Übersichtstabelle der wichtigsten Maße:

Art	Autor	Apothezien in mm	Haare in µm	Paraphysen* in µm	Asci in µm	Sporen in µm
Lachnum albidoroseum	Rehm 1896	0,3–2	fehlen!	– 5	60–70 x 9–10	15–18 x 3–4
Lachnum albidoroseum	Hein 1980	0,5(1)	–40 x 3	0–10 x ± 3	55–65 x 7-7,8	14–17 x 3,5–4
Lachnum albidoroseum	Dennis 1949	–0,6	20- 30 x 3	–	70 x 7	14–18 x 3–3,5
Lachnum albidoroseum	Verf.	0,4–1,2	25–45 x 2,5–4	0–10 x 2,5–4,5	60–100 (120) x 9–11,5	15–21 x 3–4
Lachnum cf. *imbecille*	Baral	0,2–0,75	40–55	0–15 x 4,5–5	70–81 x 8–8,3	14–18 (19) x 2,5–2,7

* Paraphysenlänge ab Ascusapex gemessen.

Die von Hein und Dennis (und auch Rehm?) angegebenen Maße wurden an Exsikkaten ermittelt.

Dank:

Ich danke Herrn H. O. Baral (Tübingen-Pfrondorf), der stets bereit war, Frischfunde zu bestimmen und mich auch bei diesem Aufsatz beriet. Außerdem möchte ich mich bei der Stadt Schwäbisch Hall und speziell beim Stadtplanungsamt dafür bedanken, daß man es mir ermöglicht hat, meinen Zivildienst meiner Neigung für Botanik und Mykologie entsprechend abzuleisten.

Nachtrag (15.7.1987):

Das hier diskutierte *Lachnum* cf. *imbecille* Karst. (in Baral & Krieglsteiner 1985) muß eine andere, noch unbenannte (*Lachnum albidoroseum* nahestehende) Art sein. P. Blank und H. O. Baral fanden während einer Exkursion ins „Eigenried" auf dem Zugerberg (CH, MTB 8817, 975 m NN), ein Hochmoor mit *Carex, Eriophorum* und *Trichophorum*, das „echte" *L. imbecille* nur auf *Carex*. Dieses weicht von den *Eriophorum vaginatum*-Funden durch eguttulate Haare mit 4–6 Septen, nur undeutlich guttulate Paraphysen, fast sitzenden Apothezien und längere Sporen (15,5,–27 x 2,6–3 µm) mit nur winzigen Tropfen ab. Gut dazu paßt auch ein Fund von Beyer an *Eriophorum* (nach H. O. Baral in litt., 26.6.1987).

Lachnum albidoroseum wurde nun auch von P. Blank (CH, Thayngen) auf *Schoenoplectus lacustris* entdeckt. Die Funddaten: 12.7.1987, CH, „Moos" bei Thayngen, zusammen mit *Psilachnum eburneum* (Rob. ap. Desm.) Baral in Baral & Krieglsteiner. Damit kann die Art erstmals für die Schweiz berichtet werden.

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The Genus Protounguicularia in Europe

(Die Gattung *Protounguicularia* in Europa)

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Key Words: *Hyaloscyphaceae, Hyalascypha, Protounguicularia, P. barbata = P. brevicapitata.*

Summary: The genus *Protounguicularia* Raitv. & Galan is treated as a monotypic genus, embracing only the type species which is shown to be conspecific with the lectotype of *Hyaloscypha quercina* Vel. var. *barbata* Vel., and a new combination is proposed. A darker form, occurring on *Sorbus* and distinguished by its abundant exudates, is recognized. The problems of delimitation of the genus in the original sense are discussed, particularly the nature of hair solidification.

