684° N 6.63313° E, elev. 2135 m, on sandy riverbank, under *Salix* sp., 25 Aug. 2020, *leg.* N. Van Vooren, herb. LY:NV 2020.08.24.

GEORGIA. Caucasus, Mtskheta-Mtianeti, Dusheti, upstream of Pasanauri, riverbank of the Black Aragvi, 42.340331° N 44.693586° E, elev. 1180 m, riverbank, on humus under *Salix* sp., *leg.* D. Benkert, 19 June 1985, herb. B 70 0003666.

GERMANY. Brandenburg, Potsdam, Werder, Glindower Tongruben, 52.348009° N 12.916367° E, elev. ca. 50 m, in an omitted pit, on moist ground under willow bushes, very gregarious, 23 Sept. 1971, *leg.* D. Benkert, herb. B 700003664; same location, at a place near a spring, under *Salix myrsinifolia*, 17 July 1983, *leg.* D. Benkert, herb. B 70 0003665; same location, in bushes of *Salix purpurea* on wet clay soil, 2 Nov. 1986, *leg.* D. Benkert, herb. B 70 0003667. Brandenburg, Kreis Oberhavel, bei Schildow (bei Berlin), Nature reserve "Kalktuffgelände am Tegeler Fließ", 52.6341243° N 13.3859524° E, elev.

45 m, in a marshy forest on peat, 3 Sept. 1989, *leg.* W.D. Diekow & D. Benkert, herb. B 70 0003668. Nordrhein-Westfalen, Witten, Recreation area Hohenstein, 51.432993° N 7.352373° E, elev. 119 m, on soil between bryophytes, 30 Sept. 2016, *leg.* T. Huelsewig, herb. MSTR P-04365.

SWITZERLAND. Kanton Schwyz, Unteriberg, Ochsenboden, 47.05278° N 8.85694° E, elev. 1010 m, muddy floodplain of a brook, under *Petasites* sp. and *Salix* sp., 18 Sept. 1999, *leg.* A. Gminder, herb. SMNS-STU-F-0002184 / 1000949. Kanton Graubünden, Matrils, Isla, 46.963483° N 9.545271° E, elev. 541 m, on sandy soil between small bryophytes, 28 Nov. 2017, *leg.* U. Roffler, herb. ZT Myc 64711.

As a conclusion, we propose the following amended description for the genus *Parascutellinia*:

Ascomata epigeous, apothecial, sessile, discoid or cupuliform, hymenium pinkish red to vinaceous or purplish red, with an external surface covered by superficial brown hairs. **Margin** covered by ± fasciculate brown hairs. **Excipulum** two-layered: medullary layer of *textura intricata* and ectal layer of *textura subglobulosa/angularis*. **Hairs** superficial, septate, with a simple base. **Asci** operculate, arising from free croziers, inamyloid, 8-spored. **Paraphyses** slender, widened at the top, containing reddish pigments (carotenoids). **Ascospores** uniseriate, ellipsoid with tapered ends to subfusoid, hyaline, guttulate, thick-walled, smooth or verrucose. **Trophic status:** species forming ectomycorrhizas. **Asexual morph** unknown.

3. New taxa

Spaniodiscus Van Vooren, U. Lindemann & Roffler, *gen. nov.* – MB 843118

Diagnosis: Differs from *Scutellinia* and other genera having an orange hymenium by the combination of the following characters: superficial and simple-based hairs, always smooth thick-walled ascospores, filled with oil droplets, and its genetic profile.

Type species: *Parascutellinia fuckelii* Donadini & Svrček

Etymology: From the ancient Greek σπάνιος (*spánios*) meaning "rare" because of the rarity of its type, and δίσκος (*dískos*) meaning "disc" because of the shape of ascomata.

Description: **Ascomata** epigeous, apothecial, sessile, orange-coloured, with an external surface and margin covered by short brown hairs. **Excipulum** two-layered: medullary layer of *textura intricata*, ectal layer of *textura globulosa/angularis*. **Hairs** simple, superficial, septate, with a simple base. **Asci** operculate, arising from croziers, inamyloid, 8-spored. **Paraphyses** slender, enlarged at the top, containing carotenoid pigments. **Ascospores** uniseriate, ellipsoid, hyaline, pluriguttulate in living state, smooth. **Trophic status** probably saprobic. **Asexual morph** unknown.

