

# *Micropeziza filicina* sp. nov. (Helotiales), a fern inhabiting species of intermediate generic position, with an emendation of the genus *Micropeziza* Fuckel

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**Summary:** *Micropeziza filicina* is described as a new species and the generic boundaries between *Calloriella*, *Calycellina*, *Crustomollisia*, and *Micropeziza* are discussed. Due to morphological similarities between the genera, and the intermediate position of this species, the amalgamation of *Calloriella* and *Crustomollisia* with *Micropeziza* is proposed. For *Calloriella umbrinella*, *Calycellina castanea* and *Orbilina mollisoides* new combinations in *Micropeziza* are proposed, and *Allophylaria soederholmii* is included within the synonymy of *C. umbrinella*.

**Keywords:** Ascomycota, *Crustomollisia*, *Calycellina*, *Calloriella*, *Micropeziza*, taxonomy.

## Introduction

In the autumn of 2012 an unknown Helotialean ascomycete species on a fern was collected by the second author during the 36<sup>th</sup> mycological survey of the German North Rhine-Westphalia Mycologists, which was attended by the first author as well. An internet-based survey revealed a further collection of the same species made a year earlier in Great Britain by the fourth author.

## Methods

The German collection was examined from living material in tap water using a Zeiss Standard 14 microscope with an achromat 100/1,25 Oil immersion objective and a Leica DMLB microscope with Planfluotar 40x/1.00 Oil immersion and Planapo 100x/1.40 Oil immersion objectives. The iodine reaction was tested with Lugol's solution (IKI = ~1% I<sub>2</sub>, 2% KI, in H<sub>2</sub>O), first without, then with potassium hydroxide (KOH) pre-treatment. Aqueous Cresyl Blue (CRB) was applied to test staining of vacuoles and gel sheaths. Photographic images (macro- and microphotos) were obtained using a Nikon Coolpix E4500, a Fuji FinePix S100FS and an ImagingSource DFK 72AUC02 digital camera. The British collection was also studied from living material in tap water using a Brunel IMXZ stereoscopic microscope with a Nikon D90 camera, and a Brunel SP200 trinocular microscope with a GXCAM9 digital camera. Measurements were obtained from living cells (indicated by the sign “\*”), for the asci in addition in the dead state (indicated by the sign “+”). The holotype is deposited in the herbarium of the University of Leipzig (LZ P-6267) and the isotype in the private herbarium of Stip Helleman (S.B.R.H.-726); the material of the British collection is held in the private herbarium of Chris Yeates (C.S.V.Y./F/2284). H.B. = private herbarium and/or illustrations of H.-O. Baral (BARAL & MARSON, 2005; see also <http://www.invivoveritas.de/>). Abbreviations of public herbaria are given according to the Index Herbariorum.

## Description of *Micropeziza filicina*

*Micropeziza filicina* Helleman, U. Lindemann & Yeates, sp. nov.  
Mycobank 805098

Holotype: Germany, Nordrhein-Westfalen, Brilon, Warstein, Lörmecketal, 51°25'35.02" N 8°24'28.24" E, alt. 402 m, 29.IX.2012, leg. U. Lindemann, on dead rachis of *Athyrium filix-femina* lying on

the ground; Herbarium of the University of Leipzig (LZ) P-6267; isotype: S.B.R.H.-726.

Paratype: Great Britain: West Yorkshire, near Marsden, 53°36'49.05" N 1°55'16.06" W, alt. 250 m, 15.X.2011, leg. C.S.V. Yeates, on a damp dead attached rachis of *Dryopteris dilatata* (C.S.V.Y./F/2284).

**Etymology:** *filicinus* = belonging to ferns.

**Apothecia** 0.15–0.3 mm, discoid, sessile, solitary to gregarious on the basal part of previous year's fern rachis. Developing from beneath the epidermis without the formation of a distinct scutum, early erumpent. Hymenium yellowish-brown when fresh, with a clear-cut dark brown margin, dark brown also on the outside due to a fragmented brown crust of exudate which is covering the exterior. **Asci** \*(40–)50–60 × 8.5–10 μm, †42–51 × (7–)8(–10) μm, 8-spored, with a slightly narrowed base arising from croziers, apex conical, apical ring staining bright blue in IKI (bb), dark blue when KOH-pretreated, of the *Calycina*-type. Some mature asci at full turgescence contain a round refractive globule 4–5 μm diam. beneath the *pars sporifera* (similar to those found in *Psilachnum* species). **Ascospores** ellipsoid-fusoid with obtuse ends, hyaline, smooth, non-septate, \*(9.8–)10.5–12.5 × (2.7–)3–3.5 μm, oil index (OCI) 4, multiguttulate in the living state, one or two large oil globules when dead (by confluence), occasionally a one-septate discharged spore was seen. **Paraphyses** multiseptate, occasionally branched near the upper septum but also below, apically gradually to abruptly swollen into a clavate to almost globose head, terminal cell \*9–17 × 3.5–5.5 μm, lower cells \*8–12 × 1.8–2.5 μm wide, swollen apices contain in the living state a large, globose to elongate, hyaline refractive vacuolar body (VB) and occasionally a separate elongate one below, extending downwards together at a length of 6–23 μm from the tip, staining turquoise-blue in CRB (living state), copper-orange to dark brown in IKI. In dead paraphyses, these vacuolar bodies are lost, although a coloured remnant is visible in KOH. The swollen tips of the paraphyses are embedded in a hyaline gelatinous substance and form a pseudoepithecium over the premature asci together with brown granules on top; fully turgescing asci break through this layer by turgor increase and slightly exceed the paraphyses prior to spore discharge. The shape of dead paraphyses is similar to the living state, while their width is reduced to †3–4 μm; in water they are internally hyaline while in KOH they show a distinct brownish content in their swollen apical part. **Ectal excipulum** thin-walled, hyaline, of *textura globulosa-angularis* (-*prismatica*), single-layered, in median section the cells appear angular and elongated vertically to the surface at the flanks, measur-