Zusammenfassung: Die Gattung *Protounguicularia* Raitv. & Galan wird als monotypisch aufgefaßt und enthält somit nur den Typus, welcher mit dem Lectotyp von *Hyaloscypha quercina* Vel. var. *barbata* Vel. konspezifisch ist. Es wird eine neue Forma vorgeschlagen; sie ist dunkler, wächst auf *Sorbus* und unterscheidet sich durch reichliches Exudat. Ferner werden Probleme der Abgrenzung des Genus im Originalsinn diskutiert.

On a few occasions while examining herbarium material of *Hyaloscypha* Boud. I came across an interesting species with septate hairs and glassy hair apices, for which there appeared to be no existing generic name. Very recently Raitviir & Galán (1986) described a new genus from Spain to accommodate the same species with two similar ones. Though I welcome the new genus *Protounguicularia* Raitv. & Galán, I do not consider it to be strictly homogenous as presently circumscribed. In this paper I will treat the genus as monotypic, embracing only the type species which shows clear glassiness at the hair apices. The residue of the genus will be treated in a forthcoming paper.

Protounguicularia barbata (Vel.) Huhtinen, comb. et stat. nov. Figs. 1–3

≡ *Hyaloscypha quercina* Vel. var. *barbata* Vel., Monogr. Discom. Bohemiae 1: 276. 1934.
≡ *Hyaloscypha barbata* (Vel.) Svrček, Česka Mykol. 39: 216. 1985.
= *Protounguicularia brevicapitata* Raitv. & Galán, Int. J. mycol. lichenol. 2: 222. 1986.
Misapplication: *Hyaloscypha quercina* Vel. var. *barbata* Vel. sensu Dennis, Kew Bull. 8: 296. 1953. (= *Hyaloscypha* sp.).

Apothecia gregarious, first globose-cupulate with a somewhat narrowing base, later cupulate and sessile to subsessile, up to 0,5 mm in diameter when fresh, pure white to slightly brownish when fresh, when dried flanks yellowish to yellolwish brown in contrast to the pure white hairs, more rarely some hairs brown, often glued in bundles and forming irregular teeth.

Ectal excipulum of textura prismatica, cells varying in size from 8–10 x 4–6 µm to 15–18 x 6–7 µm, walls hyaline, more rarely faintly to clearly brown, colour located in the wall, walls somewhat thickened, 0,5–1,0 µm thick, refractive, J⁻ except in early stages of hair development, not staining in cotton blue or ammoniacal Congo red; the inner excipulum formed of narrower textura prismatica.

Hairs up to 110 µm long, usually 2–4 µm broad at the base, more rarely up to 6 µm broad, septate, cylindrical or very slightly tapering, hyaline and smooth when fresh in water, more rarely with small, golden brown exuded droplets and deposits, when mounted in heated lactic acid always perfectly smooth, apices blunt, rarely slightly widened; hair walls usually thin, but rarely slightly thickened (up to 0,3 µm in lactic acid), J⁻, not coloured in cotton blue or Congo red; only the solid, glassy matter, typically occurring at the apex of both short and long hairs and at the thickened septa, is deep dextrinoid (without KOH pretreatment), though rarely some scattered areas in hair walls show the same reaction; the glassy material not losing refractiveness or the dextrinoid reaction when treated with 40 % KOH, not staining in cotton blue but clearly stained in Congo red; a smaller number of totally thin-walled hairs are present in addition to the partially solid hairs.

Asci cylindrical, in most specimens developed from simple septa and from a special type of crozier (see illustrations) resulting in a downward hook at the ascus base, in one collection showing normal crozier formation in addition, 30–43 x 5–7 µm, eight-spored, pore wall moderately to strongly amyloid without KOH pretreatment, in one collection first J⁻ but clearly J⁺ after KOH pretreatment, refractive in KOH.

Ascospores irregularly biseriate in the upper part of the ascus in fresh material, ellipsoid, 6–10 x 2,0–2,5 µm, aseptate, sometimes with a few small guttulae.

Paraphyses narrowly cylindrical, 1,5–1,8 µm broad, not exceeding the asci, terminal cells usually 16–20 µm long.

