

Hyaloscyphaceae in Japan (1): Non-glassy-haired members of the tribe Hyaloscypheae

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Discomycetes of the family Hyaloscyphaceae were collected from across Japan and identified. In this report, non-glassy-haired members of the tribe Hyaloscypheae, subfamily Hyaloscyphoideae are described and illustrated. The five species involved include one new species (*Phialina lacrimiformis*) and four species less well known or newly reported in Japan (*Dematioscypha dematiicola*, *Hamatocanthoscypha laricionis* var. *laricionis*, *Micropodia chrysostigma*, *M. grisella*). Cultural studies were carried out, and teleomorph-anamorph relationships are discussed for *D. dematiicola*, *H. laricionis* var. *laricionis* and their anamorphs. A key to the genera of the tribe Hyaloscypheae in Japan is provided.

Key Words—discomycetes; Hyaloscyphaceae; Japan; new species; tribe Hyaloscypheae.

Because of its diversified climatic conditions, Japan has a rich mycoflora including discomycetes.

Hyaloscyphaceae Nannfeldt (Nannfeldt, 1932), a family in the Leotiales S. E. Carp., contains a great number of species, though relatively few species have been reported in Japan. The family consists of a group of inoperculate discomycetes usually with small apothecia, mainly characterized by hairs of various shapes. Of the 260 known discomycete species in Japan (Otani, 1989), only 41 species in 9 genera are known for the family. This is because previous studies on Hyaloscyphaceae in Japan have mainly been limited to plant pathogens.

Hyaloscyphaceae in Japan have been reported in the following papers. Otani described 16 species (including 2 new species) of *Dasyscyphus* Gray, *Hyaloscypha* Boud., and *Arachnopeziza* Fuckel from Hokkaido (Otani, 1966, 1967), and later 2 species of *Dasyscyphus* from Yakushima (Otani and Tubaki, 1976). Oguchi (1981) studied *Lachnellula* P. Karst., a pathogen of conifers, and presented a monograph on 12 species. Hino and Katumoto (1961) described 2 new species of *Erinella* Quél. on bamboo. Recently Suto (1992) described *Cistella japonica* Y. Suto.

Hyaloscyphaceae in Japan have also been studied abroad. These studies mainly concerned specimens collected by Korf, who stayed several years in Japan (Korf, 1958, 1959). The specimens later resulted in reports of endemic or new species (Haines, 1984; Huhtinen, 1989). These facts suggest that more species of the family remain to be reported.

At present, most researchers working on discomycetes recognize that studies of smaller discomycetes are still at an early stage and require much basic descriptive work (Korf, 1990; Huhtinen, 1994). As a step towards a complete discomycete mycoflora in Japan, we started to work on an inventory of Japanese Hyaloscyphaceae.

In a series of papers we will give detailed descriptions of species of the family Hyaloscyphaceae collected in Japan. Because the family Hyaloscyphaceae as presently conceived is practical but heterogeneous (Sutton and Hennebert, 1994), strict taxonomical studies by molecular techniques are needed to construct a more accurate taxonomical system, but this is beyond our scope. Rather, we enumerate the species and give descriptions of species insufficiently described or hitherto unreported in Japan. For this purpose, we adopted the suprageneric taxonomy within the family proposed by Korf (1973, 1978).

In the first two papers, we deal with members of the tribe Hyaloscypheae, subfamily Hyaloscyphoideae. The tribe includes species with small apothecia with relatively short, often aseptate hairs, and cylindrical to filiform paraphyses. Only one species, *Hyaloscypha leuconica* (Cooke) Nannf., has been described from Japan (Otani, 1967). In some genera, the hairs become thickened by refractive matter and show a glassy appearance. The glassiness of the hairs is an important characteristic at the generic rank. This paper concerns non-glassy-haired members of the tribe Hyaloscypheae. Members of the large and well-known genus *Hyaloscypha* Boud. will be dealt with separately in the future.

Materials and Methods

Collection Collecting trips were made throughout Japan, from Kyushu to Hokkaido, but mainly in the Kanto district. Collected specimens were put in plastic bottles with screw caps to prevent from drying, cooled to 4°C as soon as possible, and kept at this temperature until used for isolation.

In most cases, the specimens were air-dried. Specimens described in the present paper will be deposited in

the National Science Museum, Tokyo (TNS).

Isolation For most specimens with apothecia of more than 1 mm in diam, a single apothecium with or without the substrate was removed with a surgical knife. The specimen was glued with a piece of agar on the inner surface of the lid of a Petri dish, and the lid was placed over a potato dextrose agar plate (PDA; Nissui, Tokyo) for up to 30 min to allow the apothecium to discharge ascospores. The discharged ascospores were confirmed under $\times 10$ objective. To obtain single spore isolates, Skerman's micromanipulator (Skerman, 1968) was used. Multi-spored isolates were obtained by cutting a piece of agar with germinating ascospores, or by use of a Skerman's micromanipulator. Single-spored isolates were kept on PDA slants as stock culture. When necessary, PDA or modified Weitzman-Silva-Hutner agar (WSH; 10 g oatmeal, 1 g KH_2PO_4 , 1 g $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$, 1 g NaNO_3 , 20 g agar, 1,000 ml distilled water) plates were inoculated at the center with a 1-mm agar cube containing mycelium and incubated at 17°C or 23°C. Colony characteristics were recorded for colonies grown on PDA for 3 wk at 23°C. Color indications follow Kornerup and Wanscher (1978).

Observation Dried specimens were mainly used, but some fresh specimens were also observed. The method described by Huhtinen (1989) was basically followed. An apothecium or part of an apothecium was picked up and placed directly into a drop of mounting medium. After the specimen was fully soaked in the mounting medium, a cover slip was applied, and the specimen was gently squashed. For general observation, Melzer's reagent (MLZ; 0.5 g of iodine, 1.5 g of KI, 20 g of chloral hydrate, 20 ml of distilled water), cotton blue dissolved in lactophenol (CB; 0.5 g of cotton blue, dissolved in 99.5 ml of lactophenol, equal proportions each of phenol, glycerine, lactic acid and distilled water) or congo red (CR; a saturated congo red solution in 25% ammonium hydroxide, pH 12) were used as mounting medium. When KOH pretreatment was required, specimens were treated with 3%, 10%, or 20% KOH before exposure to MLZ. To observe morphological changes of hairs in KOH treatment, the specimen was placed on a glass slide, rinsed with a drop of 70% ethanol, followed by a drop of distilled water, and a cover slip was applied. KOH of required concentration was applied from the side to replace the previous mounting medium. Line drawings were made in MLZ and/or CB. A 1% solution of phloxine B in distilled water (Ph) was used for supplement.

