

# Micropeziza Fuck. and Scutomollisia Nannf. nov. gen. (Discomycetes Inoperculati)

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*Micropeziza* Fuck. is the correct name for the genus previously known as *Actinoscypha* Karst. and *Niesslella* Höhn. *Peziza cornea* B. & Br. is shown to belong here, and *M. scirpicola* Fuck., *Trochila ignobilis* Karst., *Mollisia sylvatica* Karst., and *Belonidium aurantiacum* Rehm to be conspecific with it. The correct name becomes *M. cornea* (B. & Br.) Nannf. *Actinoscypha graminis* Karst. is given a new epithet, viz., *karstenii* Nannf., when transferred to *Micropeziza*, because of the earlier *M. graminis* (Desm.) Rehm. *M. verrucosa* (E. Müll.) Nannf. is a new combination. *M. punctum* Rehm is shown to deviate so strongly in the structure of the excipulum that it is made the type of a new genus, *Scutomollisia*, to which also three new species are referred, viz., *S. leptoderma*, *S. operculata*, and *S. stenospora*. Both genera are considered to belong to the Mollisioideae. The various positions of the fruitbodies in relation to the matrix within this group are discussed and so is the taxonomic position of *Nannfeldtia* Petr. *Actinoscypha muelleri* Graddon must be removed from the genus, but no better position can be assigned to it.

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In 1919 Höhnel (cf. 1923 p. 112) combined into his new genus *Niesslella* three inconspicuous Ascomycetes which grow saprophytically on grasses and sedges and whose superficial ascocarps develop beneath a shield of radiating hyphae, which shield irregularly tears open to expose the flat hymenium. These were *Micropeziza scirpicola* Fuck., *M. punctum* Rehm, and *Belonidium aurantiacum* Rehm. He considered *Niesslella* and his monotypical tropical genus *Discomycella* (Höhnel 1912 p. 400) as Microthyriaceae that imitate Discomycetes ("Discomyceten vortäuschende Microthyriaceen"). I found later (Nannfeldt 1932 p. 319) that the much older monotypical *Actinoscypha* Karsten (1888 p. 5; *A. graminis* Karst.) is most probably congeneric with *Niesslella*. Ten years ago Müller (1966) confirmed this, revised the genus (without mentioning *B. aurantiacum*) and described a new species (*A. verrucosa*). He found Höhnel's (and my) interpretation erroneous and recognized in *Actinoscypha* typical

inoperculate Discomycetes that could unrestrainedly be referred to Dermateaceae sensu meo. After that one more species has been described, viz., *A. muelleri* Graddon (1972 p. 158).

The "Grundart" of *Niesslella* is *Micropeziza scirpicola*, which Fuckel (1870 p. 291) placed as the second in its two species genus. According to his principles Höhnel regarded the first species, *M. poae* Fuck., as the "Grundart" of Fuckel's genus. Unfortunately, he made no serious attempt to settle its identity. He did not see the type collection (F. rhén. 1174) and trusting on Rehm's general reliability he satisfied himself by finding that the fungus distributed by Rehm (Ascom. exs. 1221) as *M. poae* is "eine echte Mollisiee". Saccardo (1889 p. 343) had earlier referred *Micropeziza poae* to *Mollisia* and listed "*Micropeziza* Fuck. ex p." as a synonym of that genus. Strangely enough, the correctness of this synonymy has never been questioned. For-



tunate, but still stranger, is the fact that nobody has observed that *Micropeziza* Fuck. (1870) as a generic name antedates *Mollisia* (Fr.) Karst. (1871) and uncritically drawn the nomenclatorial consequences.

*M. poae* is represented in Herb. Rehm (S) by two samples of the type collection. Some more samples determined by Rehm as *Niptera poae* (Fuck.) Rehm show the same species, and his description (Rehm 1891 p. 558) refers also to it. This fungus agrees in all essential respects with *M. scirpicola*, and so *Micropeziza* becomes the correct name for our genus. But there are in Rehm's herbarium under the name of *M. poae* also samples of *M. karstenii* (= *A. graminis*) and *M. punctum* as well as species of *Mollisia* s. lat., e.g. Rehm, Ascom. 1321, i.e. the collection which had misled Höhnel.

*Peziza cornea* Berkeley & Broome (1851 p. 183) as redescribed and depicted by Dennis (1960 p. 117, Pl. XX L = 1968 p. 185, Pl. XXIII L) shows so many features suggestive of *Micropeziza* that it too had to be examined in this connection. When Dennis remarks that "although this species was most thoroughly redescribed by Masee from the type collection at Kew it has been strangely misinterpreted by continental authors", he had evidently Höhnel and myself in mind. The former (1918 p. 366) had not seen the type specimen but only part of a later collection (Rbh., F. eur. 1119), collected by Broome himself on the same matrix (*Carex paniculata*), "von dem anzunehmen ist, dass es denselben Pilz enthält", an assumption that proved to be erroneous. Höhnel found his fungus to be a minute *Mollisia*. This (or a closely related species?) was illustrated by me (Nannfeldt 1932 p. 126), and going from bad to worse I stated later (Nannfeldt 1936 p. 193; repeated by Ramsbottom & Balfour-Browne

1951 p. 72) that the type specimen is identical. That statement must have been due to a misunderstanding of which was the true type material.

The label of the Rabenhorst exsiccatum gives June 1867 as the collecting date but no locality whatsoever. Besides two copies of this exsiccatum there are five more samples in K collected by Broome in the same month (all on leaves of *C. paniculata*), viz. two "Batheaston, June 1867" (Herb. Phillips and Herb. Plowright; a sample with the same labelling is in S from Herb. Sydow), two "Oakford Valley, 1 June 1867" (Herb. Broome) and one "Oakford Valley, St. Catherine's, 3 June 1867" (Herb. Broome). They show all Höhnel's fungus, except the sample from Herb. Plowright, which is now devoid of any fungus. All these samples emanate certainly from one and the same locality, viz. Oakford Valley.

It should furthermore be observed that a small piece of paper is attached to the Phillips sample with sketches of asci and spores and with the words "Sp. Herb. C.E.B. - .007 x .001 mm", for this makes the treatment in his Manual (Phillips 1887 p. 332; copied in Saccardo 1889 p. 640) a complete mystery: Batheaston is given as the sole locality and, nevertheless, the apothecia are said to be 300-500 µm broad and the spores "fusiform, slightly curved, biguttulate, at length pseudo-uniseptate, 15 x 2 µm", for these details point unequivocally to the true *P. cornea*, and this is otherwise not known from the Batheaston area.

There are in K five more samples of *P. cornea* collected by Broome on *C. paniculata*, but rather on sheaths than on leaf blades, which makes the phrase 'on dead stalks' of the original description more intelligible. They all seem to be from Spye Park (Wiltshire). The diagnosis gives "March 1850" as the collecting date, and so a sample (n. 109) dated "3/18 - 1850" must be the holotype. Another sample (also from Herb. Broome) was collected "Febr. 1850" and one (with a duplicate in Herb. Fries, UPS) "March