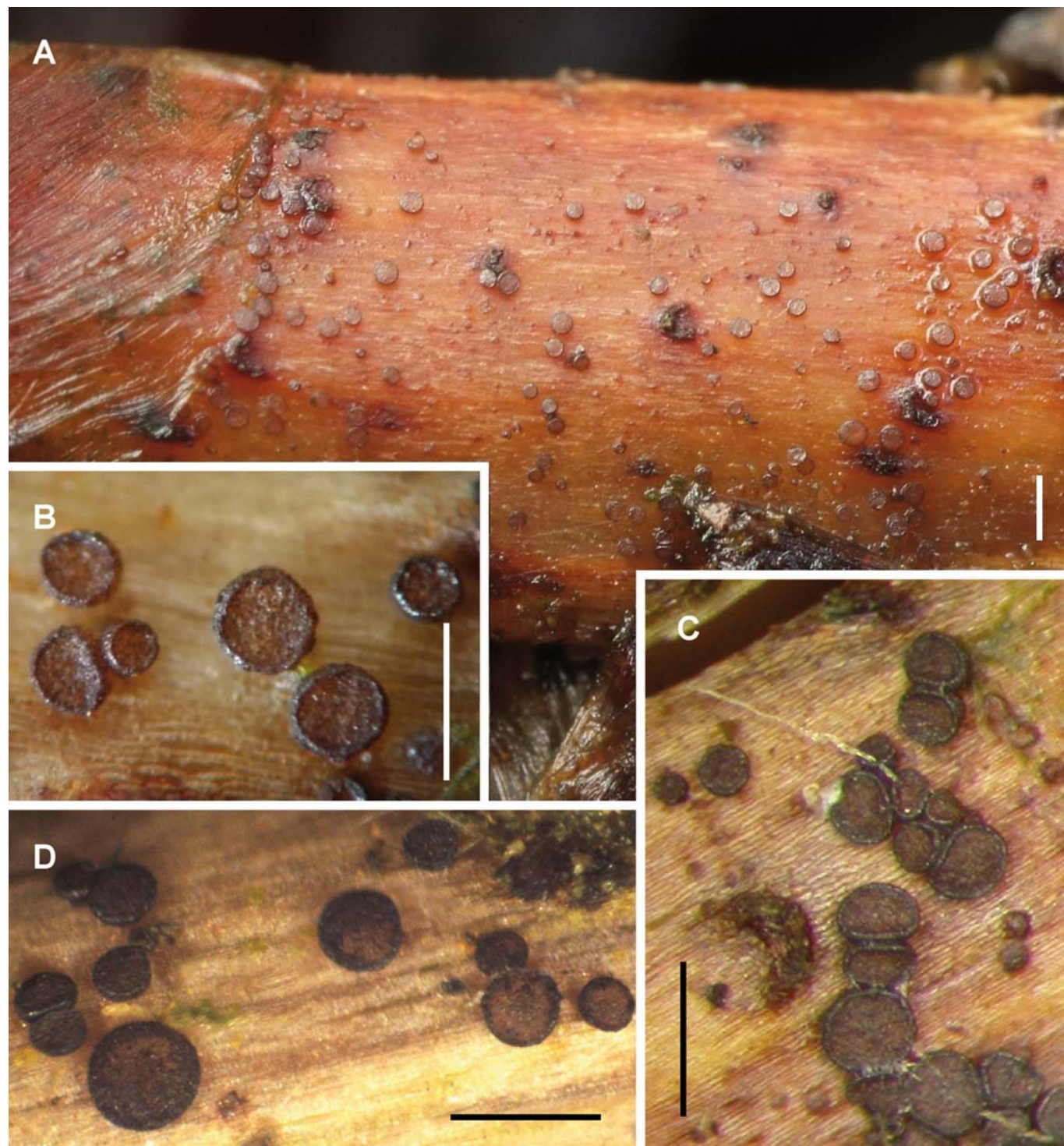
ing  $*11-16 \times 7-9.5 \mu\text{m}$  at the lower flanks and  $*6-8 \times 5-6 \mu\text{m}$  at the middle flanks, while in surface view they appear round in outline. Towards the margin the cells are more thick-walled, elongated and roundish at the top, end cells  $*4-6 \times 2-3 \mu\text{m}$ , containing VBs. **Medullary excipulum** of an ill-defined hyaline layer of small, angular to prismatic or hyphoid cells,  $10-15 \mu\text{m}$  thick, non-gelatinized. **Subhymenium** not differentiated.