An Olympus BH2 microscope equipped with Nomarski interference contrast device was used for observation. External morphology of apothecia was observed under an Olympus SZH dissecting microscope equipped with an Olympus ring lighting system. Micro-morphological measurements were made mostly under $\times 100$ objectives in MLZ or CB by using micrometers. Drawings were made with the aid of an Olympus BH2-DA drawing tube. Most sketches were prepared with a scale of $10 \mu\text{m} = 24 \text{mm}$. Color indications follow Kornerup and Wanscher (1978).

Freeze microtoming For dried materials, an apothecium

or a piece of an apothecium was first rehydrated in 3% KOH, then embedded in mucilage (Tissue Tek II; Miles laboratories, Inc., Naperville, Illinois, USA). For fresh materials, the specimen was directly embedded in the mucilage. The material was sliced at 15–25 μm with a freeze microtome (Yamato Kohki, Tokyo) equipped with an electrofreezer (Komatsu Electronics, Tokyo). Sections of apothecium were mounted in MLZ or CB and observed as described above.

Descriptions

Species are described in alphabetical order.

1. *Dematioscypha dematiicola* (Berk. & Broome) Svrček, Česká Mykol. **31**: 193. 1977. Figs. 1 A–G, 2
Peziza dematiicola Berk. & Broome, Ann. Mag. Nat. Hist. Ser. 3, **15**: 446. 1865. non sensu Svrček, Česká Mykol. **31**: 193. 1977. (= *Dematioscypha richonis*).
Lachnella dematiicola (Berk. & Broome) W. Phillips, Brit. Discom. p. 265. 1887.
Trichopeziza dematiicola (Berk. & Broome) Sacc., Syll. Fung. **8**: 414. 1889.
Dasyscypha dematiicola (Berk. & Broome) Masee, Brit. Fung. Fl. **4**: 364. 1895.
Hyaloscypha dematiicola (Berk. & Broome) Nannf., Trans. Br. Mycol. Soc. **20**: 205. 1936.
Dasyscypha heimerlii (Höhn.) Kirschst., Vert. bot. Ver. Brandenb. **66**: 26. 1924.

Apothecia scattered or cespitose, sessile, associated with anamorph which covers a wider area than apothecia on the substrate. Disc shallow to deep cupulate, grey (2E1), up to 200 μm in diam when fresh, obscured somewhat by white hairs; receptacle concolorous or darker. On drying, disc becoming deep cupulate, margin strongly incurved to obscure the hymenium, fringed by minutely downy white hairs; receptacle greyish brown (6A3) to black, finely fibrous due to hairs vesturing the external surface, white to pale yellow (3A3). Ectal excipulum of *textura prismatica*, cells 7–10 \times 2–4 μm , thin to rather thick-walled, arranged perpendicular to the surface near the base, at low angle to the surface near the margin; wall color brown to blackish, darker toward the base of the apothecium. Hairs simple, conical, gradually tapered to the sharply pointed apex, aseptate or rarely septate at the base, thin-walled, smooth, mostly 80–100 μm long, 3–4 μm thick at the base; apex sometimes solidified by a glassy matter, stable in 10% KOH leaving a lumen narrowed toward the apex; external resin and crystals absent. Asci 35–45 \times 5.5–7 μm , cylindrical clavate, arising from croziers, 8-spored; apex conical, pore MLZ— with or without KOH pretreatment. Ascospores 6–8 \times 2–3 μm , ellipsoid, straight to slightly curved, hyaline, one-celled, irregularly seriate in the asci. Paraphyses filiform, flexuose, 1 μm thick, unchanged in width, occasionally septate, simple or branched at the base, apex obtuse, not exceeding the asci.

Anamorph: *Haplographium* sp. Fig. 1H–K

Colony characteristics of SANK 25895, 25995, 26095 were identical. Colony on PDA strongly and ir-