Comments: The sequences of the holotype of *Parascutellinia fuckelii* obtained by VAN VOOREN & MAURUC (2020) allowed a comparison with the Swiss material and proved to be the same species. Its position in an isolated clade in the *Humaria* lineage (VAN VOOREN *et al.*, 2021: Fig. 1; this paper, Fig. 1), associated with its morphological characters, offers the opportunity to place it in a new genus, named *Spaniodiscus*. In the multigene phylogeny of VAN VOOREN *et al.* (2021), it is interesting to note that *Spaniodiscus* clusters with two other clades containing genera whose species possess carotenoid pigments, i.e. *Aurantiolachnea* and *Fallacidiscus* *gen. nov.* (see below).

Spaniodiscus fuckelii (Donadini & Svrček) Van Vooren, Roffler & U. Lindemann, *comb. nov.* – MB 843119 – Pl. 6–7

Basionym: *Parascutellinia fuckelii* Donadini & Svrček, *Česká Mykol.*, 39(2): 137 (1985).

Original diagnosis: *Apothecia* 3–10 mm diam., *disciformia*, *sessilia*, *disco aurantio-luteo vel vivide rubro*, *marginem extusque pilis fasciculatis, brevibus, brunneolo-coloratis dense vestita*. *Excipulum externum cellulis plus minusve globosis vel late ellipsoideis usque ad 30 µm diam., sed etiam 40 × 25 µm vel 60 µm diam., subhyalinis, sub-*

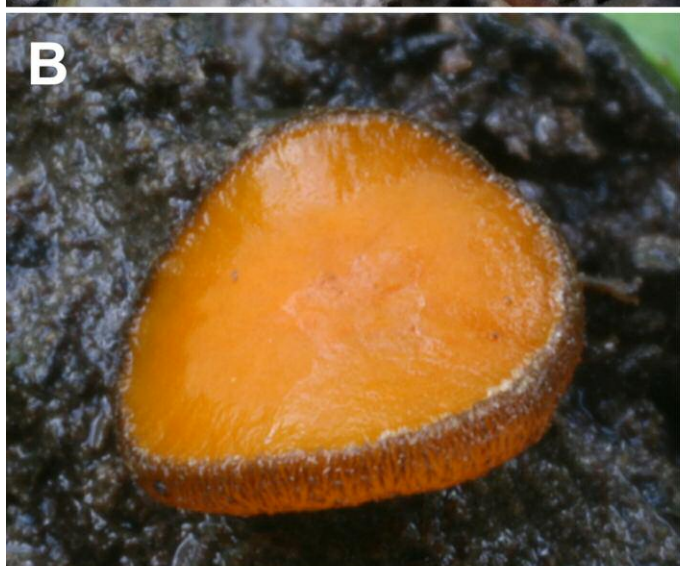


Plate 6 – *Spaniodiscus fuckelii*

A. Coll. UR-1000-1267. B–C. Different views of coll. UR-1000-1016. D. Location of coll. UR-1000-1016. All photos by U. Roffler.