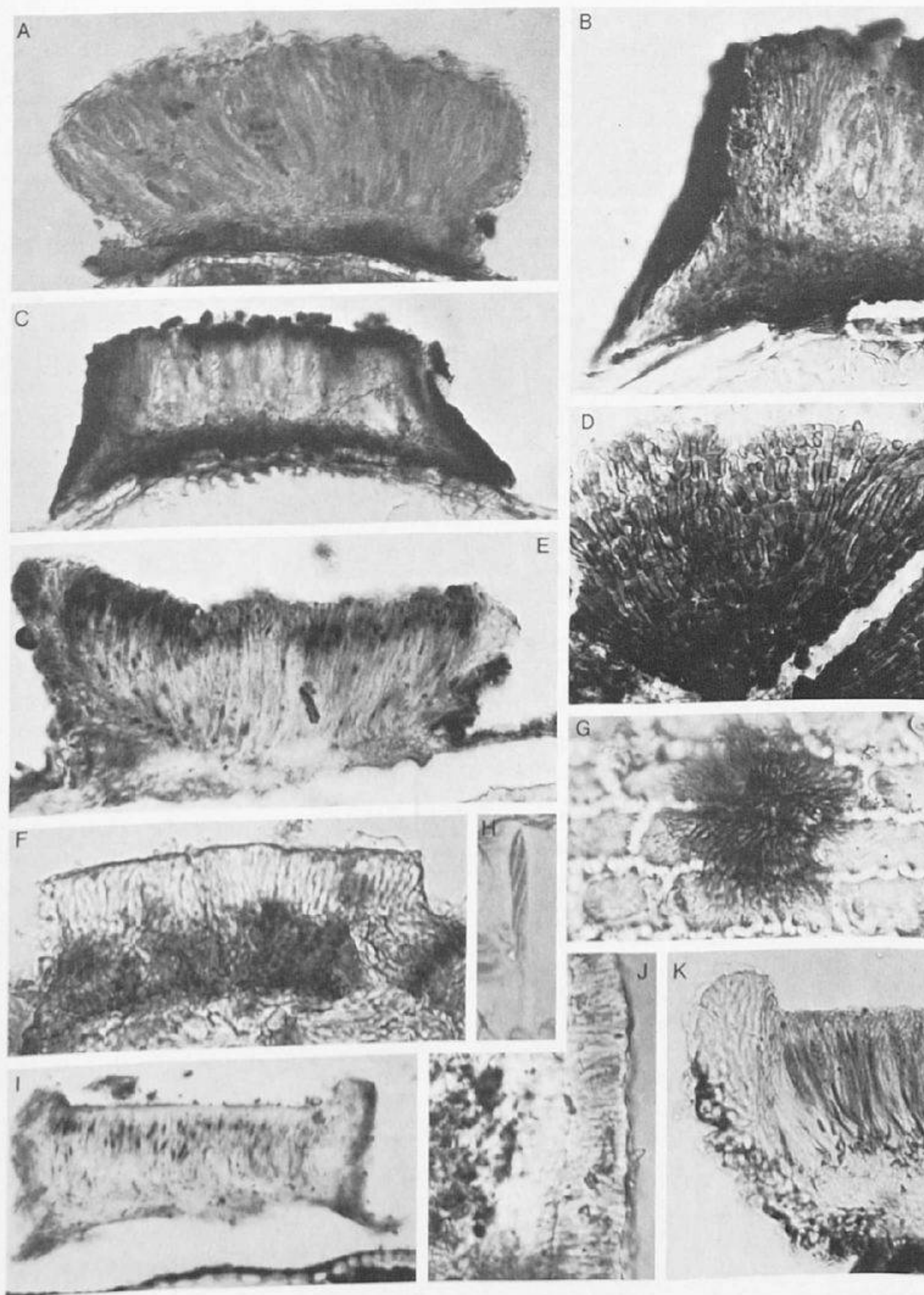


Fig. 1. A: "*Actinoscypha*" *muelleri* (isotype ZT). Median section; the cuticle clothing excipulum seen to the right; intraepidermal mycelium also discernible (c. 240 ×). - B-D: *Nannfeldtia atra* (Müller UPS). - B-C: Median sections (c. 370 × and c. 180 ×). - D: Part of shield (c. 370 ×). - E-G: *Micropeziza cornea*. - E (type of *Belonidium aurantiacum*): Median section (c. 370 ×). - F (type of *M. scirpicola*): Excipulum from outside (c. 370 ×). - G (III. 1859 Broome): Young, still semitranslucent shield (c. 370 ×). - H-K: *M. poae*. - H-I (type): Ascus with 1-septate spores and median section of apothecium (c. 1000 × and c. 240 ×). - J (J. A. N. 23966): Part of excipulum from outside (c. 370 ×). - K (J. A. N. 4115): Part of median section showing the thick walls of the excipular cells (c. 370 ×).



1859". One sample (from Herb. Ravenel) is marked "Wiltshire - Febr. 1851". These show all the same fungus, which proves to be a typical *Micropeziza*. The fifth sample, dated "1/29 - 51" shows - at least now - only a few apothecia of a *Mollisia* (s. lat.) with dark excipulum and a narrow fringe of dark radiating hyphae surrounding the base of each fruitbody.

The description of *Belonidium rufum* Schroeter (1893 p. 109) led Rehm (1896 p. 1228) to suppose a close relationship to *M. scirpicola*. According to information from Dr W. Stojanowska (in litt. 29.XI. 1975) no material is now to be found in his herbarium (WROC).

Critical perusal of descriptions of small sessile Discomycetes on grasses and grass-like monocotyledons brought to light two more candidates for inclusion into *Micropeziza*, viz., *Trochila ignobilis* Karsten (1871 p. 248) and *Mollisia sylvatica* Karsten (1888 p. 4). More species may still be hidden under insufficient or misleading descriptions, and intensified field studies will certainly add new species and widen the host-ranges and distributions of the old ones.

No other host families were included in my search, for experience has convinced me that "mollisoid" fungi growing on grasses and similar plants to a considerable extent constitute special genera restricted to such plants. It should not be forgotten, however, that Höhnelt (1919) thought *Discomycella* (with *D. tjibodensis* on dead leaves of *Amomum* sp.) to be closely related to *Niesslella*. On the other hand, our increased knowledge of *Micropeziza* makes my suggestion (Nannfeldt 1932 p. 199) untenable that also *Pezolepis* H. Sydow (1925 p. 408) might be of this kinship.

*Actinoscypha muelleri* Graddon (1972), the latest acquisition to our genus, is a most distinctive fungus, well illustrating the highly neglected wealth of small "mollisoid" Discomycetes which grow on grasses and similar

plants and for which only too often no satisfactory generic names can be found. The above species is such a case. It is no *Micropeziza* and does not fit into any other genus known to me. My examination of it (isotype, ZT) failed to show shields or remnants of such. The shape of a median section (Fig. 1 A; also well shown in Graddon's drawing) differs markedly from that of a true *Micropeziza*. The tissues of the matrix beneath the apothecia are filled by hyphae (not shown in his drawing but in my photograph), and in one section the excipulum was seen to be covered by a strongly refractive, yellowish membrane, c. 1  $\mu$ m thick, smooth except for shallow grooves at intervals of c. 10  $\mu$ m. This membrane is clearly a flap of the matrical cuticle and the grooves mark the limits between the cells of the epidermis and indicate that the apothecia form subcuticularly, just as they do, e.g., in "*Mollisia*" *advena* Karst. and "*Dibeloniella*" *eriophori* (Kirchn.) Müll. & Défago (= "*Mollisia*" *cymbispora* Rostr.) according to information from Mrs Berta Anderson. *A. muelleri* resembles also in some respects *Coronellaria* Karst.

Up to now, nine nominal species have thus been found to belong to *Micropeziza*, but are they all specifically distinct? Certainly not, but the answer given below is only tentative, for the material available at present is hardly sufficient to show the full variability and host range of these rare and little collected fungi.

*M. punctum*, *M. karstenii* (= *A. graminis*), and *M. verrucosa* (= *A. verrucosa*) each possess characters (vide infra) that make their distinctness obvious, but the other six agree closely with each other in all essential points. They differ from the first three in the shield (Fig. 1 G), whose cell walls are thin and rather pale (instead of thick and dark; Fig. 2 G) but share with *M. karstenii* and *M. verrucosa* the peculiar excipulum formed by conglutinated rows of

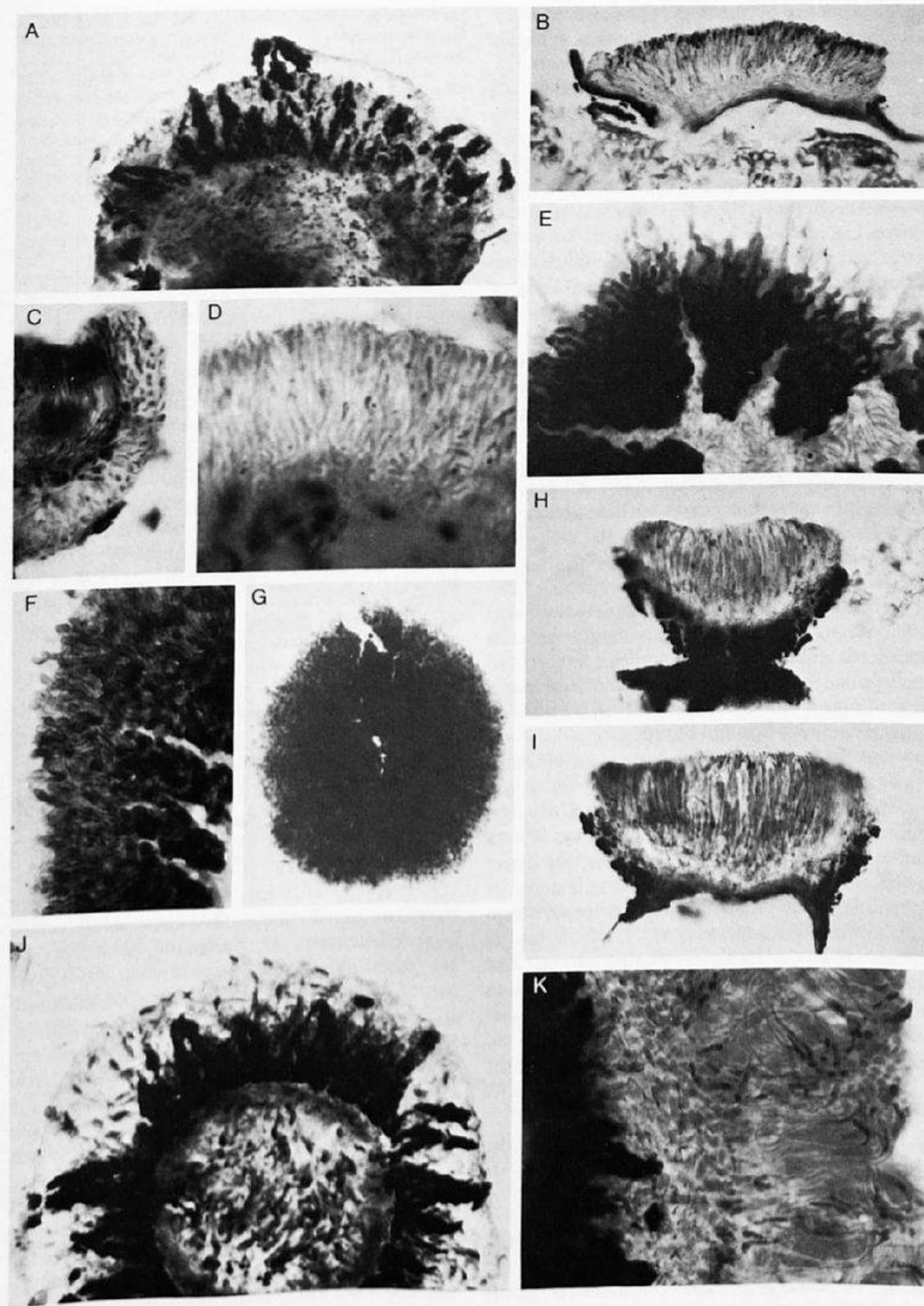


Fig. 2. A-E: *Micropeziza karstenii*. - A-B (Syd., Myc. germ. 2156): Apothecium from below with remnants of the shield and median section (both c. 150 $\times$ ). - C (Starbäck): Part of the same showing excipular structure (c. 370 $\times$ ). - D (Lohammar): Excipulum from outside (c. 150 $\times$ ). - E (J. A. N. 11522 a): Shield splitting up and exposing hymenium (c. 370 $\times$ ). - F-K: *M. verrucosa*. - F (type): Fissured shield (c. 370 $\times$ ). - G (Dutoit): Shield (c. 150 $\times$ ). - H-I (Kretschmer): Eccentric and median sections of apothecium (c. 150 $\times$ ). - J (Dutoit): Apothecium from below with remnants of the shield; asci with pigmented spores visible in the centre (c. 150 $\times$ ). - K (type): Margin of apothecium from below; to the left remnants of the shield; to the right squeezed-out hymenial elements showing pigmented tips of paraphyses (c. 370 $\times$ ).



elongated cells with hyaline, thick and strongly refractive walls (Figs. 1E, F, I-K; 2 A-D, H-K).