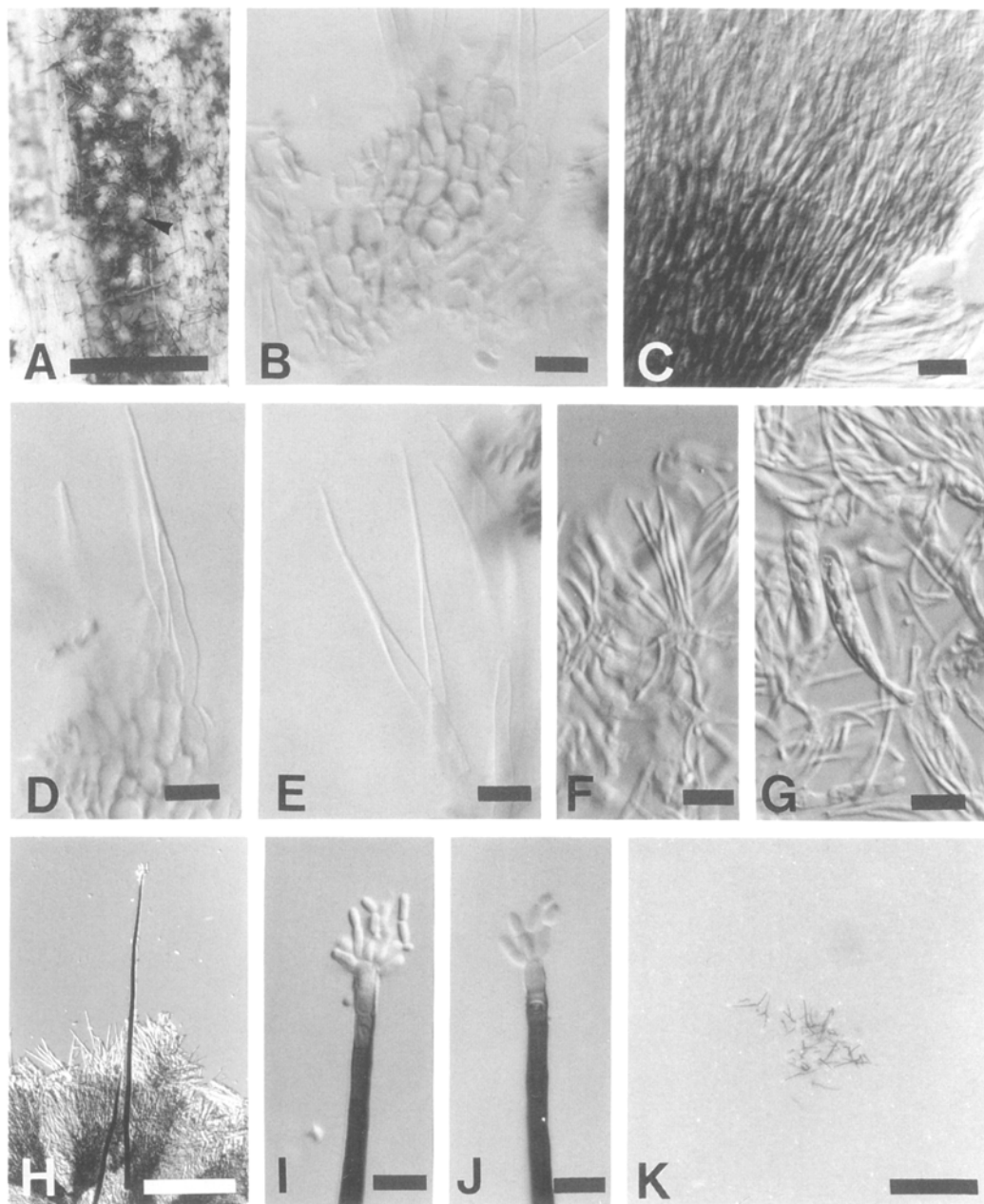


Fig. 1. *Dematioscypha dematiicola* and its *Haplographium* anamorph (A–I, TRL-417; J–K, SANK 25895).

A–G. *Dematioscypha dematiicola*. A. Dried apothecia. Note white downy hairs (arrow head) and black conidiophores of the anamorph around the apothecia. B. Ectal cells near the margin. Note the dark-colored cell walls. C. Ectal cells of the excipulum. Note the dark-colored cell walls. D, E. Hairs with glassy solid portion at the tip. F. Paraphyses. G. Asci with ascospores. H–K. *Haplographium* anamorph of *D. dematiicola*. H. Conidiophore of the anamorph. Crushed apothecia with hairs seen below. I, J. Close-up of the tip of the conidiophore. K. Conidiophores produced under culture (on WSH medium, 17°C, 30 d). Scales. A, 1 mm; B–G, 10 μm ; H, 50 μm ; I–J, 10 μm ; K, 0.5 mm.

regularly wrinkled, radially sulcate and with membranaceous elevation near the center, low and dense. Context brittle, dark brown (6F8), paler toward the margin, dark brown (6F8) from the reverse. Aerial mycelium none. Margin distinct, irregularly undulate. Soluble pigment exuded, concolorous with the colony.

Anamorph observed in 3 wk culture on WSH, but not on PDA. Conidiophores upright, macronematous,

mononematous, mostly 200–300 μm , up to 400 μm long, 4–8 μm thick near the base, often swollen and shortly branched to form rhizoid disc at the base; width unchanged below, 4–6 μm , gradually tapered from the middle toward the the apex; color dark brown, unchanged below, becoming paler in the upper portion, subhyaline to hyaline at the apex; apex often branched penicillately producing conidia. Conidiogenous cells dis-