## Discussion

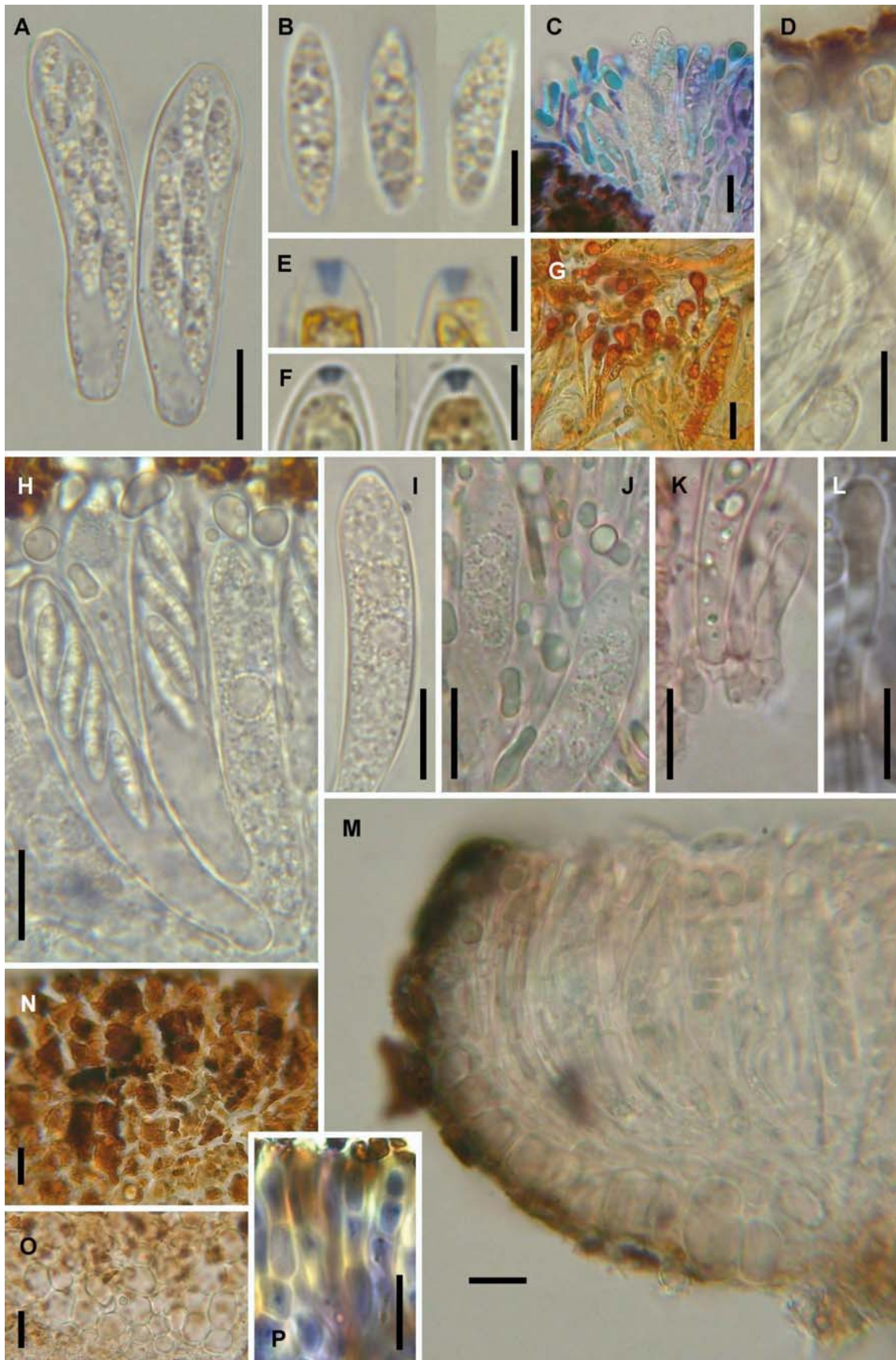
The above description is mainly based on the features of the holotype from Germany, but combines also those of the paratype from

Great Britain. The two collections concur quite well, except that the British collection shows slightly shorter ascospores ( $*9.8-10.5 \times 3 \mu\text{m}$ ) than the holotype ( $*10.5-12.5 \times 3-3.5 \mu\text{m}$ ). Nevertheless, we are confident that this deviation is due to the range of variation of a single species.

The present species resembles morphologically in many respects both *Calloriella* Höhnel (HÖHNEL, 1918a: 341f.) and *Crustomollisia* Svrček (SVRČEK, 1987: 219f.), but it also has strong similarities with *Micropeziza* Fuckel as redefined by NANNFELDT (1976). These three genera differ in their host specificity: *Calloriella* [type species *C. umbrinella* (Desm.) Höhn.] comprises two species that grow on herbaceous stems or wood, *Crustomollisia* [type species *C. roburnea*



**Plate 1 – *Micropeziza filicina*.** A–B: apothecia in fresh state: Germany, Warstein, Lörmecketal, on dead *Athyrium filix-femina* rachis (from holotype, LZ P-6267); C: idem (from isotype, S.B.R.H.-726); D: idem, Great Britain, West Yorkshire, near Marsden, on dead rachis of *Dryopteris dilatata* (from paratype, C.S.V.Y./F/2284). Scale = 0.5 mm (except A, scale = 1 mm).



**Plate 2 – *Micropeziza filicina*.** A: detached, mature asci (living state); B: ascospores (living state); C: paraphyses in CRB (living state, VBs stained turquoise); D: paraphyses (living state), apical cell with a VB, covered by pseudoepithecium; E: ascus apical thickening with amyloid ring (in IKI, dead state); F: idem, in KOH 3% + IKI (dead state); G: paraphyses in IKI (dead state, VBs stained copper-orange); H: asci [two mature (left), one immature (right)] together with paraphyses *in situ* (living state); I: immature ascus with central fusion nucleus, paraphyses with VBs in apical cells; J: immature asci with two, four and presumably eight nuclei surrounded by a sphere of small oil drops; K: croziers at the ascus base; L: paraphysis (dead state, in KOH) with distinctly brown content; M: median section of an apothecium; N: exudate crust on the ectal excipulum (middle flanks, surface view); O: exudate crust and roundish cells at the base of the apothecium (surface view); P: cells of the margin in CRB (front view, focus on cell layer). Scale = 10  $\mu\text{m}$  (except for B, E, F: scale = 5  $\mu\text{m}$ ).