Material studied: Czechoslovakia. Bohemia, Jevany, on *Fagus* wood, XI. 1923 Velenovsky (PRM, lectotype of *Hyaloscypha quercina* var. *barbata*); Rosenau, Sonntagberg, on dead wood, Strasser (Herb. Rehm, S).
Denmark. Sjaelland, Jaegersborg Dyrehave, on *Fagus* wood, 20.III.1953 Nannfeldt (UPS).
Finland. Turku, Maaria, on cortex of *Populus* or *Sorbus*, 30.X.1984 Huhtinen 84/267 (TUR); Turku, Ruissalo, on deciduous wood, 27.X.1986 Huhtinen 86/163 (TUR); Kaarina, Karpanmäki, on decorticated wood of *Sorbus*, 30.X.1986 Huhtinen 86/166 (TUR).
Norway. Akershus, Baerum, Bjerke, on *Quercus* wood, XI. 1827 Sommerfelt (Oslo).
Spain. Granada, Alhama de Granada, on *Quercus* wood, 24.II.1982 Galan & Ortega (Herb. Galan, isotype of *Protounguicularia brevicapitata*).
Sweden. Uppland, Bondkyrka, Vardsätra nature reserve, on *Populus* wood, 20.I.1930 Lundell (UPS); on *Ulmus* wood, 12.X.1933 Lundell & Ridelius (UPS).

Protounguicularia barbata (Vel.) Huhtinen forma *resinacea* (Dennis) Huhtinen, comb. et stat. nov. – Figs. 4–5

≡ *Hyaloscypha quercina* Vel. var. *resinacea* Dennis, Kew Bull. 30: 353. 1975.
= *Pezizellaster serrata* (Hoffm.) Dennis sensu Dennis, Mycol. Pap. 32: 62. 1949. (non *Peziza serrata Hoffm.*, Vegetabilia cryptogama 2: 26. 1790. = nomen dubium).

Material studied: Finland. Tampere, Pyynikki, on inner surface of bark of *Sorbus*, 1.X.1986 Söderholm 1302 (TUR). Great Britain. Warwickshire, Tamworth-in-Arden, on rotten wood of *Sorbus*, I.1974 Clark (K, holotype of *Hyaloscypha quercina* var. *resinacea*); Yorkshire, Limb valley, on inner surface of bark of *Sorbus*, Hughes (K, a fragment of IMI 27624).

This forma is distinguished by its notably dark to blackish apothecia. This appearance is due to abundant exudates, deposited as a low, broken, platelike crust on a majority of hairs. Under the microscope the hairs appear as dark brown and the solid apices and septa are obscured. Unlike the scanty resinous exudates of the type form, this crust is usually unaffected by Melzer's reagent. It is also structurally stable in ammoniacal Congo red and in 40 % KOH. In heated lactic acid it is totally dissolved, as happens in the type form. Parts of the excipulum are also covered by this exudate.

Though the overall picture of forma *resinacea* in the microscope may at a glance seem strikingly different from that of the type form, mounts made in heated lactic acid or cotton blue are exactly alike. Except for the exudate I have found no other valid microscopical differences. In Hughes' collection some apothecia have brown excipular and hair walls. This colour is located in the walls and occurs independently of the abundant resinous exudate. This pigmentation is, however, very variable and apothecia with hyaline walls are equally common.

So far I have noticed no differences between single-spore cultures derived from both forma. The darker form is apparently confined to *Sorbus*, the substrate-fungus reaction causing the excess exudate. It is also noteworthy that in both collections from *Sorbus* bark the hyphomycete *Diplococcium spicatum* Grove was very abundant around the apothecia. In the type collection of var. *resinacea* apothecia occur on decorticated wood from a stump of *Sorbus* (Clark 1980), and *Diplococcium* is less abundant. The illustration by Dennis (1975) is somewhat inaccurate in lacking most of the characteristic resinous crust (compare Figs. 4–5). As there is only one distinguishing character I prefer a recognizion at the level of a forma only.