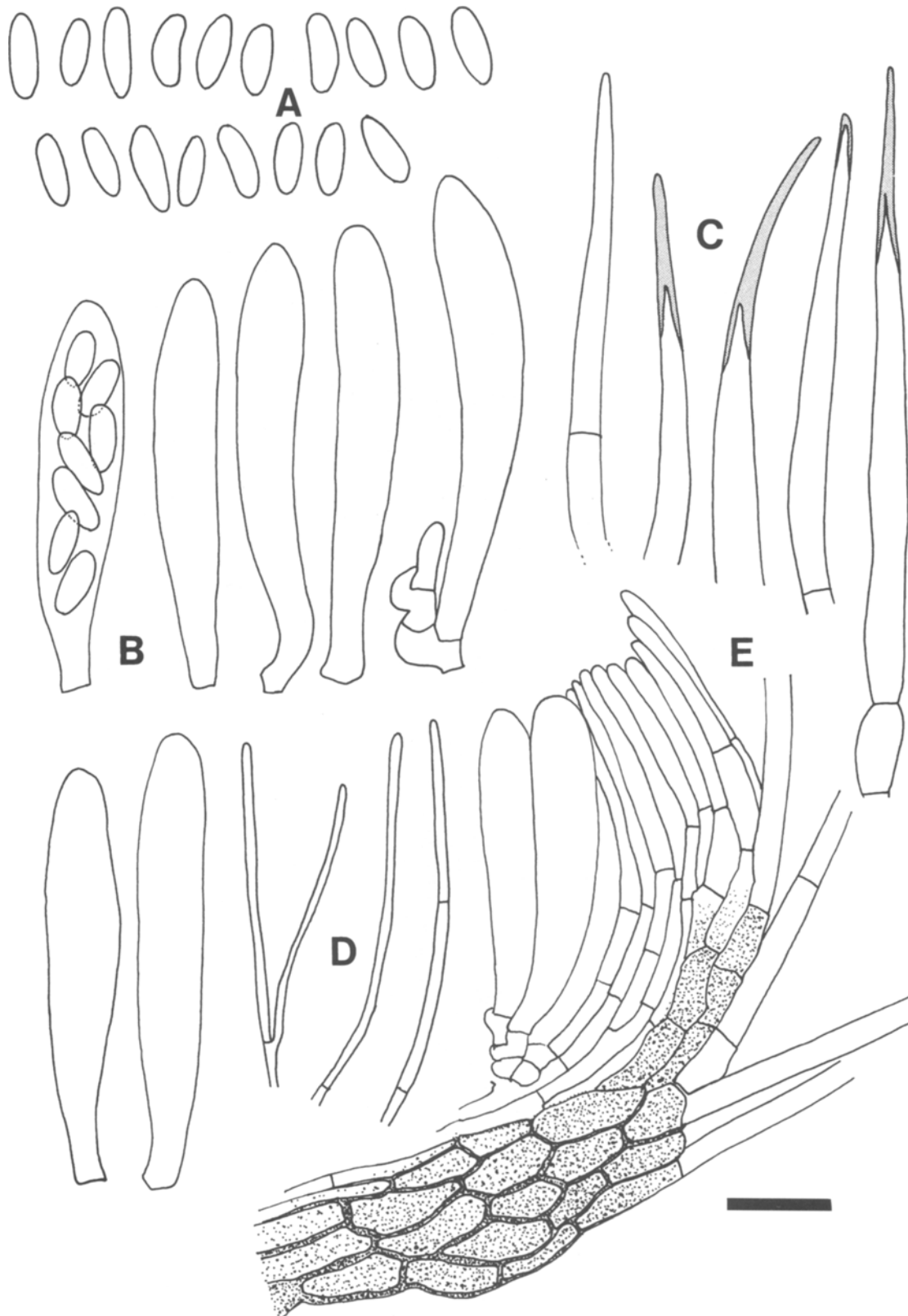


Fig. 2. *Dematioscypha dematiicola* (TRL-417).

A. Ascospores. B. Asci. One showing croziers at the base. C. Hairs. Area with gray tone indicating glassy portion. D. Paraphyses. E. Vertical section of apothecium showing the margin. Hairs showing only their bases. Scales. 10 μ m.

crete, polyblastic, borne at the ends of secondary branches, determinate, cylindrical. Conidia $5\text{--}7 \times 2\text{--}3 \mu\text{m}$, acropleurogenous, often aggregated in slimy heads, cylindrical, with rounded ends or ellipsoid, hyaline, smooth, aseptate.

Specimens examined. HONSHU: Tsukuba Univ. Sugadaira Montane Research Center, Sugadaira, Nagano Pref., on unidentified decaying wood, 30-IX-91, TRL-417 (culture SANK 25895); Tainai-mura, Niigata Pref., on wet unidentified decaying wood, 27-X-94, TRL-1098 (culture SANK 25995); Tsukimino Forest Park, Aomori-shi, Aomori Pref., on decaying wood, 10-V-95, TRL-1246 (culture SANK 26095); Mt. Tsukuba, Ibaraki Pref., on decaying wood surface, 17-VII-96, TRL-1437.

Notes. Svrček (1977) treated *D. dematiicola* and *D. richonis* var. *olivacea* (Velen.) Huhtinen essentially synonymous. Huhtinen (1987) presented a historical review of this genus and included two species, one with two varieties (*D. dematiicola*; *D. richonis* (Boud.) Huhtinen var. *richonis*; *D. richonis* var. *olivacea*). *Dematioscypha dematiicola* and *D. richonis* could be distinguished by the hair characteristics: *D. richonis* had septate hairs bearing resinous matter, whereas *D. dematiicola* had typically aseptate hairs with glassy apex. The two varieties under *D. richonis* are distinguished by the presence or absence of croziers at the ascus base. Spooner (1987) described *D. dematiicola* according to Svrček's concept.

Hughes (1953) first connected *Haplographium* Berk. & Broome with *Dematioscypha* Svrček (as *Hyaloscypha dematiicola*), but Huhtinen (1987) reported that he could find both species of *Dematioscypha* on the specimen Hughes examined for description. Therefore, strict cultural studies are required to establish the teleomorph-anamorph connection in this genus. In our studies, single-ascospore isolates were obtained from the *D. dematiicola* specimens. All of them produced a *Haplographium* anamorph, the generic characteristics of which agreed well with those given by Hughes (1953) and Ellis (1971), thus supporting *D. dematiicola*-*Haplographium* relationship. This, however, does not exclude the possibility of a teleomorph-anamorph relationship in *D. richonis*-*Haplographium*. The relationship requires further study.

The genus *Dematioscypha* is reported for the first time from Japan.

2. *Hamatocanthoscypha laricionis* (Velen.) Svrček, Česká Mykol. 31: 11. 1977. var. *laricionis*

Figs. 3A-C, 4

Unciniella laricionis (Velen.) K. Holm & L. Holm, Symb. Bot. Upsal. 21: 17. 1977. var. *laricionis*

Uncinia laricionis Velen., Monogr. Discom. Bohem. p. 295; pl. 16: 42-44. 1934. var. *laricionis*

Hyaloscypha laricionis (Velen.) Nannf., Fungi Exsiccati Suecici Fasc. 51-52: 39. 1958.

Peziza acuum Alb. & Schwein.: Fr. var. *tenuissima* P. Karst., Not. Sällsk. Fauna Flora Fenn. Förh. 10: 181. 1869.

Helotium acuum (Alb. & Schwein.: Fr.) Fr. var. *tenuissimum* (P. Karst.) P. Karst., Not. Sällsk. Fauna Flora Fenn. Förh. 11: 240. 1870.

Hyaloscypha cuneata Velen., Monogr. Discom. Bohem. p. 274; pl. 15: 57. 1934.

Hamatocanthoscypha cuneata (Velen.) Svrček, Česká Mykol. 39: 207. 1985.

Uncinia laricionis Velen. var. *lanensis* Velen., Monogr. Discom. Bohem. p. 295; pl. 16: 45. 1934.

Hyaloscypha lycopodii Velen., Monogr. Discom. Bohem. p. 282; pl. 15: 55. 1934.

Calycellina lycopodii (Velen.) Svrček, Česká Mykol. 39: 211. 1985.