*Micropeziza scirpicola* and *Mollisia sylvatica*, known only from their type collections, agree in general appearance, all microscopic details, and matrix (leaves of *Scirpus sylvaticus*), and so they can safely be declared synonymous. It should be observed that Höhnel (1919) totally overlooked the excipulum in *M. scirpicola* taking its alleged absence as a distinguishing mark from *B. aurantiacum* and that Müller (1966) did not notice its peculiar structure.

*Peziza cornea* and *Belonidium aurantiacum* are both described from *Carex*: the former (on *C. paniculata*) is known from several finds in the type locality and from one more English collection (Dennis 1960, 1968), the latter (on *C. acutiformis*) from the type collection from Germany only. The apothecia of *B. aurantiacum* are slightly paler but otherwise the agreement between all specimens is so full that they cannot be kept apart. They agree further in almost every respect with *M. scirpicola*. Besides in hosts they differ in apothecial size, the *Scirpus* fungus having slightly smaller apothecia. The asci of *M. scirpicola* are also on the average somewhat shorter and the hymenium accordingly a little lower.

*Trochila ignobilis* is based on two simultaneous finds, one (lectotype) on *Eriophorum vaginatum* and the other (paratype) on *Carex* sp. The material is very poor, especially the duplicates of the lectotype in S (from Herb. Rehm) and UPS, but there cannot be any doubt which fungus Karsten had in mind, for no other fungus is to be seen in the "maculis albicantibus". This is a *Micropeziza*, which in all details agrees with those treated above. The diagnosis is thus so far misleading as it gives the apothecia as "erumpenti-superficialia", and so is the comment "aequo fere jure ducitur ad *Trochilam* vel *Mollisiam*".

As far as I understand, all later records of this species are erroneous.

Rehm (1888 p. 142) reported as *Naevia ignobilis* (Karst.) Rehm an immersed-erumpent fungus on *Carex curvula*, collected by G. Winter and distributed as *Micropeziza subvelata* Rehm in J. Kze, F. sel. 585 and Rbh., F. eur. 2648. He had compared Winter's fungus with "Originalen Karsten's" (i.e., the sample now in S) and found them to agree so well as to be conspecific. This conclusion is incom-

prehensible, for Winter's fungus belongs clearly to the *Hysteropezizella diminuens* complex, but from that date on Karsten's species has invariably been regarded as an immersed-erumpent species. The name has, in fact, only rarely been actually used (e.g., by Rostrup 1888 p. 539, 1891 p. 612, 1894 p. 18, 1904 p. 119 and Schroeter 1893 p. 151) but has now and then been referred to as doubtfully distinct from two other Karsten species, viz., *T. fuscella* and *T. diminuens*. When I (Nannfeldt 1932 p. 114) had found that the latter species and *Hysteropezizella caricis* (Peck) H. Syd. are synonymous, Lind (1934 p. 89) transferred *N. ignobilis* to *Hysteropezizella* and used it "ad interim" as a collective name for various species of *Hysteropezizella* (and *Merostictis*) on Cyperaceae and grasses.

A second collection on *Eriophorum vaginatum* of a fungus in every detail agreeing with Karsten's species has been seen from Germany.

A recent Swedish collection (Holm 727 c) of a morphologically indistinguishable fungus on *Juncus effusus* turned up when this paper was almost completed. This find makes it even more probable that we are dealing with a single species possessing a rather wide host range. As *cornea* is the oldest of the epithets, the correct name of the species becomes *Micropeziza cornea*.

*M. poae*, finally, is described from leaves of *Poa sudetica* (= *P. chaixii*), and fungi of the same morphology have become known from culms and leaves of various grasses. They are certainly all conspecific and agree on the whole rather well with the preceding fungus on Cyperaceae and Juncaceae.

In Fuckel's diagnoses the only tangible differences between *M. poae* and *M. scirpicola* are "ascis subclavatis, stipitatis" in the former and "ascis sessilibus oblongis" in the latter and spores  $12 \times 2 \mu\text{m}$  and  $12-14 \times 3 \mu\text{m}$ , respectively. Rehm found differences in the size of the apothecia (0.2-1 mm against 0.1-0.15 mm) and in the spores, viz., 0(-1)-septate  $10-12 \times 2-2.5 \mu\text{m}$  against 1(-3)-septate  $15-17 \times 2.5 \mu\text{m}$ , but described the asci with about the same words in both. The hymenial elements are very difficult to see clearly because of their agglutination. They change also considerably with increasing age, the agglutination becoming stronger, the swellings of the paraphysal tips more pronounced and their walls pigmented. The slow

development of the asci with only few ripening at each time makes it almost impossible to find free mature spores. All descriptions of the hymenial elements must thus be taken *cum grano salis*.

The samples on Cyperaceae have spores that differ very little from those of graminicolous specimens. (The recent collection on *Juncus* is rather young without mature spores.) In both groups the spore size lies as a rule within  $12-16 \times 2-3 \mu\text{m}$ . The broadest spores observed emanate from graminicolous specimens and the few 3-septated from such on Cyperaceae.

A difference in the shape of the ascus may seem a futile character and one difficult to define as the shape changes with the age, but in the present case it is easy to see that asci of comparable age are thicker and stouter (especially basally) in specimens from Cyperaceae and *Juncus* than in such from grasses (Fig. 1 H), just as Fuckel noticed.

There are, however, additional differences. The shields are in both groups formed by radiating hyphae with so thin and pale walls that they are transparent under the microscope (Fig. 1 G). In specimens from Cyperaceae the walls are bright yellowish brown and the young shields *in situ* show the same colour under a hand lens. The diameter of the hyphae is  $2-3 \mu\text{m}$ . In the graminicolous specimens the walls are still thinner and their colour under the microscope is a pale and dirty yellowish brown with a tinge towards olive. The hyphae reach a diameter of only  $1-1.5 \mu\text{m}$ .

The structure of the excipulum is also markedly different in the two groups, the radiating thick-walled hyphae being straighter and less closely septated in the graminicolous specimens, especially their terminal cells are distinctly longer.

Moreover, the fungi on Cyperaceae and *Juncus* seem to grow in very wet habitats, as indicated by the microscopical algae that as a rule accompany them on the matrix, whereas those on grasses grow in drier, wholly terrestrial localities.

*M. poae* will thus be kept as a separate species.

The number of acceptable species has thus been reduced to five: *M. cornea*, *M. karstenii*, *M. poae*, *M. punctum*, and *M. verrucosa*. Three additional, new species (one on *Carex* and two

on *Juncus*) will be described below. Their affinities are with *M. punctum*.

More species certainly remain to be detected and described. Thus, a North American sample (U. S. A.: Washington, Mt Baker; ZT!) on *Carex* sp. collected by Prof. E. Müller shows a fungus close to *M. verrucosa* but probably distinct. The sample is too poor for description but, nevertheless, most interesting as being the first find of a *Micropeziza* outside Europe. Further, Dr O. Eriksson has given me some Swedish and Norwegian samples of *Elymus* bearing shields similar to those of *Micropeziza* but too young to show the details of excipulum and hymenium necessary for identification. Another case for intensified field studies!

Ascomycetes with ascocarps developing beneath a superficial or subcuticular covering shield have as a rule been placed in a special group (Hemisphaeriales) with numerous members, especially in the tropics. It has become evident (cf., e.g., Luttrell 1951, 1973, Arx & Müller 1954, Müller & Arx 1962) that this is no true (monophyletic) taxon but rather an ecologic and physiognomic assemblage of fungi that by convergent evolution have reached the same "life form" in response to their superficial habitat. The concerned fungi are mostly bitunicate but some few inoperculate Discomycetes have been detected amongst them (and more may remain unobserved). Thus, *Diplocarpon rosae* Wolf (1912) with subepidermal apothecia formed beneath a subcuticular radiating shield was described as a new genus of Microthyriaceae. However, when a closely related species without shield was discovered, it became clear that they were Discomycetes, and the presence or absence of a shield was not even considered as sufficient for generic distinction (Wolf 1924; cf. Nannfeldt 1932 p. 171-172). *Schizothyrioma* Höhn. with wholly subcuticular fruitbodies should also be remembered (Holm 1971).

Wholly superficial are the fruitbodies in *Micropeziza* (and *Discomycella*?) as well as in *Nannfeldtia* Petrak (1947).

Prof. E. Müller (in litt.) has drawn my attention to the last-mentioned genus (sole species *N. atra* Petr. on leaves of *Carex firma*) and generously supplied material (Switzerland: K<sup>1</sup> Graubünden: Davos Ducantal b. Sertig



2.IX. 1971 E. Müller) for study. Clearly it does not belong to the Phacidiaceae as suggested by its author (and repeated by Korf 1973 p. 280). Prof. Müller suggests a close affinity to *Micropeziza*, but I cannot follow him in this. In my opinion it affords rather an additional example of convergent evolution leading to "hemisphaerioid" fruitbodies (Fig. 1 B-C). The following are the principal deviating features: (1) The structure of the shield whose radiating hyphae from the very beginning are firmly coalesced into a plate similar to that of many Microthyriaceae (Fig. 1 D); (2) the breaking up of the central suprahymenial part of the shield into polygonal cells or small groups of cells, simulating an epithecium; (3) the presence of a rich subcuticular and intraepidermal mycelium beneath the fruitbodies and of numerous hyphae perforating the wall of the matrix and connecting the mycelium with the fruitbodies. Further deviating features are the shape and non-septation of the spores. To Petrak's very full description can be added that the spore wall eventually becomes smoky grey and that the ascus tips show a small, flat, directly I + ring with a wide opening.