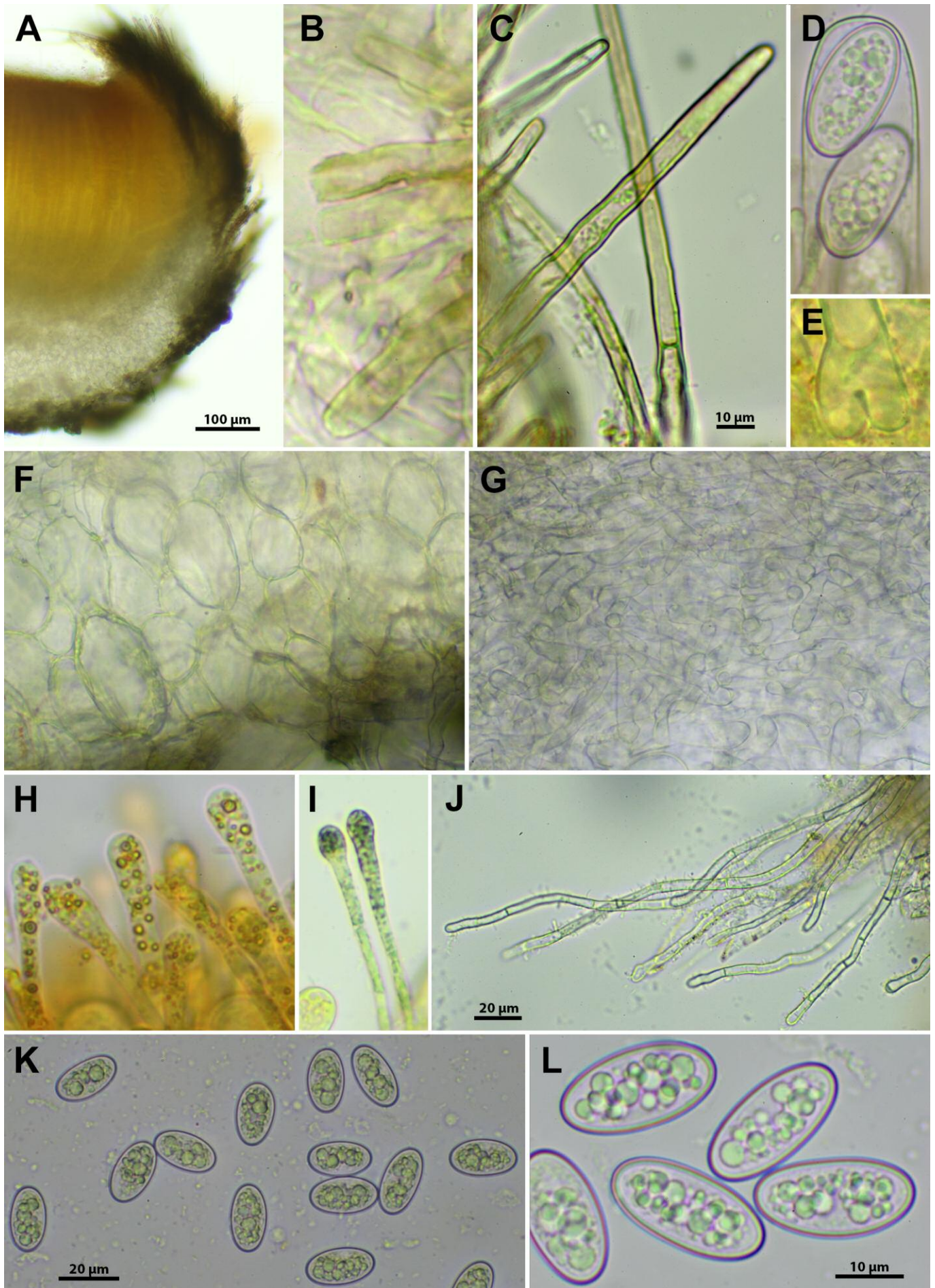


Plate 7 – *Spaniodiscus fuckelii*. Microscopical characters (from coll. UR-1000-1267)

A. Section of an apothecium. B. Base of excipular hairs. C. Hairs. D. Top of an ascus. E. Base of an ascus. F. Ectal excipulum. G. Medullary excipulum. H. Top of paraphyses. I. Paraphyses in Lugol's solution. J. Anchoring hyphae. K-L. Ascospores. All photos by U. Roffler.

crasse tunicatis instructum. Pili 150–250 (–300) × 4–9 µm, subcylindracei, recti, apice obtuse attenuati, plerumque non dilatati nec acuti, parte basali simplices, non radicati, e cellulis superficialibus oriundi, septati, pallide brunnei, parte superiore nonnumquam pallidiori usque subhyalini, tunica subincrassata (1.5–2 µm). Insuper pili toti colorati breviores in parte externa excipuli observati erant. Asci 240–290 × 13–14 µm, cylindracei, octospori, sporis distichis. Paraphyses numerosae, filiformes, 1.5–2 µm crassae, apice rectae atque parum dilatatae (3–5 µm), ecoloratae, in strato citrino-luteae. Ascosporae 19–22 × 10.5–12 µm, oblongo-ellipsoideae, guttulis 1–3 maioribus (plerumque binis) instructae, ecoloratae, laeves. Hab. Ad ligna putridissima Laricis deciduae ad terram udam calcaream deiecta vel in terra immersa, rare etiam ad terram nudam, semper in Laricetis montanis in Alpibus Gallicis, late distributa species. — Gallia: Alpes de Haute Provence, Allos Valcibièrre, 2000 m s. m., IX. 1984, leg. J.-C. Donadini (holotypus 135-84 in herb. MARS-JCD Donadini).