Hyaloscypha juniperi E. Müller, Sydowia 21: 149. 1968.

Apothecia scattered, short but distinctly stipitate, 200-300 μm in diam, up to 200 μm high; disc deep cupulate, hymenium obscured by incurving margin; receptacle pruinose due to hairs, reddish orange (7A6) when dried, rehydrating light orange (5A5); stipe cylindrical, pruinose, often reduced to short turbinate base, frequently dark at the base. Ectal excipulum *textura prismatica*, composed of cells $6\text{--}15 \times 4\text{--}6.5 \mu\text{m}$, arranged along the surface, the outermost cells giving rise to hairs. Hairs hyphoid, simple, straight to cincinnate, curving toward the outside, cylindrical, 2-3 μm thick, occasionally up to 5 μm thick at the base, narrowly conical or gradually tapered to the obtuse apex, up to 25 μm long, aseptate or basally 2-septate, thin-walled, smooth, hyaline, occasionally bearing amorphous resinous matter not dissolved in MLZ. Asci $30 \times 4\text{--}5 \mu\text{m}$, cylindrical clavate, seemingly arising from croziers; apex conical, pore MLZ+ without KOH pretreatment. Ascospores $4\text{--}6 \times 2 \mu\text{m}$, ellipsoid to cuneiform, hyaline, aseptate. Paraphyses cylindrical, flexuose, 2 μm thick, apex obtuse, not exceeding the asci.

Anamorph: unnamed.

Figs. 3D-F, 5

Colony of SANK 27595 on PDA plate largely umbonate at the center, centrally floccose, shiny due to yeast-like production of conidia in surrounding area, context glutinous, black from the surface, dark green (25F3) from the reverse. Sectors and zonation absent. Aerial mycelium developed only at the center, floccose, dark green (28F3), not forming mycelial strands. Margin distinct, entire, flat. Soluble pigment not produced.

Conidiophores inconspicuous on the host; in culture, semi-macronematous, hyaline, simple or repeatedly branched to give dendroid appearance. Mycelium superficial or immersed, 2 μm thick; fertile hyphae repeatedly branched, frequently disarticulating at last, branch itself bearing conidia in acropetal order. Conidiogenous cells integrated, born intercalary or terminal, polyblastic, with one to several obtuse protuberances after the conidia detached, $7\text{--}11 \times 2\text{--}3 \mu\text{m}$, more frequently yeast-like, giving a colony of slimy appearance. Conidia acropleurogenous, ellipsoidal, occasionally truncate at both sides, $4\text{--}8 \times 2\text{--}3 \mu\text{m}$, aseptate, hyaline, with or without a protuberant hilum.

Specimens examined. HONSHU: Kenmin-no-mori, Bousou, Chiba Pref., on decorticated *Pinus*(?) wood, 18-XII-92, TRL-684 (culture SANK 27595).

Notes. The specimen TRL-684 showed intermediate morphology between *H. laricionis* var. *laricionis* and

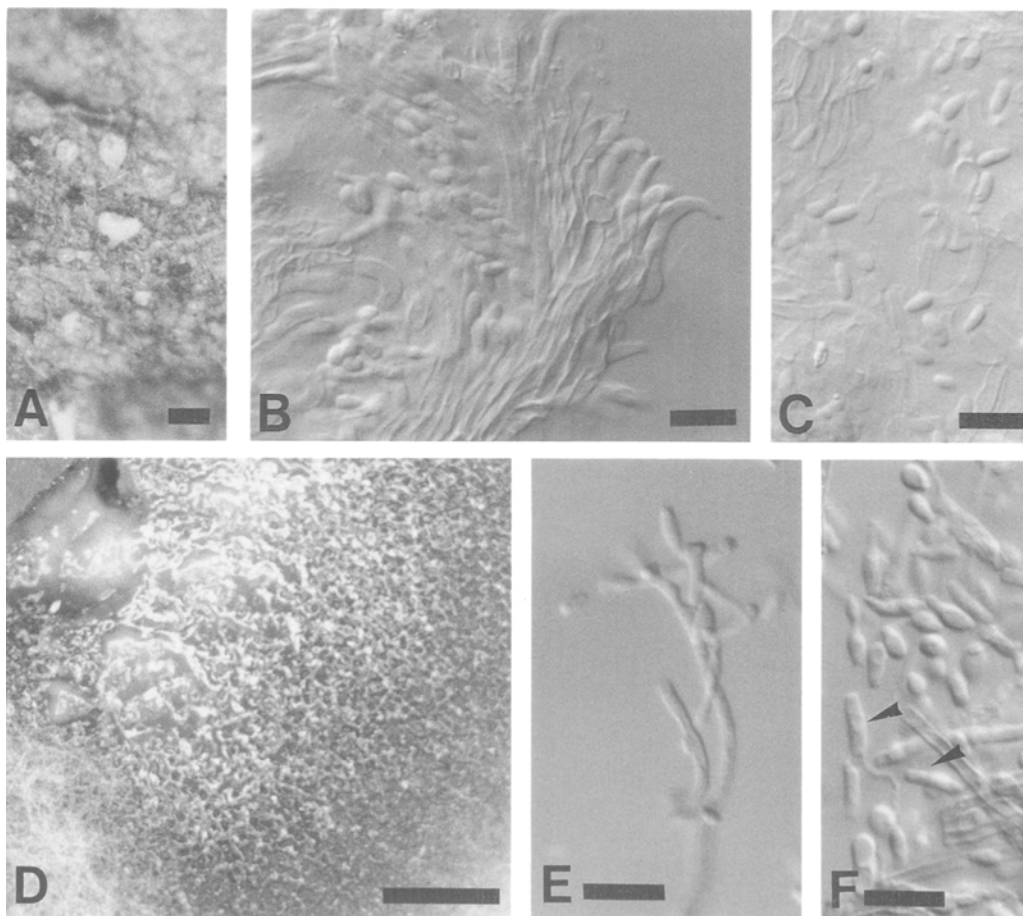


Fig. 3. *Hamatocanthoscypha laricionis* var. *laricionis* and its anamorph (A–C, TRL-684; D–F, SANK 27595).