A very homogeneous and certainly monophyletic group is formed by *M. cornea*, *M. karstenii*, and *M. poae*, each of which happens to be the type of one of the three genera we are concerned with. The crucial feature is the peculiar texture of the marginal excipulum (*vide supra*). Other important traits are the structure of the shield, the tendency to agglutination of the hymenial elements (which may become almost as firm as in *Orbilia*), the general shape and size of the spores, and the intense direct reactivity to iodine in the perforated apical ascus plug (becoming almost black). The perforation is relatively wide and easily seen from above. In *M. cornea*, where the apical part of the plug reaches c. 3  $\mu$ m in

diameter, it can be seen that the plug consists of a wider apical cylinder and a narrower proximal one separated by a low uncolourable ring.

As the iodine reactions have been found to offer several previously neglected complications with bearing upon the use of this character in taxonomy (cf. Kohn & Korf 1975; Nannfeldt 1976) and affecting also species treated in this paper I have found it advisable to describe the reactions in detail.

In *M. cornea* and *M. poae* the shields are formed by hyphae whose walls are thin and pale. The remnants of the shields contrast thus only slightly in colour from the excipulum when attached to it (Fig. 1 F, J). In *M. karstenii*, on the contrary, the hyphae (especially those in the central part of the shield) possess thicker and much darker walls, and their remnants consequently stand out as dark crusts or scurves on the pale excipulum (Fig. 2 A).

*M. verrucosa* agrees exactly with the preceding group with regard to the excipulum and has also shields of the same type (Fig. 2 F, G, J, K) but the conglutination of the hyphae is stronger (approaching the conditions in *Nannfeldtia*). The walls of the hyphae are more undulate, and their free ends are short and rounded with pigmented walls. The shields of the North American sample referred to above are of about the same character.

The eventually rough and pigmented spore wall in *M. verrucosa* is unique within the genus, but two more alleged unique characters do not hold true, for the cup-shaped base of the apothecium and the presence of a dark thick "subiculum" between it and the matrix are fictions due to the study of eccentric sections. Median sections show apothecia of exactly the same shape and position as in the other species (Fig. 2 H, I).

Pigmentation of the spore wall is no common feature within the Mollisioideae and, when it

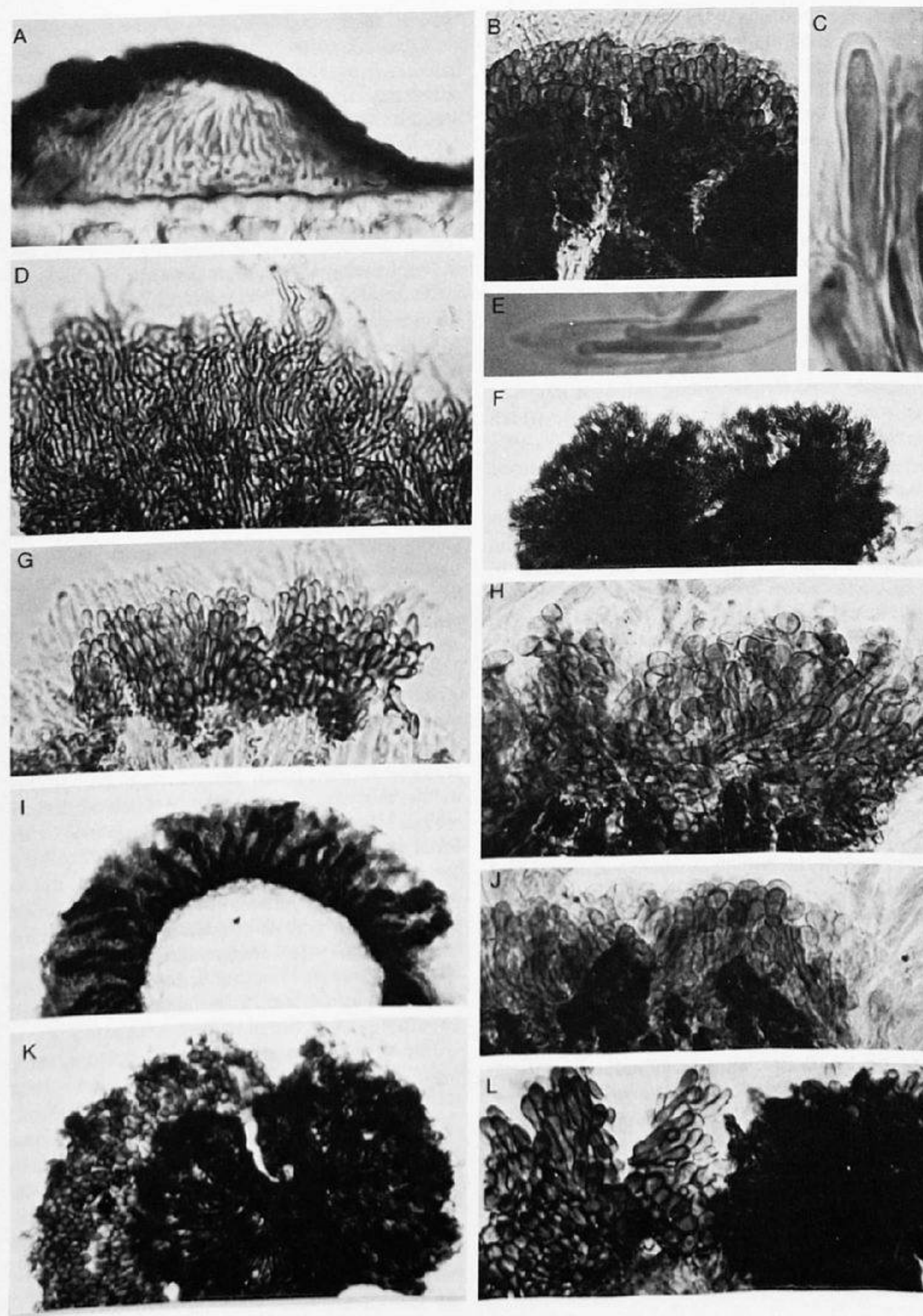


Fig. 3. A-D: *Scutomollisia punctum* (J. A. N. 14611). - A: Median section of young fruitbody; apothecium still covered by the shield (c. 600 $\times$ ). - B: Margin of excipulum from outside (c. 370 $\times$ ). - C: Young ascus with maximal wall thickening (c. 1000 $\times$ ). - D: Margin of shield (c. 370 $\times$ ). - E-G: *S. stenospora* (type). - E: Part of mature ascus with two spores left; the large drop in the distal end of the spores visible (c. 1000 $\times$ ). - F: Two confluent shields (c. 150 $\times$ ). - G: Margin of excipulum from outside (c. 370 $\times$ ). - H-J: *S. leptoderma* (type). - H: Margin of excipulum from outside (c. 370 $\times$ ). - I: Apothecium from below with remnants of the shield (c. 150 $\times$ ). - J: Margin of excipulum from outside (c. 370 $\times$ ). - K-L: *S. operculata* (type). - K: Shield on top of apothecium (c. 240 $\times$ ). - L: Apothecium from below; to the right operculum adhering to the excipulum (c. 370 $\times$ ).



occurs, it appears as a rule rather late. It is to be found, e.g., in "*Niptera*" *arctica* Rehm as well as in several members of the *Hysteropezizella* complex (cf. Défago 1968). The situation resembles thus that in Hemiphaciaceae and Sclerotiniaceae discussed by Korf (1962 p. 16-18).

The spore wall is almost without exception smooth in the whole Helotiales. A roughness comparable to that in *M. verrucosa* seems to occur occasionally in "*Niptera*" *arctica* and to consist of minute (occasionally confluent) amorphous granules attached to the wall and can hardly be designated as a true ornamentation.

*M. punctum* and the three novelties differ strikingly from the preceding in the structure of the excipulum (Fig. 3B, G, H, J, L), which agrees with that typical of the *Mollisia-Pyrenopeziza* complex. Their excipulum is formed by radially arranged, diverging rows of  $\pm$  isodiametric cells of which the outer are subglobose and have strongly pigmented walls except towards the margin, where the terminal cells of the rows are elongated and  $\pm$  clavate with paler walls. Because of the deviating excipulum these species will be placed in a new genus, *Scutomollisia*, with *M. punctum* as the type species.

It could be expected that the excipulum should tend to be reduced or transformed when the apothecia develop beneath a shield, since its protecting function has been taken over by the shield, just as is the case in most members of the *Hysteropezizella* complex where the matrix affords protection to the  $\pm$  immersed apothecia (cf. Défago 1968). Such is evidently also the case with the species of *Micropeziza sensu restrictiore* and in one of the new species of *Scutomollisia*, viz., *S. leptoderma*, in which the excipulum is thin, externally dissolved into long (up to 70  $\mu$ m), flaccid, free, hypha-like rows of subcylindrical cells (c. 2-4  $\mu$ m in diam. and up to 20  $\mu$ m long) terminating in a large subglobose or broadly pyriform cell (ca. 8-12  $\times$  8-12  $\mu$ m) (Fig. 3 H, J). All cells remain long so thin-walled and pale that the whole excipulum is easily overlooked. In the three other species it is as strong, coherent and dark as normally in the *Mollisia-Pyrenopeziza* complex.