There is one collection from *Sorbus* I have treated under the type form. When studied fresh in water mounts it showed tiny, scattered, amorphous lumps of golden brown resinous material which were always soluble in Melzer's reagent. The overall appearance of apothecia was uniformly pale in both fresh and dried material. Hence, this collection on *Sorbus* does not represent forma *resinacea*.

Hughes 'collection in K is a fragment of the same material which Dennis (1949) studied when introducing his new combination *Pezizellaster serrata* (Hoffm.) Dennis (Fig. 5). The original diagnosis (Hoffmann 1790) refers to a substipitate, whitish fungus, and according to Hoffmann (1825) there is no material of *Peziza serrata* in his herbarium. It is certain that Hoffmann's fungus is not the taxon on *Sorbus* and it must be treated as a nomen dubium. The existing illustration is inaccurate and shows a species of uncertain identity (Hoffmann 1790). The apothecia in Hughes' specimen are now dark brown and the abundant exudates result in the toothed appearance illustrated by Dennis (1949: 62).

Hyaloscypha quercina Vel. var. *quercina* is not closely related to var. *barbata* Vel. and has been transferred to the genus *Psilocistella* Svrček (1977). I have studied both the lectotype of var. *quercina* and the collections cited by Dennis (1953) under that name, and find them to represent different species. This was also pointed out by Svrček (1977). The material studied by Dennis represents an unnamed species of *Psilocistella*.

The development of asci

The development of asci in *Protounguicularia barbata* is noteworthy. In the genus *Hyaloscypha* two main types of ascal development can be observed: asci are borne with a simple septum or they arise from croziers. A third, intermediate and rare type found in only one species so far, characterizes all collections of *P. barbata*. Studying bundles of asci one can easily observe that they arise from simple septa, or show curious downward hooks from the ascus mother cells. This hook is frequently seen at bases of loose, mature asci, whereas asci arising from normal croziers (e. g. in *P. variepilosa* Raitv. & Galán and *P. monoseptata* Galán & Raitv.) show different bases. This rarely observed morphological character might appear as a result of altered septal development in the crozier.

It is my experience in *Hyaloscypha* that taxonomic entities do not show variation in ascus development: a taxon is characterized by one of these development types only. But this rare type shows variation in itself, because there are both simple septa and a type of crozier to be found. Surprisingly, in one collection of *P. barbata* (12.X.1933 Lundell & Ridelius, UPS) I noticed also normal crozier formation in addition, occurring in a same apothecium. The development types of asci and their role in taxonomy will be more thoroughly discussed in the forthcoming monograph of *Hyaloscypha*.

The generic problems

Creating the genus *Protounguicularia*, Raitviir and Galan united three species with long, cylindrical, blunt and septate hairs. The type species, *P. brevicapitata* (= *P. barbata*), was shown to have glassy hair apices. Similar glassy deposits were described for *P. monosep-*

tata, whereas those of *P. variepilosa* were stated to be less refractive. After studying the type specimens, kindly lent for study by Dr. R. Galán, as well as one additional collection of both *P. monoseptata* (from Norway) and *P. variepilosa* (from Czechoslovakia), I feel it necessary to delimit the genus in a different way.

In the type species the glassy material is similar to that characterizing the glassy-haired *Hyaloscyphaceae*, i. e. strongly refractive and not staining in cotton blue mounts. In *P. barbata* this material shows a rapid and clear dextrinoid reaction, resulting in a deep purplish red or wine-red colour. This reaction is retarded or even lacking in some hairs, but in those cases a KOH pretreatment results in a normal staining reaction. In addition to hair apices, the same material has also accumulated in septal areas and more rarely in other areas of hair walls, which consequently stain deeply. With its KOH-stability and clear staining reaction in Congo red, the refractive material comes close to that found in *Hyalopeziza* Fuckel subg. *Hyalopeziza* (Huhtinen 1987).