A. Dried apothecia. B. Vertical section of the apothecium showing ectal excipulum and hairs. C. Ascospores. D. Close up of the center of a colony showing yeast-like growth (on WSH medium, 23°C, 10 d). E. Conidiogenous structure showing acropleurogenous conidiogenesis. F. Conidia produced in yeast-like phase. Disarticulating hyphae also seen (arrowhead). Scales. A, 0.1 mm; B, C, 10 μ m; D, 0.5 mm; E, F, 10 μ m.

H. ocellata Huhtinen. Huhtinen (1989) described that the latter was morphologically similar to the former but less common. In its dimensions and proportion of spores, the present fungus was closer to *H. ocellata* than to *H. laricionis* var. *laricionis*. But some characteristics of the present specimen disagreed with the diagnostic characteristics of *H. ocellata*: biguttulate spores not often seen and hair warts not prominent. In addition, apothecia did not occur on bark. The substrate of *H. ocellata* is reported to be bark, and this appears to be an important characteristic to distinguish the two species. The major host of *H. laricionis* var. *laricionis* is described as fallen cones (Huhtinen, 1989), but Huhtinen himself reported other substrates. The present species is found on decaying decorticated wood, so this is not a decisive characteristics for identification.

Hamatocanthoscypha laricionis appears to be fairly common on various kinds of substrate. Two specimens from Yamagata and Kushiro are listed in Huhtinen (1989).

3. *Micropodia chrysostigma* (Fr.) Boud., Hist. Classific.

Discom. d'Eur. p. 128. 1907. Figs. 6, 7

Peziza chrysostigma Fr., Syst. Mycol. 2: 128. 1822.

Helotium chrysostigma (Fr.) Fr., Summa Veg. Scand. p. 355. 1849.

Erinella chrysostigma (Fr.) Quél., Enchiridion fungorum p. 304. 1886.

Pezizella chrysostigma (Fr.) Sacc., Syll. Fung. 8: 288. 1889.

Hymenoscypha chrysostigma (Fr.) Schröter, Cohn's Krypt. Flora Schlesien 3: 71. 1893.

Phialea chrysostigma (Fr.) Höhn., Mitt. Bot. Lab. tech. Hochsch. Wien 3: 94–108. 1926.

Allophylaria chrysostigma (Fr.) Nannf., Trans. Br. Mycol. Soc. 23: 246. 1939.

Psilachnum chrysostigma (Fr.) Raitv., Scripta Mycol. 1: 104. 1970 (ut "*chrysostigmum*").

Peziza aspidiicola Berk. & Broome, Ann. Mag. Nat. Hist. Ser. 2, 13: 465. 1854.

Mollisia aspidiicola (Berk. & Broome) Quél., Bull. Soc. Bot. Fr. 27: 234. 1879.

Helotium aspidiicola (Berk. & Broome) Rehm, Hedwigia 20: 35. 1881 (ut "*aspidiicolum*").

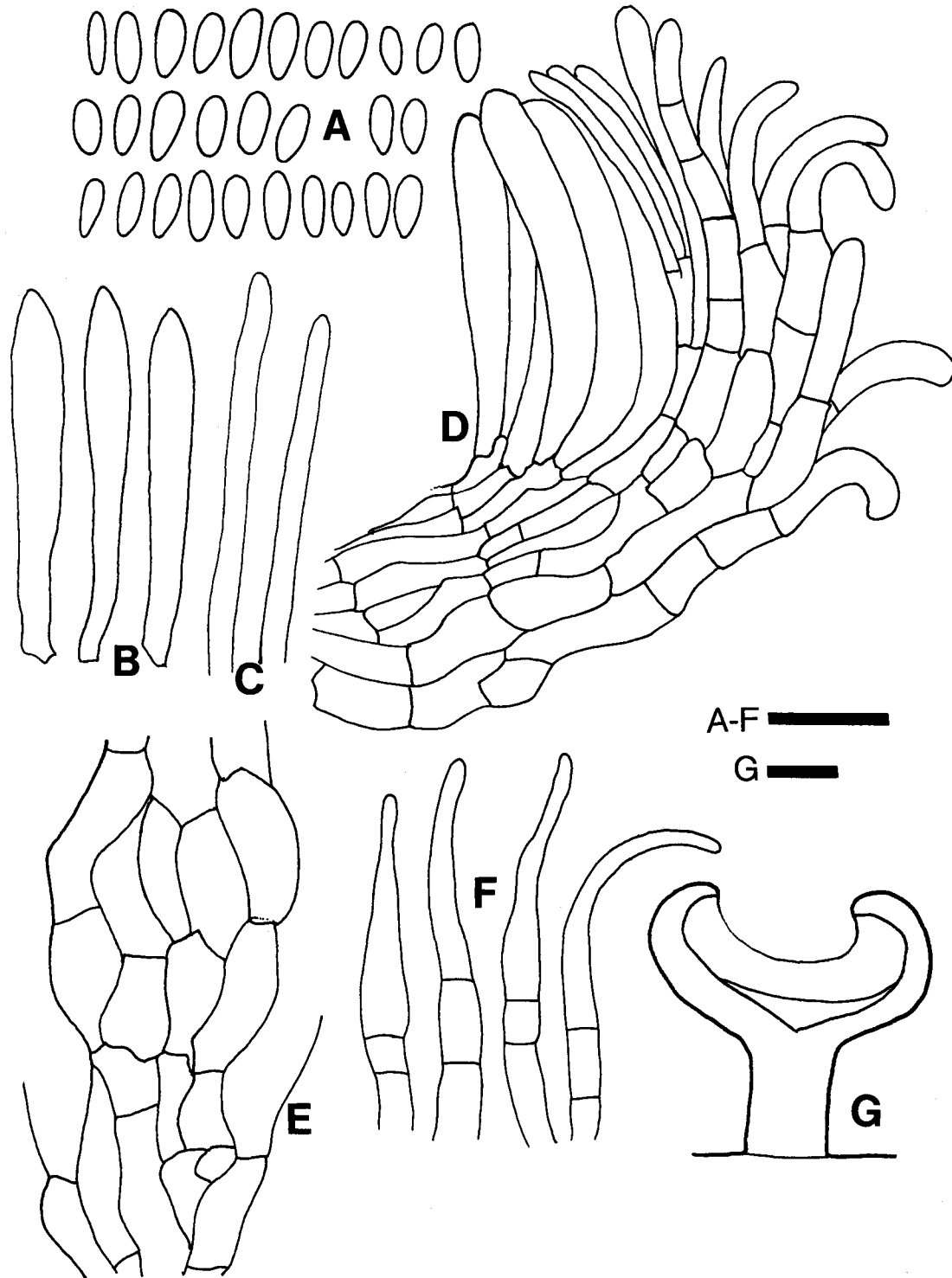


Fig. 4. *Hamatocanthoscypha laricionis* var. *laricionis* (TRL-684).