The shield (Fig. 3 D, F, K) has the same structure in *Scutomollisia* as in *Micropeziza*. The normal way for the hymenium to become

exposed is by  $\pm$  radial, centrifugal fissures in the shield, resulting in a number of triangular flaps,  $\pm$  firmly adhering to the excipulum. The number of such flaps and, consequently, their breadths vary from species to species. *S. leptoderma* has the most numerous and narrowest flaps (Fig. 3 H-J). One of the new species of *Scutomollisia*, viz., *S. operculata*, forms an interesting exception. The centre of its shield is firmer and does not rupture from the pressure of the growing apothecium. The entire shield is instead lifted from the matrix. Sometimes it becomes lying on the apothecium as a free operculum (Fig. 3 K) until it falls off, but usually it remains attached to the matrix on one side and adheres on that side to the excipulum (Fig. 3 L). The material of *S. stenospora* is too young to show with certainty how the shield behaves.

In *S. punctum* the asci are rather plump,  $\pm$  cylindrical, almost sessile and, when young, hardly narrowed upwards and broadly rounded, thus similar to those of *M. cornea* but still more extreme. Their wall is firm, thick and strongly refractive. Before spore formation the wall can apically reach a thickness of well 2  $\mu$ m (Fig. 3 C). Also the wall (and the median septum) of the young spores is unusually thick and highly refractive. In one otherwise typical apothecium (J.A.N. 14611) still unseptated spores had smoky grey walls that got a distinct violet tinge by iodine. The asci are 1- as observed by Rehm (1881, 1891), and not even pretreatment with KOH and H<sub>2</sub>SO<sub>4</sub> provokes a positive reaction. No apical plug is to be seen. In its place there is a thin, almost flat cushion. Müller (1966) reports a positive reaction and draws an ascus of the same shape and with the same apical plug as in his other species. Now, however, he finds (in litt. 22.XII. 1975) that he must have been the victim of some mistake.

The new *S. leptoderma* has also plump and unconditionally 1- asci as well as spores that rather early show a very distinct median septum.

The two remaining species, *S. operculata* and *S. stenospora*, possess on the contrary gracile asci with subconical tips, including minute apical plugs (c. 1  $\mu$ m in diameter) that with iodine directly acquire a pure, but not very dark blue. No fully mature spores have been seen and only few that have escaped from the asci. They are hyaline-walled, subcylindri-

cally clavuliform with the upper end slightly thicker and more rounded than the lower, show no sign of septation, and contain a row of usually four rather large drops (vacuoles?), of which the uppermost as a rule is the largest and situated very close to the end (Fig. 3 E).

The agreement in excipular structure of the four species of *Scutomollisia* with the *Mollisia-Pyrenopeziza* complex is so close that it cannot be doubted that they are derived from it. On the other hand, the differences in the same respect from the true *Micropezizae* are so profound that the two genera must represent different evolutionary lines. In view of our present knowledge (cf. Nannfeldt 1976) there is no hindrance for keeping both 1- and 1+ species in *Scutomollisia*.

More detailed comparisons with the *Mollisia-Pyrenopeziza* complex are out of the question as long as its taxonomy is in its present chaotic state, but some remarks on the position of the apothecium in relation to the matrix may be useful here. In the floristic literature *Mollisia* (incl. *Tapesia* Fuck.) is regularly described as having superficial apothecia but this is not correct. Korf's formulation (1973 p. 291) is not accurate either: "Apothecia entirely superficial, rarely with a tiny base inserted in the host tissue". The "inserted base" is the primordium, which forms within the matrix just below its surface and from which the apothecium grows out. Höhnelt (e.g., 1918 p. 577-578) calls such a base a "hypostroma", and Le Gal & Mangenot (e.g., 1958 p. 31, 1961 p. 316) designate such apothecia as "suberumpent". The presence of such an intramatrical primordium is rather the rule than an exception. But, for example, Graddon (1972) was misled to consider this feature so unusual that he named his new *M. stromatica* after it. The type species of *Mollisia* (*M. cinerea* (Pers. ex Fr.) Karst.), *Tapesia* (*T. fusca* (Pers. ex Fr.) Fuck.) and *Haglundia* Nannf. (*H. perelegans* Nannf.) possess such primordia (cf., e.g., Nannfeldt 1932 figs. 13a, 23a and 11a, tab. IV fig. 3, tab. VI figs. 1 and 2). More examples are illustrated by, e.g., Le Gal & Mangenot (1958, 1960, 1961, 1966), Bellemère (1968), and Aebi (1972).

On the other hand, Hütter (1958) goes too far in the opposite direction when ascribing all

the "Mollisieae" (i.e., *Belonopsis* (Sacc.) Rehm, *Mollisia*, *Tapesia*, and *Trichobelonium* (Sacc.) Rehm) a stipe-like apothecial base. He overlooks the existence of closely allied species with  $\pm$  broad-based, truly superficial apothecia. However, rather few species can with full confidence be placed in this latter category, for a tiny intramatrical base is easily missed, if not specially sought for.

Le Gal was evidently well aware of this distinction, and amongst her detailed and exact descriptions and drawings we find two wholly superficial lignicolous species, viz., *Mollisia cinereo-olivascens* Le Gal & Mangenot (1958 p. 52-53 as *Niptera cinerea* var. *olivacea*; 1961 p. 304-308) and *M. undulato-depressula* (Feltg.) Le Gal & Mangenot (1960 p. 152-160). Otherwise the few reliable examples known to me are on substrates with smooth, firm and persistent surfaces. One such species, *M. millegrana* (Boud.) Nannf. on *Filipendula ulmaria*, is illustrated by me (Nannfeldt 1932, figs. 14c and d), but this is far from being a typical *Mollisia*. More typical species seem to occur on grasses, Cyperaceae and Juncaceae, but for lack of adequate studies they cannot be mentioned by reliable names. At least part of *Niptera* Fr. sensu Dennis (1972) belongs here, e.g., *Peziza junciseda* Karst. ssp. *juncinella* Karst. as shown by the type specimen. In some cases there is a dense intramatrical mycelium beneath the apothecia (just as in *Nannfeldtia*, see above), in other cases there is no or only a sparse inconspicuous mycelium.

If we further remember that the bases of  $\pm$  superficial "mollisoid" apothecia are often surrounded by a fringe of radiating brown-walled hyphae adpressed to the matrix, it is easy to imagine how species with superficial apothecia beneath a shield can have evolved. The assumption that *Scutomollisia* has arisen this way from the *Mollisia-Pyrenopeziza* complex seems unavoidable.

For the species of *Micropeziza* a corresponding evolution is probable, but their "roots" are less obvious. Shields and hymenia are so similar to those in *Scutomollisia* as to suggest a close affinity, but the excipulum is so deviating that on first sight the affinity with the Mollisioideae (and even with the Dermateaceae on the whole) might be questioned. However, the formation of "sclerenchymatic" tissues can



evidently be realized in most groups of fungi, probably as a response to edaphic conditions.

The pigmentation of spore walls and paraphysal tips (as in *M. verrucosa*) is an unusual feature in the Mollisioideae though far from unknown, and also the roughness of the spore wall has at least one counterpart (see above). It seems thus possible that also *Micropeziza* is derived from the Mollisioideae and that its peculiar excipulum has arisen by reduction of the normal external layer accompanied by a strong "sclerenchymatization" of an inner layer.

Le Gal & Mangenot (1958 p. 52-54, 1961 p. 301-308) describe and depict a lignicolous typical *Mollisia* (*M. cinereo-olivascens* Le Gal & Mangenot), in which the perihymenial excipulum has "une zone interne de filaments incolores et redressés, à disposition radiale, à parois réfringentes plutôt épaissies; ces parois ne se colorent pas au bleu coton, alors que le

contenu des hyphes bleuit intensément" (1958 p. 52). This is word for word applicable to the *Micropeziza excipulum*. On several occasions I have seen similar tissues in superficial culmicolous species of *Mollisia* s. lat. (which I must leave anonymous).

Evolutionary lines in the opposite direction, i.e., towards immersed and at the most ± erumpent apothecia lead evidently to the *Hysteropezizella* complex, where likewise reduced and/or transformed excipula can be found. An inner "sclerenchymatic" layer of *Micropeziza* type is thus very conspicuous in *Merostrictis circinata* (Lib.) Défago. It becomes thus still more likely that *Micropeziza* too has its phylogenetic "roots" in the *Mollisia-Pyrenopeziza* complex, representing an independent line and a more "advanced" stage than *Scutomollisia*.

#### Key to Discomycetes with superficial apothecia formed beneath a shield of radiating hyphae

1. Hymenium in mature apothecia with an "epithecium" of crumbled remnants of the shield. On *Carex firma* ..... *Nannfeldtia atra* (see p. 329-330)
2. Hymenium naked in mature apothecia ..... 2
2. Perihymenial ectal excipulum of "textura oblita"; its hyphae with thick, hyaline, strongly refractive walls (*Micropeziza*) ..... 3
3. Ectal excipulum "mollisoid", i.e., "textura globulosa"-"textura angularis"; cells brown-walled, towards the margin elongated and claviform, paler (*Scutomollisia*) ..... 6
3. Shield of rather pale, thin-walled hyphae; its torn flakes almost concolorous with the excipulum when attached to the apothecium ..... 4
4. Shield hyphae with strongly pigmented walls; the torn flakes of the shield much darker than the excipulum ..... 5
4. Shield hyphae 2-3 µm in diam.; their walls bright yellowish brown. Asci plump, <55 µm long. On Cyperaceae and Juncaceae ..... *M. cornea*
5. Shield hyphae 1-1.5 µm in diam.; their walls pale and dirty yellowish brown with a tinge of olive. Asci gracile, mostly 55-75 µm long. On grasses ..... *M. poae*
5. Spores hyaline, smooth. On grasses ..... *M. karstenii*
6. Spore wall early greyish brown, rough. On *Carex sempervirens* ..... *M. verrucosa*
6. Asci plump with broad rounded tips, unconditionally 1-. Spores 15-22 × 3.5-4.5 µm, early with a distinct median septum ..... 7
7. Asci gracile, acuminate with minute apical plugs, directly 1+ (pure blue). Spores narrower (c. 2 µm broad), long (permanently?) unseptate ..... 8
7. Excipulum conspicuous with distinctly pigmented cell walls. On grasses, esp. *Nardus* ..... *S. punctum*
7. Excipulum thin and long translucent, dissolved into free cell rows; cell walls thin and rather pale. On *Juncus* ..... *S. leptoderma*
8. Spores 16-22 × 2 µm. On *Juncus* ..... *S. stenospora*
8. Spores 8-11 × 2 µm. On *Carex binervis* ..... *S. operculata*

#### *Micropeziza* Fuck.

Fuckel, Jb. Nassau. Ver. Naturk. 23-24 (=Symb. myc.): 291 (1870). - Lectotypus (sel. by Höhnel 1919): *M. poae* Fuck.