(Velen.) Svrček] is based on a species on leaves of *Fagaceae*, whereas *Micropeziza* [type species *M. poae* Fuckel] is confined to herbaceous substrate, mainly of monocots. However, a thorough comparison of the three genera and their type species led us to the conclusion that they should be merged into one genus, for which the oldest name should be adopted: *Micropeziza*. The arguments for this amalgamation will be discussed below.

### Gelatinized ectal excipulum

The main characteristics of the genus *Micropeziza* as redefined by NANNFELDT (1976) concern a gelatinized ectal excipulum “formed of conglutinated rows of elongated cells with hyaline, thick and strongly refractive walls” (“*textura oblita*”), especially at the margin (“perihymenial”). This marginal tissue more or less protrudes beyond the hymenial surface by forming a thick raised rim. At the flanks the excipulum is built up of isodiametric, distinctly gelatinized cells (*textura globulosa-angularis*, see BARAL & MARSON, 2005, H.B. 3244, 5014 [type of *M. karstenii* Nannf.]).

A very similar structure of the ectal excipulum was reported by SVRČEK (1987) for *Crustomollisia roburnea*: rather thin-walled angular cells at the flanks, while at the margin advancing into a *textura oblita*. Also *Calloriella umbrinella* does not substantially differ herein: HÖHNEL (1918a: 343) described the species with firm-walled (“derbwandig”) parenchymatic (isodiametric) cells at the flanks, while at the margin more prosenchymatic (elongate). A marginal excipulum of *textura oblita* that forms a protruding rim was noted in *C. umbrinella* by the third author in a fresh specimen (BARAL & MARSON, 2005, H.B. 3258) and in the type (H.B. 4674).

It must be emphasized here that the excipular cells are only slightly thick-walled in living tissue, whereas in the dead state the cell lumen shrinks and the external layer of the wall swells by water imbibition and exhibits the conglutinating intercellular gel. Thus, a firm-walled *textura porrecta* in the living state may appear as a *textura oblita* in the dead state.

### Paraphyses

In addition to the broadly similar structure of the excipulum, the shape and content of the paraphyses are also very similar in *Micropeziza*, *Calloriella* and *Crustomollisia*, being apically more or less swollen and containing large refractive vacuolar bodies (VBs). This feature can usually be seen in living specimens only. Paraphyses in rehydrated material have mostly lost these refractive VBs and their heads are somewhat shrunken compared to the living state. Whereas the paraphyses in *Micropeziza* are apically mostly more or less clavate in shape, those in *Calloriella* and *Crustomollisia* are abruptly swollen into a clavate to almost globose head (figured for the type species of both genera in BARAL & MARSON, 2005, under the name *Calloriella*: H.B. 4300a; 4314; 7477), covered by varying amounts of brown exudate. The paraphyses of the present species are nearly identical to those of *Calloriella* and *Crustomollisia*.

### Immature asci

In immature asci of the present species small lipid droplets (LBs) encircle the fusion nucleus and the nuclei of the 2-, 4-, and 8-nuclei stages (the first fusion nucleus 5.75–8 µm in diameter, nuclei 3–3.25 µm at 8-nuclei-stage, see plate 2H–J). This striking feature represents the meiotic division of the fusion nucleus as a precondition of the spore-forming process, and is visible under the light microscope only in living asci. During ascus maturation this spherical ring of LBs around the nuclei elongates when the young ascospores are being formed (plate 2–J). Until now this feature is not reported in the literature from *Calloriella*, *Crustomollisia*, and *Micropeziza*, because of the rareness of studies of living specimens and because immature stages are usually not included in descriptions. However, the feature was seen in *C. umbrinella* (H.B. 3258) and *M. cornea* (Berk. & Broome) Nannf. (?= *M. karstenii* Nannf., H.B. 3244). Although the meiotic nuclear division is a feature common to all ascomycetes, the feature of a spherical ring of LBs might have some taxonomical

value since it was so far not observed in other groups of the *Helotiales*. The abundant presence of LBs in young asci is a feature that many of those ascomycetes share which produce spores with a high lipid content. The dense arrangement of these LBs around nuclei is not unusual in such species and was figured for the genus *Pezizula* Tul. & C. Tul. by BARAL (1992: figs 42–43). However, the ring-like arrangement of LBs around the nuclei and their sparser occurrence in the ascoplasma seems to be unique to the group of *Micropeziza*-like species and supports also the proposed amalgamation of *Micropeziza*, *Calloriella* and *Crustomollisia*.

### Exudate crust and scutum

The presence of a scutum that covers the very young apothecia (primordia) was stressed by NANNFELDT (1976) as a character of *Micropeziza*, but also of *Scutomollisia* Nannf. and *Nannfeldtia* Petrak. The very young apothecia of *Micropeziza* develop beneath a brown scutum formed by radiating hyphae. At maturity, this scutum is typically found at the side of each apothecium. Remnants of the brown scutum form irregular dark spots on the excipulum very similar to the genus *Calloriella*, sometimes as small, dark brown, irregular teeth near the margin, sometimes at the base where these spots form a brown basal ring (see BARAL & MARSON, 2005, H.B. 3244, 4741, 5014, 5565 [type of *Actinoscypha graminis* P. Karst.]). However, a scutum could not consistently be recognized in the adult apothecia of the studied material of *M. cornea* which, according to the observations of the third author, cannot specifically be separated with certainty from *M. karstenii* Nannf. (≡ *Actinoscypha graminis*). Only in *Micropeziza* spp. a scutum is observed so far, whereas it was not reported either in *Calloriella* or *Crustomollisia*, and was not observed in the present species.