A. Ascospores. B. Asci. C. Paraphyses. D. Section of apothecium showing ectal excipulum and hairs. E. Ectal cells. F. Hairs. G. Schematic drawing of the apothecial section showing the outline of structure. Hairs not drawn. Scales. A-F, 10 μ m; G, 50 μ m.

Erinella aspidicola (Berk. & Broome) Quél., Enchiridion fungorum p. 304. 1886.
Lachnella aspidicola (Berk. & Broome) W. Phillips.,

Brit. Discom. p. 245. 1887.
Dasyscypha aspidicola (Berk. & Broome) Sacc., Syll. Fung. 8: 451. 1889.

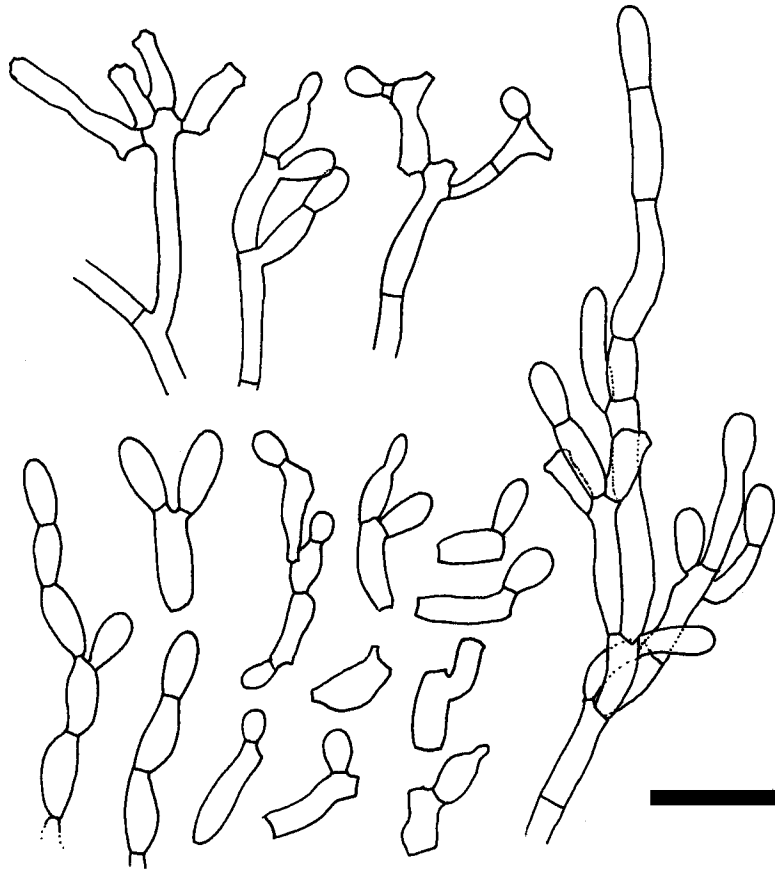


Fig. 5. Anamorph of *Hamatocanthoscypha laricionis* var. *laricionis* (SANK 27595). Various aspects of conidia-producing structures. Scales. 10 μm .

Pezizella aspidiicola (Berk. & Broome) Rehm, Rab. Kryptogamenfl. 2 Aufl. 1: 684. 1892.

Hymenoscypha aspidiicola (Berk. & Broome) Schröter, Cohn's Krypt. Flora Schlesien 3: 72. 1893.

Atractobolus aspidiicola (Berk. & Broome) O. Kuntze, Rev. Gen. Plant. 3: 445. 1898.

Micropodia aspidiicola (Berk. & Broome) Boud., Hist. Classific. Discom. d'Eur. p. 128. 1907.

Peziza versicolor Desm., in Ann. Sci. nat. Bot. Ser. 3, 20: 230. 1853.

Pseudohelotium versicolor (Desm.) Sacc., Syll. Fung. 8: 296. 1889.

Urceolella versicolor (Desm.) Boud., Hist. Classific. Discom. d'Eur. p. 129. 1907.

Peziza pteridina Nyl., Not. Sällsk. Fauna Flora Fenn. Förh. 10: 58. 1869.

Mollisia pteridina (Nyl.) P. Karst., Myc. Fenn. 1: 194. 1871.

Hyaloscypha pteridina Velen., Monogr. Discom. Bohem. p. 282. 1934.

Apothecia gregarious or scattered, short-stalked to almost sessile, up to 200 μm high; disc flat to shallow cupulate, up to 200 μm in diam, pale to yellowish white (2A2) when fresh, becoming pale orange white (5A2)

when dried; margin slightly pubescent due to short hairs when fresh, strongly incurving when dried; receptacle concolorous, smooth to finely pubescent. Ectal excipulum of thin-walled *textura prismatica*, cells 7–13 \times 3–4 μm , arranged at an angle to the surface, giving rise to hairs or hair-like short protrusions at the margin. Hairs straight, cylindrical to slightly expanded toward obtuse apex, one to several celled, up to 40 μm long, 2–3 μm thick at the base, 4–5 μm thick at the widest point; wall thin, smooth, bearing no crystals nor resinous matter, MLZ–. Asci 30–43 \times 4–5 μm , cylindrical clavate to saccate with a broad base, 8-spored, arising from croziers; apex indistinctly MLZ+ without KOH pretreatment. Ascospores 6.5–9 \times 1.5–2 μm , narrowly clavate to ellipsoid, often with a pointed lower end, aseptate, hyaline, no guttulae observed in MLZ. Paraphyses cylindrical with obtuse apex, aseptate or 1–2-septate, 3 μm wide, almost constant in width, not exceeding the asci.