*Actinoscypha* Karst., Medd. Soc. F. Fl. Fenn. 16: 5 (1888). - Typus (only species): *A. graminis* Karst.  
*Niesslella* Höhn., Ber. Deutsch. Bot. Ges. 36: 468 (1919). - Typus (by designation): *Micropeziza scirpicola* Fuck.

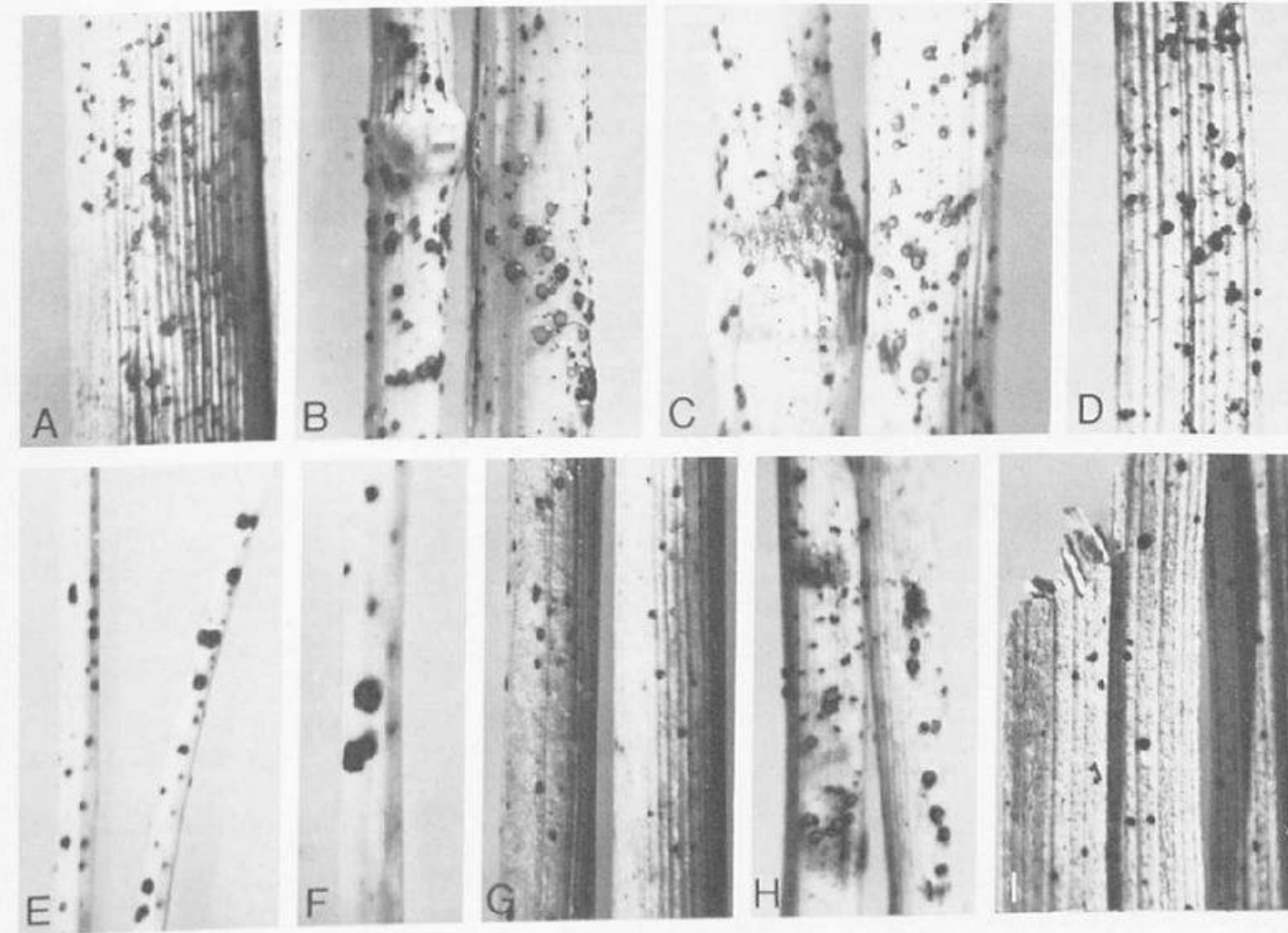


Fig. 4. A: *Micropeziza cornea* (Holm 727 c). - B: *M. karstenii* (J. A. N. 7739). - C: *M. poae* (J. A. N. 4115). - D: *M. verrucosa* (Dutoit). - E-F: *Scutomollisia punctum* (J. A. N. 11771 d). - G: *S. stenospora* (type). - H: *S. leptoderma* (type). - I: *S. operculata* (type). - All 6 ×, except F (12 ×). - Photo Kerstin Holm.

#### 1. *Micropeziza cornea* (B. & Br.) Nannf. nov. comb.

*Peziza cornea* B. & Br., Ann. Mag. Nat. Hist. 2:7: 183 (1851). - *Calloria cornea* Phill., Man. Brit. Discom. p. 332 (1887). - *Mollisia cornea* Höhn., Sitzber. Akad. Wiss. Wien, Math.-nat. Kl. 1, 127: 367 (1918; non sensu Höhn.). - Typus (only coll.): England (*Carex paniculata*) 18.III. 1850 C. E. Broome (K!).

[*Peziza scirpicola* Fuck., F. rhen. 1870 (1866; nom. nud.)] - *Micropeziza scirpicola* Fuck., Jb. Nassau. Ver. Naturk. 23-24 (=Symb. myc.): 292 (1870). - *Mollisia scirpicola* Sacc., Syll. fung. 8: 384 (1889). - *Belonidium scirpicola* ("scirpicolum") Rehm in Rbh., Krypt. Fl., ed. 2, 1:3: 567 (1891). - *Urceolella scirpicola* Boud., Hist. Class. Discom. d'Eur. p. 130 (1907). - *Niesslella scirpicola* Höhn., Ber. Deutsch. Bot. Ges. 36: 468 (1919). - *Actinoscypha scirpicola* E. Müll., Ber. Schweiz. Bot. Ges. 76: 234 (1966). - Typus (only coll.): Fuck., F. rhen. 1870 (*Scirpus sylvaticus*).

*Trochila ignobilis* Karst., Bidr. känned. Finlands nat. folk 19 (=Myc. Fenn. 1): 248 (1871). - *Pha-*

*cidium ignobile* Karst., Acta Soc. F. Fl. Fennica 2:6: 160 (1885). - *Naevia ignobilis* Rehm in Rbh., Krypt.-Fl., ed. 2, 1:3: 142 (1888; non sensu Rehm). - *Hysteropezizella ignobilis* Lind, Kgl. Danske Vidensk. Selsk., Biol. Medd. 11 (2): 89 (1934; non sensu Lind). - Lectotypus (sel. here): Finland (*Eriophorum vaginatum*) P. A. Karsten (Herb. Karsten 1535 H!; isolectotypi: S! UPS!).

*Mollisia sylvatica* Karst., Medd. Soc. F. Fl. Fenn. 16: 4 (1888). - Typus (only coll.): Finland (*Sc. silv.*) P. A. Karsten (holotypus: Herb. Karsten 1495 H!; isotypus: S!).

*Belonidium aurantiacum* Rehm in Rbh. l.c. p. 564 (1891). - *Niesslella aurantiaca* Höhn. l.c. p. 468 (1919). - Typus (only coll.): Syd., Myc. march. 1582 (*Carex acutiformis*).

*Matr.*: various Cyperaceae, e.g. *Carex acutiformis* and *C. paniculata*, *Eriophorum vaginatum*, and *Scirpus sylvaticus*, as well as *Juncus effusus*.

*Exs.*: Fuck., F. rhen. 1870 ("Peziza sc.") S! = Herb. Barbey-Boiss. 1171 ("Microp. sc.") S! UPS! - Syd., Myc. march. 1582 ("Moll. Karstenii var. Caricis") S! UPS!



[Non: Jaap, F. sel. 151 ("Pezizella turgidella"), - Rbh., F. eur. 1119 ("Peziza cornea"), - Syd., Myc. germ. 1003 ("Pezizella turgidella"), 1941 (id.), 3145 ("Moll. cornea"), 3549 (id.). - Syd., Myc. march. 366 ("Helotium aspidiolum"). - All = *Mollisia* spp.]

Ill.: Figs. 1 E-G, 4 A; Rehm l.c. p. 510 (*Bel. aur.*); Dennis 1960 Pl. XX L (*Moll. cornea*) = 1968 Pl. XXIII L; Müller 1966 figs. 2c, 3 (*Act. sc.*).

#### Specimens seen

Sweden: Uppland: Dalby "Jerusalem" (*J. eff.*) 3.X. 1975 K. & L. Holm 727c (UPS!).