The glassy material is, however, different from that of hair walls, which can easily be observed in *P. barbata*. In both Melzer's reagent and in Congo red the wall proper remains uncoloured. Also the hairs of *Urceolella crispula* (Karst.) Boud. and *U. carestiana* (Rab.) Dennis show dual structure: after KOH pretreatment the strongly swollen solidifying substance is surrounded by a thin wall proper. And in *Unguiculella xylemicola* Bøhler the wall proper retains its structure in KOH while the solidifying substance is dissolved (Huhtinen 1987).

The most important feature in *P. barbata* in relation to the other two species included in the genus is the true, glassy nature of the material solidifying hair apices. It is hyaline and refractive and not resinous and coloured. Both in *P. monoseptata* and *P. variepilosa* hairs lack this glassy material. They contain dull material of totally different structure: a yellowish brown, resinous matter which occasionally is also deposited on the hairs. This resin is to some extent persistent in heated lactic acid and stains deeply in cotton blue. In addition, the hairs contain concentrations of plasma at the apices and at each septum, resulting in a somewhat banded appearance in cotton blue.

Protounguicularia barbata lacks any amyloid reactions in hairs or excipulum, whereas this is true for both the other two species. The amyloid reaction occurs independently of any visible, morphological structure in the walls. It is extremely strong and appears as few scattered blackish violet areas at hair apices or in the lower parts. In the excipulum it is seen as frequent small nodules. Probably such an amyloid reaction is shown in the photographs provided by Raitviir & Galán (1986, Figs. 58–61), though the mountant is not stated. I have seen such a strong amyloid reaction only in *Hyaloscypha stevensonii* (Berk. & Br.) Nannf., where it is very rarely seen in hairs but rather frequently observed in the excipulum. With the exception of the clearly lighter amyloid reaction in *Urceolella amphipila* Huhtinen (cf. Huhtinen 1987), these are the only cases where I have seen a true amyloid reaction (i. e. violaceous or bluish) in the hairs of a hyaloscyphaceous species.

A yellowish brown, resinous exudate is found in all three species of *Protounguicularia*. This same substance characterizes for example *Hyaloscypha stevensonii* and *Dasyscyphella crystallina* (Fuckel) Raitv., and studying CUP material of *Arachnopeziza* Fuckel I found it to be present in at least seven species of the genus. In taxonomic work these exudates should be kept separate from true pigments, which are produced in excipular and hair walls or occur inside hairs and paraphyses. In the same way a distinction should be recognized between a glassy substance concentrated inside the hairs and a resinous exudate occurring both in and on the hairs. Our present day concept of classification is based on the belief that taxa with glassy hairs should be grouped separately from the rest of the *Hyaloscyphaceae*, I here take a similar step. As discussed in a forthcoming paper where the formal transfers will be proposed, I believe that *Protounguicularia monoseptata* and *P. variepilosa* are closely related to *Arachnopeziza*. Should there later accumulate evidence against the value of glassy hairs as a valid character at the generic level, then we should probably also have to include *P. barbata* into that genus.

According to the interpretation in this paper the genus *Protounguicularia* is related to *Hyalopeziza* as delimited by Korf and Kohn (1980). The combining histochemical characters are summarized by Huhtinen (1987). Raitviir and Galán (1986) presented some hypotheses on the direction of evolution of glassy-haired taxa and suggested that *Protounguicularia* is ancestral to *Unguicularia* Höhn. As we have meagre knowledge about the primitive versus advanced characters in the whole family, studies combining morphology, histochemistry, cultural work and thorough observations on substrate preferences are essential to phylogenetic suggestions.

Acknowledgements

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Nachtrag der Redaktion:
Protounguicularia barbata (als *P. brevicapitata*) wurde inzwischen auch in Süddeutschland festgestellt: MTB 7420, 7315 = H. O. Baral, MTB 8218 = P. Plank (Meldungen 1986 an Krieglsteiner).