Type: Coll. MPU:JCD 135-84 (holotype).

Apothecia 6–10 mm diam., sessile, disciform to barely cupuliform, spreading with age, hymenium yellow orange to deep orange; external surface subconcolorous or paler, but densely covered with tufts of brown hairs, partly appressed. **Margin** hairy, slightly raised.

Subhymenium and medullary excipulum not distinguished, of *textura intricata*, with narrow hyaline hyphae, 5–10 µm wide. **Ectal excipulum** of *textura globulosa/angularis* with hyaline cells, 25–40 (50) µm wide. **Excipular hairs** superficial, straight, 150–360 × 4–9 µm, yellow-brown to amber brown, septate, 1.5–2 µm thick-walled, ± obtuse at the top, with a simple base. **Marginal hairs** similar but slightly longer, interspersed with small ones, shorter and distinctly obtuse. **Anchor hyphae** present, hyaline, obtuse, septate, up to 6 µm wide and sometimes longer than 200 µm. **Asci** cylindrical, (240) 300–360 × (14) 17.5–19 µm, arising from croziers, operculate, 8-spored. **Paraphyses** slender, septate, 2–3 µm diam., slightly enlarged at the top, 4–5 (6) µm diam. or clavate, up to 8 (9) µm, hyaline, containing small oil bodies and a yellow-orange granular pigment (carotenoid) becoming greenish in Lugol's solution. **Ascospores** uniseriate, elongate ellipsoid to subcylindrical, sometimes inequilateral, (17.5) 18–23 (24) × 11–13.5 µm [$X = 21.5 \times 11.4$ µm, $Q = 1.7–2.0$, $Q_m = 1.9$], † 20–24.5 (25.2) × (9) 10–11.5 µm [$\dagger X = 22.6 \times 10.7$ µm, $Q = 1.9–2.3$, $Q_m = 2.1$], hyaline, smooth, rather thick-walled, containing (1) 2–3 (4) medium to large oil drops, accompanied by smaller droplets that merge in rehydrated material.

Studied collections: FRANCE. Alpes-de-Haute-Provence, Allos, bois de Valcibièrre, above the forest hut, ~44.239811° N 6.588836° E, elev. ~2000 m, on decaying wood of *Larix decidua* and calcareous soil, Sept. 1984, leg. J.-C. Donadini, herb. MPU:JCD 135-84 (holotype); GenBank ITS MT273640, LSU MT273654, TEF1 MT274710. Savoie, Bessans, near “torrent d'Avérole”, 45.306089° N 7.039833° E, elev. 1825 m, on calcareous sandy soil, on dewatered part, 2 Sept. 2021, leg. N. Van Vooren, herb. LY:NV 2021.09.00.

SWITZERLAND. Graubünden, Seewis im Prättigau, Potz, Ronenbühel, 47.03949° N 9.404611° E, elev. 1600 m, 20 Aug. 2018, leg. U. Roffler, herb. ETH:ZT Myc 61124 [ex pers. herb. UR-1000-1016]; GenBank ITS MW546597, LSU MW546563, TEF1 MW544638, RPB2 MW544623. Graubünden, Furna, Tritt, 46.953027° N 9.654666° E, elev. 1570 m, 17 Sept. 2020, leg. U. Roffler, pers. herb. UR-1000-1267.

Distribution: Very rarely reported, only known from Austria (DÁMON, 2013), France (DONADINI & SVRČEK, 1985; DONADINI, 1986a; this paper) and Switzerland (this paper).

Comments: The species has been originally described in *Parascutellinia* by DONADINI & SVRČEK (1985) who amended this genus to integrate it. *P. carneosanguinea* differs from *S. fuckelii* by several characters: colour of apothecia (pink-red to vinaceous red vs. orange), content of ascospores (biguttulate vs. pluriguttulate), type of spore ornamentation (finely warted vs. smooth).