Finland: Tavastia australis: Tammela Mustiala Pellinsuo (*Er. vag. & Carex* sp.) 6.IX. 1870 P. A. Karsten (lectotypus *Tr. ign.* & paratypus: Herb. Karsten 1534 H!); Mustiala Särkijärvi (*Sc. silv.*) 22.VIII. 1887 P. A. Karsten (typus *Moll. sylv.*).

Germany: Bayern: Haspelmoor nr. München (*Er. vag.*) 30.IX. 1910 G. Ade 19 (S!). - Brandenburg: Paulsborn nr. Berlin (*C. ac.*) VIII. 1887 P. Sydow (Myc. march. 1582; typus *Bel. aur.*). - Hessen: Mappen nr. Nassau (*Sc. silv.*) "vere" L. Fuckel (F. rhen. 1870; typus *Microp. sc.*).

England: Cheshire (*C. pan.*) II. 1949 W. G. Graddon (comp. Dennis II.cc.). - Wiltshire: Spye Park (*C. pan.*) II. 1850, 18.III. 1850, 29.I. 1851, II. 1851 & III. 1859 C. E. Broome (vide supra; K! UPS!).

The records from Somerset (Batheaston area) are all erroneous (vide supra). That from Yorkshire (see Ramsbottom & Balfour-Browne 1951 p. 72) cannot be verified as no voucher specimen has been seen.

#### 2. *Micropeziza karstenii* Nannf. nov. nom.

*Actinoscypha graminis* Karst., Medd. Soc. F. Fl. Fenn. 16: 5 (1888). - Typus (only coll.): Finland, Tammela, 'ad lacum Salois' (*Molinia coerulea*) P. A. Karsten (H; n.v.). [Non *Micropeziza graminis* (Desm.) Rehm.]

Matr.: various grasses, e.g. *Arrhenatherum*, *Calamagrostis*, *Cinna*, *Molinia*, *Poa*.

Exs.: Syd., Myc. germ. 2156 ("Niptera Poae") S! UPS!

Ill.: Figs. 2 A-E, 4 B; Müller 1966 figs. 1, 2b.

#### Specimens seen

Sweden: Småland: Kärda Källunda (*Cal. canescens*) 28.VI. 1929 J. A. N. 2168 (UPS!). - Uppland: Uppsala (Bondkyrka) Ulleråker (*Cal. can.*) 13.VI. 1946 S. Lundell (UPS!). - Gästrikland: Gävle Lövudden (*Cal. can.*) 14.VII. 1945 J. A. N. 7739 (UPS!). (*Cal. purpurea*) 2.VII. 1963 J. A. N. 18201e (UPS!). - Hälsingland: Forsa Mt Storberget (*Cinna latifolia*) 22.VII. 1936 G. Lohammar (S! UME! UPS!). - Jämtland: Nyhem Dockmyr (*Cal. sp.*) 24.VI. 1975 J. A. N. 23947e (K! UPS!). Åre Handöl (*Cal. sp.*) 20.VII. 1951 J. A. N. 11520b & 11522a (UPS!).

Finland: Tavastia australis: Tammela Salois (*Cal. sp.*) VII. 1887 K. Starbäck (Herb. Karsten 1494, H!); (*Mol. coer.*) VIII. 1887 P. A. Karsten & K. Starbäck (isotypus?; S!).

Germany: Bayern: Bayerischer Wald auf dem Rachel (*Cal. can.*) 7.VIII. 1923 H. Sydow (Myc. germ. 2156).

Switzerland: K! Graubünden: Fürstenalp 1850 m (*Cal. varia*) VIII. 1903 A. Volkart (S! as *Mollisia poaeoides*, det. Rehm). - K! Wallis: Aletschreservat Moränenweg (*Arrh. versicolor & Poa alpina*) 24.VII. 1964 E. Müller (l.c.: ZT!); Belalpweg (*Cal. villosa*) 26.VII. 1964 E. Müller (l.c.: ZT!).

Austria: Tirol: Ortler Gumpenhöfe (*Festuca?*) VI. 1884 H. Rehm (1891 p. 559, 1914 p. 103 as *Niptera poae*; S!).

#### 3. *Micropeziza poae* Fuck.

Fuckel, Jb. Nassau, Ver. Naturk. 23-24 (=Symb. Myc.): 291 (1870). - [*Peziza Poae* Fuck., F. rhen. 1174 (1866; nom. nud.)] - *Mollisia Poae* Sacc., Syll. fung. 8: 343 (1889). - *Niptera Poae* Rehm in Rbh., Krypt.-Fl., ed. 2, 1:3: 558 (1891). - Typus (only coll.): Fuck., F. rhen. 1174 (*Poa sudetica* = *P. chaixii*).

Matr.: various grasses, e.g. *Calamagrostis*, *Festuca*, *Poa*.

Exs.: Fuck., F. rhen. 1174 ("Peziza P.") S! = Hb. Barbey-Boiss. 1170 ("Mollisia P.") S! - Syd., Myc. march. 962 ("Mollisia Karstenii") S! UPS!

[Non: Rehm, Ascom. 1221 ("Niptera P."), q.e. *Mollisia* sp. - Syd., Myc. germ. 2156 ("Niptera P."), q.e. *Microp. graminis*. - Thüm., F. austr. 838 ("Microp. P."), q.e. *Mollisia* sp.]

Ill.: Figs. 1 H-K, 4 C.

#### Specimens seen

Sweden: Uppland: Uppsala, Eriksbergsskogen (*Cal. canescens*) 28.VIII. 1942 S. Lundell (UPS!). Vänge "Fiby urskog" (*Cal. arundinacea*) 8.IX. 1930 J. A. N. 4115 (S! UPS!). - Gästrikland: Gävle "Arboretum Vallshage" (*P. nemoralis*) 16.VIII. 1975 J. A. N. 23966 (UPS! ZT!).

Germany: Bayern: Bayerischer Wald Arber (grass) IX. 1885 H. Rehm (S!). - Brandenburg: Grunewald nr. Berlin (*Cal. epigeios*) 16.IX. 1885 P. Sydow (Myc. march. 962). - Hessen: Oestrich Hinterlandswald (*P. chaixii*) "autumno" L. Fuckel (F. rhen. 1174; typus). - Thüringen: Oberhof (*F. altissima*) VII. 1906 O. Jaap (1914 p. 426; S!).

Austria: Tirol: Kaiser-Gebirge Stripsen-Joch (*Cal.?*) X. 1905 H. Rehm (S!).

Rehm's record (1891 p. 559; 1914 p. 103) from Ortler (Tirol) is erroneous and refers to *M. karstenii*, Jaap's (1914 p. 426) on *Glyceria fluitans* from Thüringen cannot be controlled as no specimen has been available.

#### 4. *Micropeziza verrucosa* (E. Müll.) Nannf. nov. comb.

*Actinoscypha verrucosa* E. Müll., Ber. Schweiz. Bot. Ges. 76: 236 (1966). - Typus (by designation): Switzerland 21.VII. 1964 Müller (ZT!).

Matr.: *Carex sempervirens*.

Exs.: O.

Ill.: Figs. 2 F-K, 4 D; Müller 1966 figs. 2d, 5.

#### Specimens seen

France: Dép! Savoie: Haute Maurienne Petit Mont Cenis 29.VI. 1966 E. Müller (l.c.: ZT!).

Switzerland: K! Graubünden: Albulapass Murtel digl Crasp alv 14.X. 1972 E. Müller (ZT!). Alp Trida above Samnauntal c. 2450 m 11.VII. 1930 E. & G. Kretschmer (S! UPS!). - K! Wallis: Aletschreservat Moosfluh nr. Brig 21.VII. 1964 E. Müller (typus, ZT!); Moränenweg 3.VIII. 1964 E. Müller (ZT!) and 20.IX. 1965 E. Müller (l.c.) & F. Casagrande (ZT!). "In valleculla 'Menouve' ad montem summum Paeninum" 2100 m 13.VIII. 1939 D. Dutoit (UPS!).

Romania: Transylvania: "supra vallem Bulea prope pag. Árpás" 1900 m 22.VII. 1914 J. Tuzson (S!).

This species is probably rather common on its host, as I have been able to pick out three samples from the phanerogamic collections in S and UPS.

A North American specimen (U.S.A.: Washington E. Müller, on *Carex* sp.; ZT!) represents certainly an undescribed species close to *M. verrucosa* (see p. 329).

#### *Scutomollisia* Nannf. nov. gen.

*Micropeziza* Fuck. persimilis sed differt structura excipuli apotheciorum ut in *Mollisia* et *Pyrenopeziza*, extus "textura globulosa", margine cellulis elongatis claviformibus. - Species typica: *Micropeziza punctum* Rehm.

Very similar to *Micropeziza* Fuck. but differing in the structure of the apothecial excipulum, which agrees with that in the *Mollisia*-*Pyrenopeziza* complex, externally of "textura globulosa" and marginally with elongated, claviform cells.

#### 1. *Scutomollisia leptoderma* Nannf. nov. sp.

Scutum ca. 0.2-0.3 mm diam., opacum, atrobrunneum, denique irregulariter stellatim findens. Excipulum apothecii "mollisioideum", tenue, extus paullo pigmentatum, in series (ad 70 µm longas) laxas liberas cellularum subcylindricarum, 2-4 µm diam. et ad 20

µm longarum dissolutum et in cellulam subglobosam-late pyriformem (8-12 × 8-12 µm) terminatas. Asci 45-75 × 9-12 µm, claviformes, utique 1-, 8-spori. Sporae (haud maturae) 16-20 × 3.5-4.5 µm, subfusiformes, cito distincte medio uniseptatae. Paraphyses filiformes (ca 1 µm diam.), apice abrupte clavatae vel subglobosae (ad 6 µm crassae). - Hab. in culmis anni praeteriti *Junci arctici* × *filiformis* in Lapponia Lyckselensi Sueciae. - Typus: 1.VIII. 1927 Nordenstam (UPS!).