In comparison to *Micropeziza* and *Calloriella*, the present species and *Crustomollisia roburnea* exhibit a more abundant brown crust on the outside of the ectal excipulum which bursts into scales during growth. In *Micropeziza* and *Calloriella* the reddish- to olivaceous-brown crust is thinner, the scales smaller and more scattered, but the feature is otherwise quite similar.

In regard to the amalgamation of the three genera, the scutum and the exudate crust must be classified as optional, not as mandatory features. In the genus *Calycellina* Höhn. a scutum sometimes occurs [*C. ulmariae* (Lasch) Korf (see BARAL, 1989: pl. 1 fig. B) or *C. fagina* (Ant. Schmidt & Arendh.) Baral], whereas most of the species of that genus appear to lack this feature.

Another characteristic of *Crustomollisia* different from *Calloriella* and *Micropeziza* is the presence of a basal ring made up of brown cells or exudate. According to SVRČEK (1987: 220) this is a conspicuous feature of *Crustomollisia*. The ring was also seen in the type of *Orbilium mollisioides* Höhn. (see BARAL & MARSON, 2005: H.B. 6293), which turned out to be a synonym of *C. roburnea* (see below). However, in a recent collection of that species no such basal ring was observed (see BARAL & MARSON, 2005: H.B. 4300a), hence the presence of this structure seems to be variable and might depend on the distribution of the brown exudate crust on the exterior of the apothecium.

### Pseudoepithecium

This term is used here in the sense of KIRK *et al.* (2008): “an amorphous or granular layer overlying paraphyses in an apothecium and in which their tips are embedded, but not forming a separate tissue”. This granular layer corresponds to the crust on the ectal excipulum of *C. roburnea* and the present species, with which it merges at the margin. Concerning the presence of an epithecium in *Crustomollisia* different authors have different opinions. In his re-description of *C. roburnea* Svrček (*loc. cit.*) mentions nothing about a (pseudo)epithecium, whereas HÖHNEL (1909: 1522) points out in his description of *Orbilium mollisioides* (= *C. roburnea*) that the heads of the paraphyses form an “Epithelialmembran”. This epithelial membrane is composed of the roundish paraphyses heads up to 4 µm diameter, which are agglutinated by a semi-gelatinous sub-

stance (“fast gallertige Masse”). The study of the third author confirms Höhnel’s observation concerning the gelatinous matrix in *Crustomollisia* (see BARAL & MARSON, 2005: H.B. 4300a, 6293).

### Taxonomical position of *Micropeziza filicina*

In regard to the previous discussion the present species holds an intermediate position between *Calloriella* and *Crustomollisia*, though being closer to the latter. Like *Crustomollisia* it has an abundant brown crust on the outside of the ectal excipulum which bursts into scales during growth, whereas *Calloriella* lacks an abundant fragmented crust, though showing small olivaceous-brown granules near the margin. As in *Crustomollisia* and in *Micropeziza*, the present species has asci arising from croziers and with strongly euamyloid apical rings, whereas the asci of *Calloriella* arise from simple septa and have an inamyloid apex (see BARAL & MARSON, 2005).

With regard to the ascospores, the present species differs from all species mentioned above. The ascospores of *Calloriella* and *Micropeziza* are distinctly larger than the here presented species, although they concur in their rather high lipid content. In contrast, the spores of *Crustomollisia* are intermediate in size and show a comparatively low lipid content.

### Ecology

From an ecological point of view the present species differs markedly from *Calloriella*, *Crustomollisia* and *Micropeziza* as currently understood. It grows on ferns, i.e. it seems to prefer cryptogamic hosts whereas *Calloriella* and *Crustomollisia* grow on the remnants (stems, leaves) of angiosperms. However, two unpublished collections on leaf blades of *Potentilla palustris*, the first made by L. Bailly (Belgium) and presented in Ascofrance ([http://www.ascofrance.fr/search\\_forum/17319](http://www.ascofrance.fr/search_forum/17319)), the second made by L. Krieglsteiner (Germany), strikingly coincide with the present species and could be conspecific though having a less developed exudate crust on the flanks and ascospores which are slightly narrower and longer and have a somewhat lower lipid content.

The geology and habitat of the collection sites of *M. filicina* is the preferred habitat of the host plants: the German collection site is a woodland of mainly *Betula pendula* and *Alnus glutinosa* but also some *Picea abies* on a soil covering weakly acidic sandstone at the lower part of the western slope of a river bed; the British collection site is a mixed *Betula pendula* and *Quercus petraea* forest towards



**Plate 3** – Collection site of the paratype of *Micropeziza filicina* (Great Britain, West Yorkshire, near Marsden).

the woodland edge, with dense *Vaccinium myrtillus* nearby, on soil covering strongly acidic sandstone of the Millstone Grit formation.