Based on the known collections, *Spaniodiscus fuckelii* grows in subalpine forests (between 1500 and 2000 m), under conifers (*Larix decidua* or *Picea abies*), on calcareous soil with wood debris or on rotten wood. The recent French collection (2 Sept. 2021) extends the habitat outside forest, in dewatered zone of a stream, although some trees (*Larix decidua*, *Salix* sp.) were not distant from the collection site.

As we did not find any match with some EcM sequences registered in GenBank (using the ITS gene), we believe that the species is saprobic.

Fallacidiscus U. Lindemann, Roffler & Van Vooren, *gen. nov.* – MB 836842

Diagnosis: Differs from *Spaniodiscus fuckelii* and *Ramsbottomia* spp. by discoid apothecia with a small marginal edge, a hairless margin, and finely warted ascospores containing polar oil droplets, as well as its genetic profile.

Type species: *Fallacidiscus helveticus* U. Lindemann, Roffler & Van Vooren

Etymology: From Latin *fallax* meaning “deceiving” because of the possible confusion with morphologically close genera, and *discus* meaning “disc” because of the shape of ascomata.

Description: **Ascomata** epigeous, apothecial, sessile, yellow-orange-coloured, with an external surface densely covered by short brown hairs and a hairless margin. **Excipulum** two-layered: medullary layer of *textura intricata*, ectal layer of *textura subglobulosa/angularis*. **Hairs** short, simple, superficial, septate, with a simple base, obtuse or slightly sharp. **Asci** operculate, 8-spored, narrowing toward base, arising from croziers, inamyloid. **Paraphyses** slender, ± enlarged at the top, containing carotenoid pigments. **Ascospores** uniseriate, ellipsoid, hyaline, thick-walled, containing small bipolar oil droplets, finely warted. **Trophic status** unknown. **Asexual morph** unknown.

Fallacidiscus helveticus U. Lindemann, Roffler & Van Vooren, *sp. nov.* – MB 836843 – Pl. 8–9

Diagnosis: Differs from *Spaniodiscus fuckelii* by ornamented ascospores containing small polar oil droplets, a hairless margin, and shorter excipular hairs, as well as its genetic profile.

Type: Coll. ETH:ZT Myc 61122 (holotype).

Etymology: From the Latin *helveticus*, based on the country Switzerland (*Helvetia* in Latin) where the species has been collected for the first time.

Apothecia 1–5 mm diam., sessile, first globular, then pulvinate, later discoid with a small, inconspicuous edge, hymenium yellow-orange; hairless margin but external surface densely covered with small brown hairs.

Subhymenium of *textura intricata*, made of light orange-yellowish thin-walled hyphae. **Medullary excipulum** of *textura intricata*, made of hyaline thin-walled, slender to broad, or somewhat inflated, septate hyphae. **Ectal excipulum** of *textura globulosa/angularis*, made of thin-walled hyaline cells, globose cells up to 25 µm diam., angular cells up to 40 µm in length. **Margin** of *textura prismatica*, made of hyaline cells with a brownish wall. **Excipular hairs** superficial, short, up to 140 µm in length, up to 9 µm wide at the base, brown, thick-walled, septate, straight, obtuse or slightly sharp, not rooting. **Asci** cylindrical, 330–370 × 13–16 µm, narrowing towards the base, arising from croziers, operculate, 8-spored, inamyloid. **Paraphyses** filiform, hyaline, septate, 2–3 µm diam., at the top ± widened up to 5 µm, branching in the lower part, brightly yellow-orange in the upper part due to carotenoid granular pigments (strongly staining in dark green with Lugol's solution), and also containing hyaline refractive vacuoles; the paraphyses appear to be glued together because of an amorphous orange-yellow substance on the apices. **Ascospores** uniseriate, (14.5) 15–19 (19.5) × 8–11 µm, $X = 16.5 \times 9.5$ µm, $Q = 1.5–2.0$, $Q_m = 1.7$ ($n = 90$), ellipsoid, rarely