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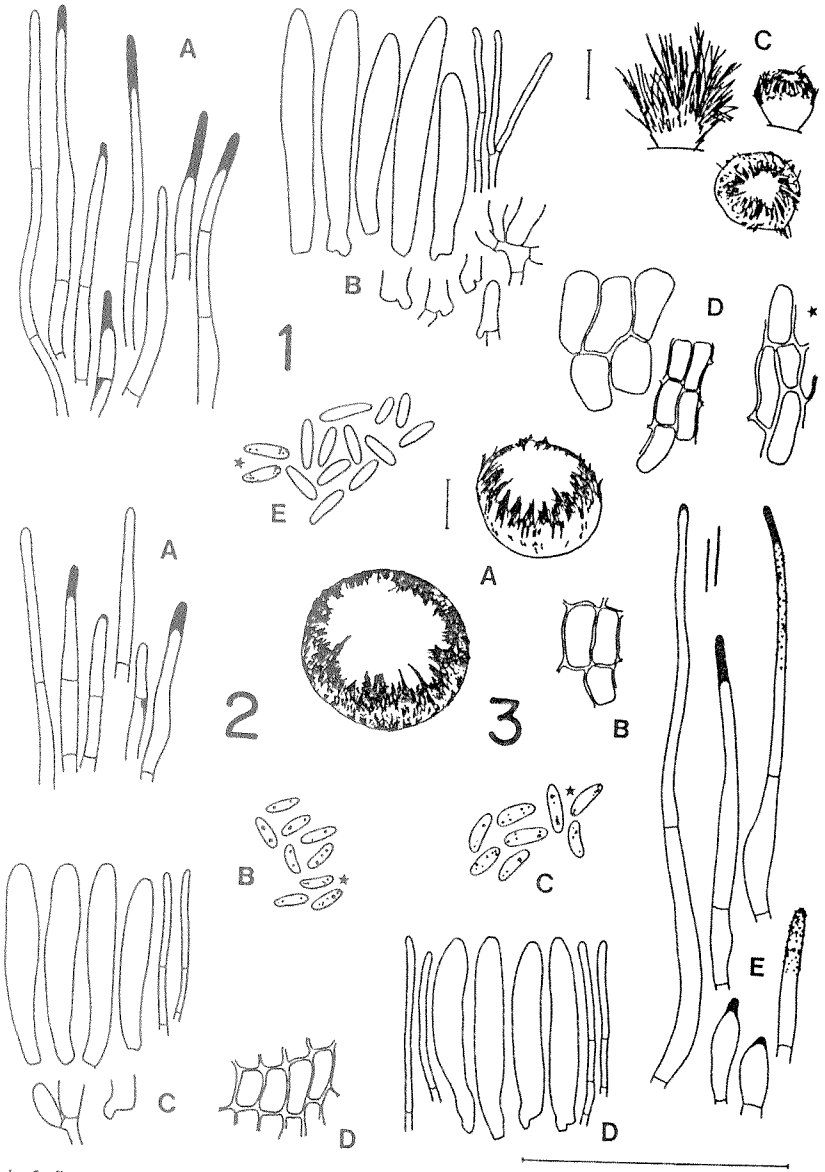
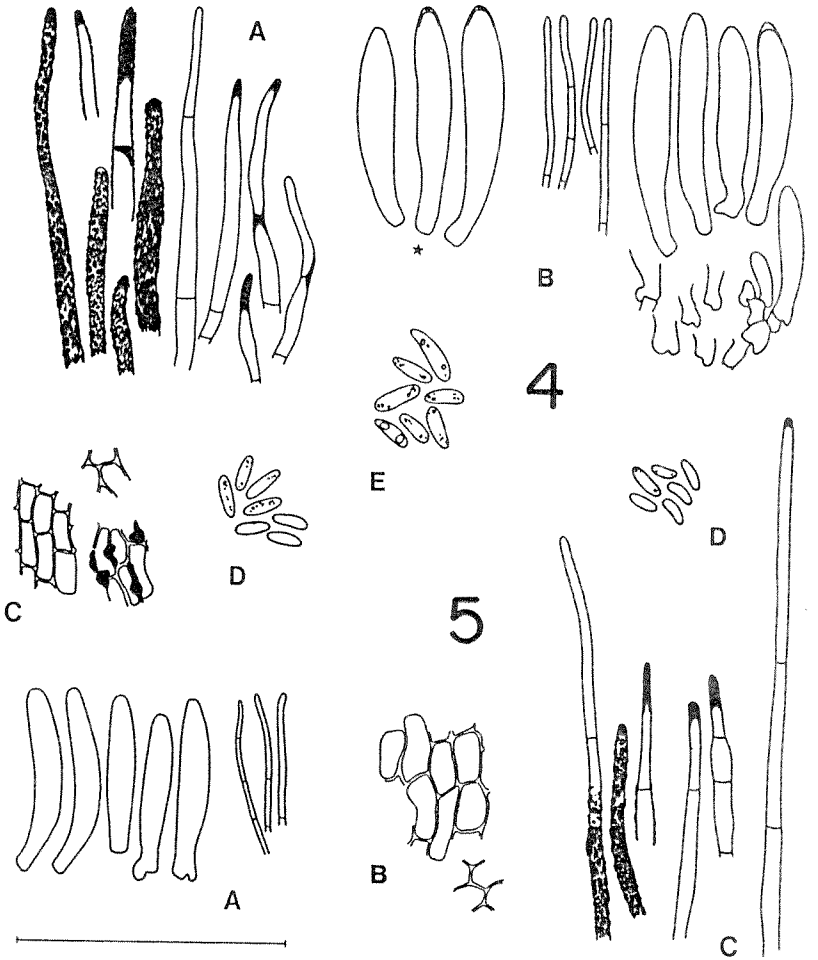