Shield c. 0.2-0.3 mm in diam., circular or somewhat irregular, opaque, blackish brown, eventually breaking up into numerous narrowly triangular flaps clothing the apothecium. Hyphae of the shield c. 3-4 µm in diam.; their walls dark brown, c. 0.3-0.7 µm thick.

Excipulum thin, "mollisoid", externally faintly pigmented and dissolved into flaccid free rows (up to 70 µm long) of subcylindrical cells (2-4 µm in diam. and up to 20 µm long) and a terminal subglobose or broadly pyriform cell (c. 8-12 × 8-12 µm).

Asci 45-75 × 9-12 µm, claviform with broad rounded tips, unconditionally 1-, 8-sporous.

Spores (hardly mature) 16-20 × 3.5-4.5 µm, subfusiform, straight or slightly curved rather early with a distinct median septum, hyaline.

Paraphyses filiform (c. 1 µm in diam.), apically abruptly clavate or subglobose (up to 6 µm in diam.), hyaline, not agglutinated.

Matr.: *Juncus arcticus* × *filiformis*.

Exs.: O.

Ill.: Figs. 3 H-J, 4 H.

#### Specimen seen

Sweden: Lycksele lappmark: Stensele on the bank of Lake Storuman at Storuman Railway Station 1.VIII. 1927 S. Nordenstam (typus).

#### 2. *Scutomollisia operculata* Nannf. nov. sp.

Scutum ca. 0.15-0.25 mm diam., opacum, atrobrunneum, sensim e matrice operculatim sublevans sed plerumque uno latere perpetuo affixum et ceteroquin apothecium lateraliter appressum, rarius circumcirca sublevatum et ad tempus apothecio superpositum. Excipulum apothecii "mollisioideum", extus pigmentatum, "textura globulosa", cellulis 5-10 µm diam., iis marginem versus doliformibus, ca. 7 × 4 µm, extremis claviformiter elongatis, saepe basi coliformiter constrictis, ad 10-12 µm longis. Asci claviformes, apicem versus subconice attenuati, 35-50(-60) × 5 µm, directe 1+, 8-spori. Sporae (haud maturae) 8-11 × 2 µm, subcylindricae subclaviformes, apicibus



rotundatis, guttatae, hyalinae. Paraphyses graciles, hyalinae, filiformes, ca. 1  $\mu\text{m}$  diam., apice clavulate incrassatae, ad 2.5  $\mu\text{m}$  diam. – Hab. in foliis anni praeteriti *Carex binervis* in Hordaland Norvegiae. – Typus: Holm 756 (holotypus: UPS!, isotypus: BG!).

Shield of radiating hyphae, c. 0.15–0.25 mm in diam., circular or somewhat irregular, opaque, blackish brown, eventually not cracking by radiating fissures but lifted in its entirety from the matrix by pressure of the growing apothecium. As a rule the shield remains fixed to the matrix on one side and becomes on that side pressed to the apothecium; rarely it becomes lifted all round by the apothecium and rests on it until eventually falling off. Hyphae of the shield c. 3  $\mu\text{m}$  in diam., their walls dark brown and 0.5–0.7  $\mu\text{m}$  thick.

Excipulum typically "mollisoid", the outermost layer of "textura globulosa" with brown-walled cells, c. 5–7  $\mu\text{m}$  in diam. Towards the margin the cells form distinct parallel rows, become barrel-shaped, c. 7  $\times$  4  $\mu\text{m}$ , the marginal cells clavate, with paler but yet distinctly pigmented walls, up to 10–12  $\mu\text{m}$  long, often basally with a constricted neck.

Asci clavate, 35–50(–60)  $\times$  5  $\mu\text{m}$ , sessile with a basal knob, upwards subconically attenuated with a minute apical plug (<1  $\mu\text{m}$  in diam.), directly I+, 8-sporous.

Spores (hardly mature) 8–11  $\times$  2  $\mu\text{m}$ , subcylindrically subclaviform, rounded in both ends and slightly tapering towards the lower end, straight or slightly curved, hyaline, with a row of rather large drops (vacuoles?).

Paraphyses filiform (c. 1  $\mu\text{m}$  in diam.), slightly incrassated apically up to 2.5  $\mu\text{m}$ , hyaline, not agglutinated.

Matr.: *Carex binervis*.

Exs.: O.

Ill.: Figs. 3 K, L, 4 I.

#### Specimen seen

Norway: Hordaland: Bergen Fyllingsdalen 24.III. 1976 K. & L. Holm 756 (typus).

### 3. *Scutomollisia punctum* (Rehm) Nannf. nov. comb.

*Micropeziza punctum* Rehm, Ber. Naturh. Ver. Augsburg 26: 65 (1881). – *Beloniella punctum* Rehm,

Ascom. n. 261 b (1887); Hedwigia 26: 98 (1887). – *Niptera punctum* Sacc., Syll. fung. 8: 485 (1889). – *Beloniella punctum* Rehm in Rbh., Krypt.-Fl., ed. 2, 1:3: 569 (1891). – *Niesslella punctum* Höhn., Ber. Deutsch. Bot. Ges. 36: 470 (1919). – *Actinoscypha punctum* E. Müll., Ber. Schweiz. Bot. Ges. 76: 235 (1966). – Typus (only coll.): Rehm, Ascom. 261 (*Nardus stricta*).

Matr.: *Nardus stricta* and other grasses, e.g. *Calamagrostis* and *Poa*.

Exs.: Rehm, Ascom. 261 ("Microsp. p.") S! UPS!; 261 b ("Bel. p.") S!

Ill.: Figs. 3 A–D, 4 E–F; Müller 1966 figs. 2 a (ascus tip erroneous), 4.

#### Specimens seen

Sweden: Hälsingland: Los, between Lake Fräkentjärn and Lake Nätsjön (*N. str.*) 25.VII. 1956 J. A. N. 14611 (H! UPS!). – Härjedalen: Tännäs Mt Hamrafjället (*N. str.*) 23.VII. 1933 J. A. N. 4658 b (UPS!). – Jämtland: Åre Högåsen (*N. str.*) 4.VIII. 1951 J. A. N. 11771d (UPS!).

Finland: Lapponia enontekiensis: Mt Valtioaivi c. 800 m (*Cal. neglecta*) 31.VII. 1960 L. & H. Roinainen (Müller 1966 p. 235; H!).

Germany: Bayern: Bayerischer Wald Arber (*N. str.*) IX. 1885 H. Rehm (Ascom. 261b; 1891 p. 569; 1914 p. 105). – Sachsen: Erzgebirge Fichtelberg 1902 W. Krieger (fide Höhnel 1919 p. 269).

Switzerland: K' Graubünden and K' Wallis: one find each (*N. str.*) (Müller 1966 p. 235; ZT!).

Austria: Tirol: Taschach-Glacier im Piz-Tal (*Poa* sp.?) VIII. 1875 H. Rehm (S! as *Niptera poae*).

Czechoslovakia: Cechy: Teplice (=Teplitz) (*N. str.*), summer 1873 F. v. Thümen (Rehm, Ascom. 261; typus).

Rehm's record (1891 p. 569) from Krain cannot be verified as no voucher specimen is to be found. His record (1914 p. 105) from Taubenberg (Oberbayern) is erroneous, and so is Jaap's (1914 p. 426) from Thüringen.

### 4. *Scutomollisia stenospora* Nannf. nov. sp.

Scutum 0.15–0.3 mm diam., opacum, atrobrunneum. Excipulum apothecii extus pigmentatum, "textura globulosa", cellulis ca. 6–8  $\mu\text{m}$  diam., iis marginem versus claviformiter elongatis, extremis ad 20  $\times$  3–4  $\mu\text{m}$ . Asci 50–70  $\times$  6–7  $\mu\text{m}$ , graciles, anguste claviformes, apicem versus subconice attenuati, directe I+, 8-sporei. Sporae (immaturae) 16–22  $\times$  2  $\mu\text{m}$ , subcylindricae-subclaviformes, saepe leviter curvatae, apicibus rotundatis, guttatae. Paraphyses filiformes (ca. 1  $\mu\text{m}$  diam.), apice clavulate incrassatae (ad 2  $\mu\text{m}$  diam.), hyaline. – Hab. in culmis anni praeteriti *Junci subnodulosi* in Scania Sueciae. – Typus: Holm 223a (UPS!).

Shield c. 0.15–0.3 mm in diam., circular or somewhat irregular, opaque, blackish brown. The

material too young for showing how the apothecia becomes exposed. Hyphae of the shield c. 3  $\mu\text{m}$  in diam.; their walls dark brown, c. 0.5–0.7  $\mu\text{m}$  thick.

Excipulum typically "mollisoid"; the outermost layer of "textura globulosa" with brown-walled cells (c. 6–8  $\mu\text{m}$  in diam.). Towards the margin the cells form distinct parallel rows and become elongated  $\pm$  clavate (the marginal up to 20  $\times$  3–4  $\mu\text{m}$ ) with paler but yet distinctly pigmented walls.

Asci c. 50–70  $\times$  6–7  $\mu\text{m}$ , gracile, clavate and subconically attenuated above, with a minute apical plug directly I+ (pure but not very dark blue), 8-sporous.

Spores (immature) 16–22  $\times$  2  $\mu\text{m}$ , subcylindrical-subclaviform with rounded ends, straight or slightly curved, hyaline with (usually 4) large drops (vacuoles?), the largest very close to the upper end.

Paraphyses filiform (c. 1  $\mu\text{m}$  in diam.), septate, slightly incrassated apically (up to 2  $\mu\text{m}$  in diam.), hyaline, not agglutinated.

Matr.: *Juncus subnodulosus*.

Exs.: O.

Ill.: Figs. 3 E–G, 4 G.

#### Specimen seen

Sweden: Skåne: Benestad Örup 14.VI. 1974 K. & L. Holm 223a (typus).

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