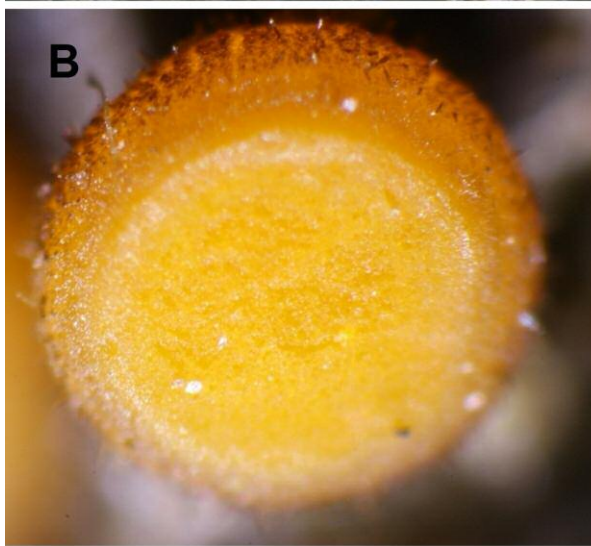


Plate 8 – *Fallacidiscus helveticus*

Coll. ZT Myc 61122 (holotype): A. Apothecia *in situ*; B. Close-up view of an apothecium; C. Close-up view of the excipular hairs. Coll. ZT Myc 61123 (paratype): D. Apothecia *in situ*; E. Close-up view of an apothecium. All photos by U. Roffler.