### Generic synonymization

We conclude that the similar characteristics of the morphological features and the variable expression of the exudate crust as well as the scutum and the basal ring justify the amalgamation of the three genera *Calloriella*, *Crustomollisia* and *Micropeziza*, the latter of which has priority over the other two:

***Micropeziza*** Fuckel, *Jb. nassau. Ver. Naturk.*, 23-24: 291 (1870) [1869-70] – type: *M. poae* Fuckel  
 = *Actinoscypha* P. Karst., *Meddel. Soc. Fauna Flora fenn.*, 16: 5 (1888)  
 – type: *A. graminis* P. Karst. (≡ *Micropeziza karstenii*)  
 = *Calloriella* Höhn., *Sber. Akad. Wiss. Wien, Math.-naturw. Kl., Abt. 1*, 127: 345 (1918) – type: *C. umbrinella* (Desm.) Höhn.  
 = *Niesslella* Höhn., *Ber. dt. bot. Ges.*, 36 (8): 468 (1919) [non *Niesslella* Speg. 1880] – type: *N. scirpicola* (Fuckel) Höhn. (= *Micropeziza cornea*)  
 = *Crustomollisia* Svrček, *Sydowia*, 39: 219 (1987) [1986] – type: *C. roburnea* (Velen.) Svrček (= *Micropeziza mollisioides*)

### Type species of *Micropeziza*

Some doubts arose about the identity of the type species of *Micropeziza*, *M. poae* Fuckel. BARAL (in WEBER, 1992: 31, 96) assigned a record to that species based on another record documented under that name on an unpublished drawing (H.B. 3808). Re-examination of the latter finally revealed that these two records concern a more or less pale-coloured species of *Pyrenopeziza*, probably *P. karstenii* Sacc. [≡ *Hysteropezizella karstenii* (Sacc.) Nannf.]. This species differs from *M. cornea* in urceolate apothecia, small ascospores with a low lipid content, and in apically uninflated paraphyses which instead contain many small guttules of low refractivity (living state).

NANNFELDT (1976) did not provide descriptions of the species accepted by him in *Micropeziza*. In his key he relied mainly on the characters of the shield hyphae (width, wall thickness, intensity of pigmentation). In order to clarify the identity of *M. poae*, the lectotype material from G was examined by the third author (H.B. 7834, BARAL & MARSON, 2005). As a result, this species seems to be hardly separable at the species level from *M. cornea* and *M. karstenii*. The width of the shield hyphae as given by Nannfeldt as 1–1.5 µm in his key turned out to be 2–3 µm in the type material of *M. poae*, thus concurring with that in *M. cornea*. Nannfeldt saw also an ecological correlation: those specimens on *Cyperaceae* and *Juncus* (*M. cornea* s. str.) he



**Plate 4** – Collection site of the holotype of *Micropeziza filicina* (Germany, Warstein, Lörmecketal).

thought to be adapted to very wet habitats, whereas those on grasses to occur in drier localities. Further studies on this species complex are necessary, while there is no doubt that these three taxa are congeneric.

***Micropeziza cornea*** (Berk. & Broome) Nannf., *Bot. Notiser*, 129 (3): 335 (1976).

≡ *Peziza cornea* Berk. & Broome, *Ann. Mag. nat. Hist., Ser. 2*, 7: 183 (1851).

?= *Micropeziza karstenii* Nannf., *Bot. Notiser*, 129(3): 336 (1976).◇

≡ *Actinoscypha graminis* P. Karst., *Meddel. Soc. Fauna Flora fenn.*, 16: 5 (1888) [non *Micropeziza graminis* (Desm.) Rehm, ?= *Pyrenopeziza karstenii* Sacc.].

?= *Micropeziza poae* Fuckel, *Jb. nassau. Ver. Naturk.*, 23-24: 291 (1870) [1869-70].◇

≡ *Mollisia poae* (Fuckel) Sacc., *Syll. fung. (Abellini)*, 8: 343 (1889).

≡ *Niptera poae* (Fuckel) Rehm, in Winter, *Rabenh. Krypt.-Fl., Edn. 2 (Leipzig)*, 1.3 (lief. 36): 558 (1891) [1896].

≡ *Pyrenopeziza poae* (Fuckel) Boud., *Hist. class. Discom. Eur. (Paris)*: 133 (1907).

◇ = synonymy according to type study by H.-O. Baral.

For further synonyms of *M. cornea*, see NANNFELDT (1976).

### ***Calycellina***

Another question that needs to be clarified in the context of this amalgamation concerns the differences between *Micropeziza s.l.* as redefined above and *Calycellina* as described by HÖHNEL (1918b: 599f.) and redefined by LOWEN & DUMONT (1984) and BARAL (1989: 210f., incl. *Phialina* Höhn.). For a distinction between *Micropeziza* and *Calycellina*, a number of morphological features are listed which might individually not seem sufficient as distinguishing criteria, but the combination of characters outlines in our opinion two separate albeit closely related genera.

An important difference between *Micropeziza* and *Calycellina* is that the paraphyses of *Micropeziza* form a pseudoepithecium which is generally absent in *Calycellina*, i.e., although a gel around the paraphyses apices occurs also in *Calycellina*, no granular layer covers the gel. The refractive vacuolar bodies in the apical part of the paraphyses of *Calycellina* show a distinct similarity to those of *Micropeziza*. As a rule, VBs disappear in dead cells, but in quite a number of *Calycellina* species they become persistent and remain as a sort of resinous matter, and also in *M. filicina* their remnants can still be seen in dead cells. Whereas the paraphyses of *Micropeziza* have a clavate to almost globose head, those of *Calycellina* are usually not inflated at the apex, though slightly clavate apices occur, e.g., in *C. leucella* or *C. lachnibrachya*, with rather short terminal cells and included VBs. A second difference is that the cells of the margin of *Calycellina* are usually thin-walled and mostly extend into hairs or hair-like end cells, containing generally a refractive vacuolar body in the basal cells. However, particularly *C. ulmaria* (Lasch) Korf (see BARAL, 1989: 211-212) and *C. leucella* P. Karst. tend to a gelatinized ectal excipulum (see also LOWEN & DUMONT, 1984).