Figs. 1–3 *Protounguicularia barbata*. 1) lectotype of *Hyaloscypha quercina* Vel. var. *barbata* Vel. (PRM 149740). A) hairs in cotton blue, refractive parts darkened B) asci, ascal bases and paraphyses in cotton blue (C) dried apothecia D) ectal excipulum in cotton blue and KOH (marked) E) spores in Melzer's reagent and in Congo red (marked). 2) isotype of *Protounguicularia brevicapitata* (Herb. Galan). A) hairs in cotton blue B) spores in cotton blue and in Melzer's reagent (marked) C) asci, ascal bases and paraphyses in cotton blue D) ectal excipulum in Melzer's reagent. 3) coll. Huhtinen 86/163 (TUR). A) apothecia in fresh condition B) ectal excipulum in cotton blue C) spores in water (in fresh condition) and in Melzer's reagent (marked) D) asci and paraphyses in water (in fresh condition). E) hairs in water (in fresh condition) showing the resinous exudate and the maximum wall thickness characterizing some hairs. – Scale 50 μm, for apothecia 100 μm.



Figs. 4–5. *Protounguicularia barbata* f. *resinacea*. 4) coll. Söderholm 1302 (TUR). A) hairs in Melzer's reagent (left), two in optical section, and in cotton blue; pigment and refractive parts darkened. B) asci, ascal bases and paraphyses in cotton blue and in Melzer's reagent (Marked) C) ectal excipulum in cotton blue and in water, showing the exudate D) spores in Melzer's reagent E) spores in water (in fresh condition). 5) coll. S. J. Hughes from Limb valley (KEW). A) asci and paraphyses in cotton blue B) ectal excipulum in cotton blue C) hairs in Melzer's reagent (left) and in cotton blue D) spores in Melzer's reagent. – scale 50 μm.