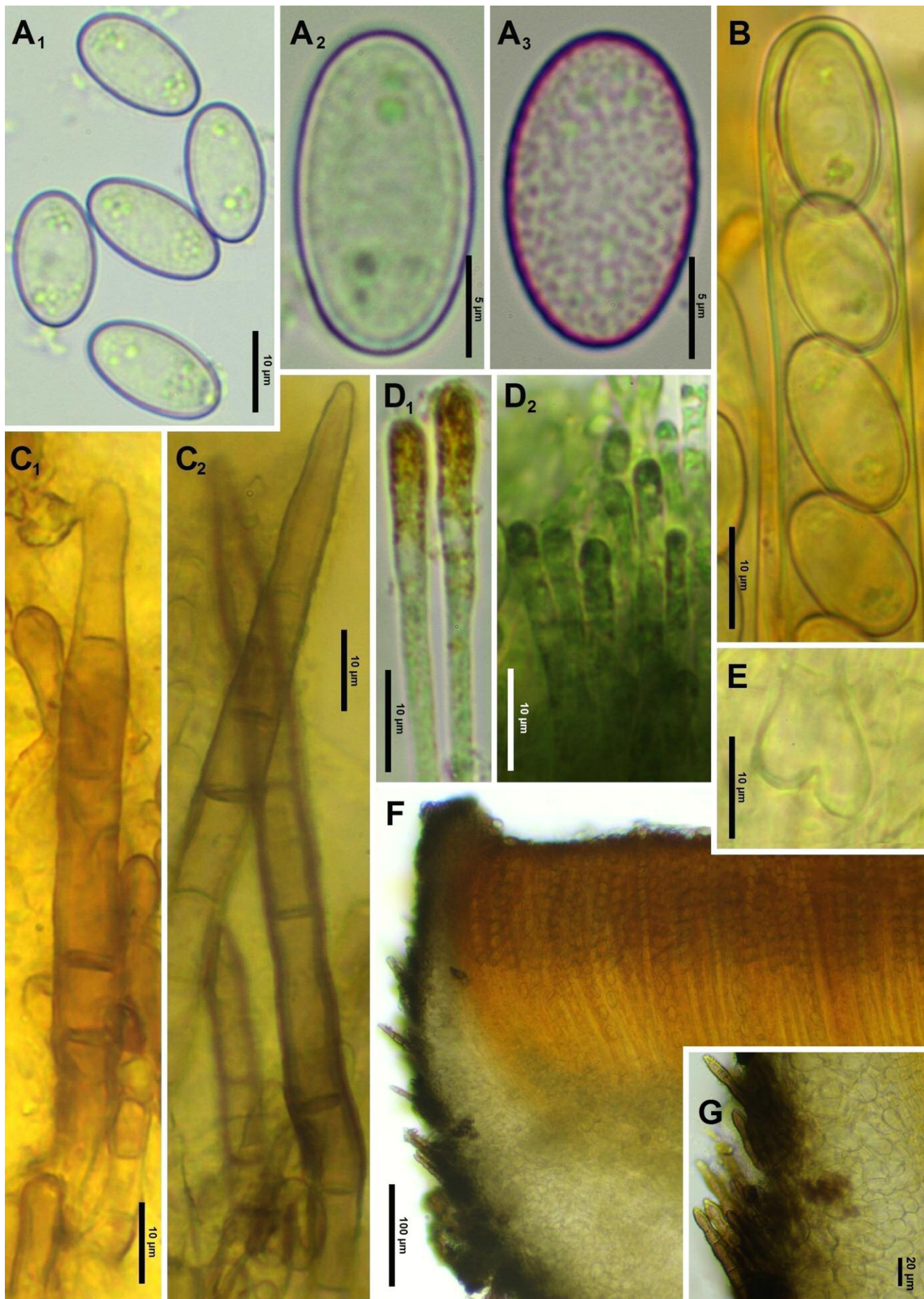


Plate 9 – *Fallacidiscus helveticus*. Microscopical characters

A₁–A₂: Ascospores in H₂O. A₃: Ascospore in Phloxin. B: Ascus in H₂O. C₁–C₂: Excipular hairs. D₁: Paraphyses in H₂O. D₂: Paraphyses in Lugol's solution. E: Ascus base. F: Vertical section of an apothecium. G: Vertical section of the ectal excipulum showing hairs. (A₂, B, C₂, D₁, D₂, and E from coll. ZT Myc 61122; A₁, A₃, C₁, F, and G from coll. ZT Myc 61123). All photos by U. Roffler.

slightly trapezoid, hyaline, thick-walled (0.4–0.6 µm), containing many oil droplets at the poles which merge into two large oil drops when dead, in CB shrinking and dying quickly, smooth when young, finely warted when mature, warts sometimes coalescent or forming elongated ridges but never a net.

Studied collections: SWITZERLAND. Graubünden, Prättigau, Fanas, Valschinar, 46.989389° N 9.650833° E, elev. 885 m, on soil between mosses, 13 Nov. 2018, *leg.* U. Roffler, herb. ETH:ZT Myc 61122 (holotype), MSTR:P 25016 (isotype) [ex pers. herb. UR-1000-1033]; GenBank ITS MW546608, LSU MW546576, TEF1 MW544643, RPB2 MW544627. Same location, 1 Sept. 2020, *leg.* U. Roffler, pers. herb. UR-1000-1265. Same location, 5 Oct. 2021, *leg.* U. Roffler, pers. herb. UR-1000-1332-00. Graubünden, Prättigau, Klosters, Monbiel, 46.857917° N 9.923917° E, elev. 1278 m, on soil in a rather shady hollow where small mosses started to grow on the sandy, not very gravelly soil near a river which had been reshaped as a floodplain after some heavy flooding, 7 Oct. 2017, *leg.* U. Roffler, herb. ETH:ZT Myc 61123 [ex pers. herb. UR-950-984]; GenBank ITS MW546609, LSU MW546577.

Distribution: Only known from Switzerland.

Comments: At first glance *Fallacidiscus helveticus* macroscopically looks like a *Ramsbottomia* or *Melastiza* species but it can also easily be confused with *Spaniodiscus fuckelii* (see above), because both the macroscopical habit and the morphological features are quite similar. Nevertheless, clear differences can be detected on detailed examination (see diagnosis). Furthermore, the ascospores of *F. helveticus* show a striking similarity with those of *Paratracharina poiraultii* (Boud.) Van Vooren *et al.* (VAN VOOREN *et al.*, 2015) but other morphological features are clearly different: the type of ascospore ornamentation, the marginal hairs and hyaline paraphyses of *P. poiraultii*. If the polar oil droplets of dead ascospores of *F. helveticus* have merged into two large drops, confusion with species of *Anthracobia* would be possible. However, the conspicuous ascospore ornamentation of *F. helveticus* as well as the different type of hairs allow to easily separate them. With only two localities so far no valid statements concerning the ecology and lifestyle of *F. helveticus* can be undertaken.

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