In contrast to *Calycellina*, the cells of the gelatinized margin of *Micropeziza* are more obviously thick-walled, never "hairy", and generally lack vacuolar bodies. A further difference to *Calycellina* is that *Micropeziza* has an ectal excipulum with a more or less developed brown crust. Yet, a brown basal ring is typical of *Calycellina*, and sometimes a scutum occurs [*C. ulmariae* (Lasch) Korf, see BARAL, 1989: pl. 1 fig. B; *C. fagina* (Ant. Schmidt & Arendh.) Baral]. As for the isodiametrical cells at the flanks of the excipulum, the two genera are quite similar, although some species of *Calycellina* show prismatic cells. A gel sheath that stains lilac in CRB often surrounds the ascospores in *Calycellina*. Such a sheath was also observed in the type species of *Calloriella* and *Crustomollisia*, but it did not stain with CRB (a sheath was not seen in *M. filicina*).

Finally, the macroscopic habit of *Calycellina* and *Micropeziza* is clearly different. The apothecia of *Calycellina* are more delicate and

have whitish or yellowish colours. In contrast, the apothecia of *Micropeziza* seem to be more robust and are brownish-coloured which is, of course, due to the brown crust. It is also notable that Höhnel himself, who described *Calloriella* and *Calycellina* as new genera in the same year, saw obviously no connection between them.

### **New combinations**

The amalgamation of *Calloriella* and *Crustomollisia* with *Micropeziza* requires new combinations for *Calloriella umbrinella* and *Crustomollisia roburnea*.

***Micropeziza umbrinella*** (Desm.) Baral, Helleman & U. Lindemann, comb. nov. – Mycobank 805099

Basionym: *Peziza umbrinella* Desm., *Annl. Sci. Nat., Bot., sér. 2*, 19: 369 (1843).

≡ *Urceola umbrinella* (Desm.) Quél., *Enchir. Fung.*: 322 (1886).

≡ *Niptera umbrinella* (Desm.) Sacc., *Syll. fung.*, 8: 483 (1889).

≡ *Calloriella umbrinella* (Desm.) Höhn., *Sber. Akad. Wiss. Wien, Math.-naturw. Kl., Abt. 1*, 127: 345 (1918).

= *Belonium orbilioides* Rehm, in Winter, *Rabenh. Krypt.-Fl., Edn. 2 (Leipzig)*, 1.3 (lief. 54): 1232 (1896).◇

= *Calloria subalpina* Rehm, in Krieger, *Fung. Saxon. Exsicc., Pilze Sachsen's XLIV (nos 2151-2200): no. 2165 (1912)*.◇◇

= *Calloria subalpina* var. *discrepans* Rehm, *Annl. mycol.*, 10 (4): 353 (1912).

≡ *Corynella discrepans* (Rehm) Rehm, *Ber. Bayer. Bot. Ges.*, XV: 251 (1915).

= *Allophylaria soederholmii* Svrček, *Česká Mykol.*, 40 (4): 204 (1986).•

◇ synonymy proposed here according to type study by H.-O. Baral.

◇◇ synonymy according to type study by HÖHNEL (1918a: 345).

• synonymy proposed here (according to the original description, see discussion below).

*Allophylaria soederholmii* Svrček is here included in the synonymy of *M. umbrinella* because the description of SVRČEK (1986) fits very well to that given by HÖHNEL (1918a: 341ff.). Svrček was obviously unaware of Höhnel's work because he refers to a similarity of *Niptera umbrinella* (Desm.) Sacc., but rejected this idea because Desmazières did not give any information regarding the excipulum. For affirmation an authentic specimen of *M. umbrinella* from M was studied by the third author (H.B. 4674 ined.). *Allophylaria* is a genus in which the excipulum is built up of a more or less highly gelatinized *textura oblita*, and the apothecia are usually distinctly stipitate. However, the cells on the flanks may also show a prismatic shape, especially in the living state, thereby approaching the situation in *Micropeziza*.

The re-examination of the type collection of *Orbilium mollisioides* Höhn. by the third author has shown that *Crustomollisia roburnea* and *O. mollisioides* are undoubtedly conspecific [BARAL *et al.* (ined.): General Part, List of excluded, doubtful, or little known taxa; cf. HÖHNEL, 1909: 1521f.]. Thus, *C. roburnea* is a later synonym of *O. mollisioides* and a new combination of *O. mollisioides* in *Micropeziza* is here proposed.

***Micropeziza mollisioides*** (Höhn.) Baral, Helleman & U. Lindemann, comb. nov. – MycoBank 805100

Basionym: *Orbilium mollisioides* Höhn., *Sber. Akad. Wiss. Wien, Math.-naturw. Kl., Abt. 1*, 118: 1521 (1909).

= *Pezizella roburnea* Velen., *Monogr. Discom. Bohem. (Prague)*: 161 (1934).

≡ *Crustomollisia roburnea* (Velen.) Svrček, *Sydowia*, 39: 219 (1987).

*M. mollisioides* was identified as *Calycellina castanea* (Sacc. & Ellis) Dennis by the third author in BARAL & MARSON (2005). However,

G. Garcia (pers. comm.) questioned that this American species, which was recorded on leaves of *Quercus laurifolia* in Florida, is con-specific, especially because it partly grew on living leaves (DENNIS, 1964: 38) and was described with shorter asci. The presence of two large ellipsoid oil drops in the ascospores as drawn by Dennis might be a further difference, indicating a higher lipid content, though probably caused by confluence of smaller LBs. Two syntype specimens from PAD were studied by the third author, but they were strongly overmature. The original sketch on them shows a medium-sized oil drop in each spore half and a median pseudoseptum.

When comparing spore size in the literature, *C. castanea* has much broader spores (11–14 × 3–4 µm fide SACCARDO, 1882: 572, 10–11 × 3 µm fide DENNIS, 1964: 38) than *O. mollisoides* (8–12 × 1.5–2 µm fide HÖHNEL, 1909). *Helotium furfuraceum* W. Phillips & Harkn. (on dead leaves of *Quercus agrifolia* in California), tentatively placed in synonymy with *Helotium castaneum* by Höhnel, has even larger spores 15 × 5 µm. However, SVRČEK (1987) gave for *C. roburnea* a spore size of 11–13.5 × 3–4 µm, which is in concordance with our personal observations on European specimens on *Quercus robur*, *Q. rubra* and *Q. ilex* [\* (10–)11–15(–17) × 3.3–4.3(–4,8) µm]. In the type of *O. mollisoides* at FH (Germany, Sachsen, on *Quercus rubra*) the spores measured †10–12 × 2.3–2.7 µm (see BARAL & MARSON, 2005, H.B. 6293), which is at the lower end of the range of the species, and certainly also a result of shrinkage in the dead state.

At the moment, we prefer to consider the American taxon as different from *M. mollisoides*, and the following new combination is proposed:

***Micropeziza castanea*** (Sacc. & Ellis) Baral & Guy Garcia, comb. nov. – MycoBank 805101

Basionym: *Helotium castaneum* Sacc. & Ellis, *Michelia*, 2 (8): 572 (1882).

≡ *Calycina castanea* (Sacc. & Ellis) Kuntze, *Revis. gen. pl. (Leipzig)*, 3 (2): 448 (1898), as "Ellis & Sacc."

≡ *Calycellina castanea* (Sacc. & Ellis) Dennis, *Persoonia*, 3 (1): 38 (1964).

≡ *Hymenoscyphus castaneus* (Sacc. & Ellis) M.P. Sharma, *Himalayan Bot. Res. (New Delhi)*: 128 (1991).

?= *Helotium furfuraceum* W. Phillips & Harkn., *Bull. Calif. Acad. Sci.*, 1(1): 24 (1884), fide HÖHNEL (1909: 63).

## Excluded or imperfectly known taxa

The alpine species *Micropeziza verrucosa* (E. Müll.) Nannf., on leaves of *Carex sempervirens*, is extraordinary within *Micropeziza* by showing an ornament of small warts on the hyaline non-septate spores which finally turn 3-septate and brown (MÜLLER, 1966: 237). It is probably closely related to *M. cornea*, but no information on croziers and the oil content of the spores is given. The apices of paraphyses probably contain VBs in the living state, according to the brownish coloration of the cytoplasm reported by Müller.

Another species assigned to *Calloriella*, *C. nipteroidea* Le Gal, is so far known only from the type location in Madagascar. Judging from

the description and line drawing of LE GAL (1953: 386ff.), this wood-inhabiting species could fit rather well into the genus but is not further mentioned in the present study. She herself refers to *Niptera rollandii* Boud., a species which is lichenized and belongs in *Coenogonium* Ehrenb. (= *Dimerella* Trevis), as *C. pineti* (Ach.) Lücking & Lumbsch.

The type examination of *Orbilium myristicae* Henn. and *O. fuscopolida* Henn. by the third author has shown that the two taxa are con-specific and could tentatively be placed in *Micropeziza*. Like *C. nipteroidea*, this species is known only from the two type locations in Java and Australia where it grew on living leaves of *Myristica fragrans* and petioles of a *Lauraceae*, respectively [cf. BARAL *et al.* (ined.): List of excluded, doubtful, or little known taxa]. Because of the lack of recent collections with features in living state, this species is also not further treated in the present study.

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### Key to the accepted European species of *Micropeziza* based on characters in living state

- 1 Asci with inamyloid apex, arising from simple septa; ectal excipulum with brown granules only near the margin; ascospores with two large and many minute oil drops (OCI = 4–5), \*13–19(–21) × 3.7–5 µm, on herbaraceous stems of angiosperms ..... ***M. umbrinella***
- 1\* Asci with euamyloid apical ring, arising from croziers; ectal excipulum at flanks and margin sparsely to densely clothed with a brown fragmentated crust ..... 2
- 2 Ascospores with only minute oil drops (OCI = 1–2), \*(10–)11–15(–17) × 3–4.3(–4.8) µm; on leaves of *Quercus* spp. .... ***M. mollisoides***
- 2\* Ascospores with many small and some medium- to large-sized oil drops (OCI = 4–5) ..... 3
- 3 Ascospores \*9.8–12.5 × 3–3.5 µm; on rachises of ferns ..... ***M. filicina***
- 3\* Ascospores \*15–21(–24) × (2.8–)3–3.5(–4) µm; on culms and leaves of monocots ..... ***M. cornea* s.l.**

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