Specimens examined. HONSHU: Mt. Daisen, Tottori Pref., on unidentified decaying fern stem, 28-V-94, TRL-1029; Fukuroda water fall, Ibaraki Pref., on unidentified decaying fern stem, 18-X-94, TRL-1104.

Notes. The taxonomic position of this species is subject to controversy. The gross morphology is similar

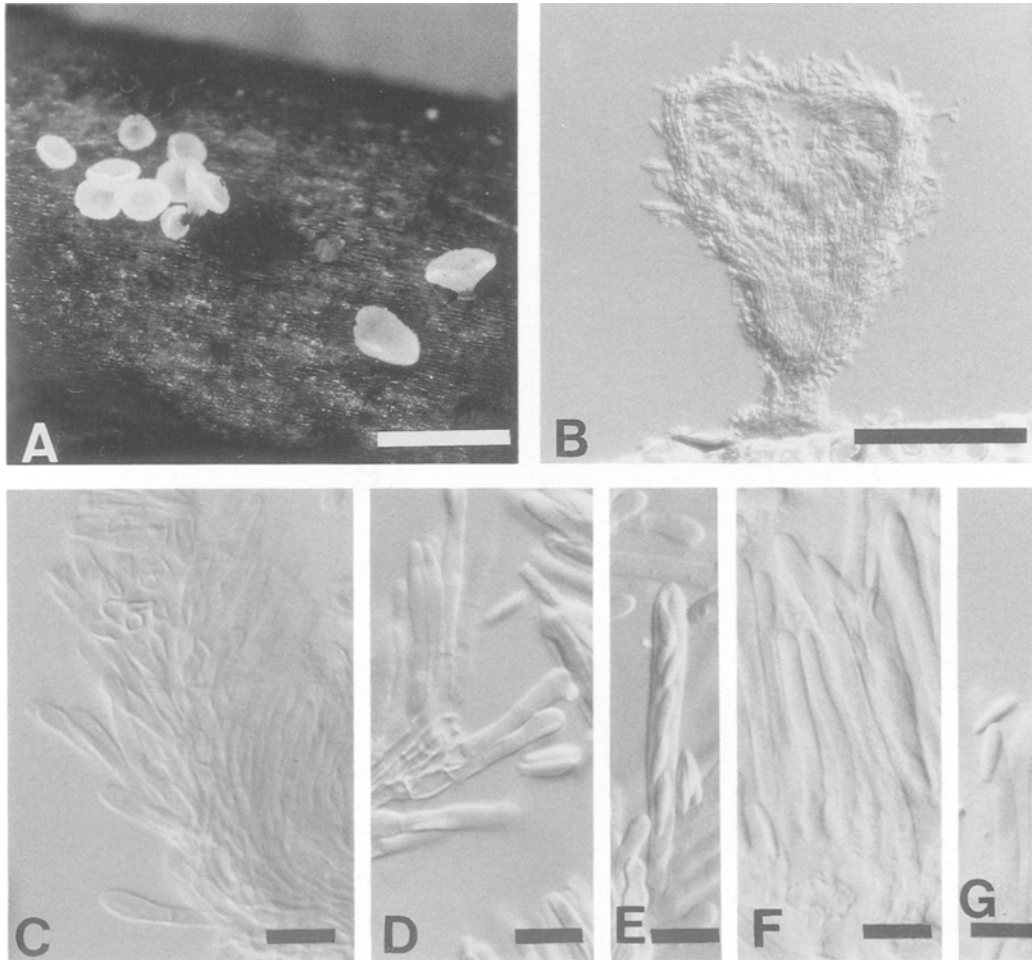


Fig. 6. *Micropodia chrysostigma* (TRL-1104).

A. Fresh apothecia on fern remain. B. Vertical section of apothecium showing incurving margin and external short hairs. C. Close up of margin showing ectal excipular cells giving rise to hairs. D. Hairs protruding from the excipular cells. E. Asci. F. Paraphyses among immature asci. G. Ascospores.
Scales. A, 1 mm; B, 100 μm ; C-G, 10 μm .

to some species of *Pezizella* P. Karst., especially the margin fringed by the hairs. The genus *Pezizella* is dubious because it may involve both species of Hyaloscyphaceae and Leotiaceae. The *textura prismatica* ectal excipulum and protrusion regarded as hairs place the species in the family Hyaloscyphaceae. Because the paraphyses are cylindrical or filiform, and not lanceolate, it should not be placed in *Psilachnum* Höhn. Of genera or the synonym list provided by Dennis (1956), *Micropodia* Boud. and *Microscypha* Syd. & P. Syd. may be appropriate for the present species, though both generic concepts are rather vague. The latter was recently suggested to be synonymous with *Hyaloscypha* (Huhtinen, 1989: 53). Although few authors accept the genus *Micropodia* (Svrček, 1985, 1987) at present, this genus appears to be the oldest. It consists of the fewest species, and is the less controversial option for accommodation of the present fungus in Hyaloscyphaceae.

Böhler (1974) reported the present species on a variety of ferns. It is widely distributed in the world.

The genus *Micropodia* is reported for the first time from Japan.

4. *Micropodia grisella* (Rehm) Boud., Hist. Classific. Discom. d'Eur. p. 128. 1907. Figs. 8, 9

Helotium grisellum Rehm, Hedwigia 24: 13. 1885.

Dasyscypha grisella (Rehm) Sacc., Syll. Fung. 8: 467. 1889.

Lachnella grisella (Rehm) W. Phillips, Grevillea 18: 84. 1890.

Phialea grisella (Rehm) Rab., Kryptogamenfl. 1: 737. 1893.

Trichopeziza grisella (Rehm) Rehm as Syd., Myc. marchica, No. 956. 1895.

Microscypha grisella (Rehm) Syd., Ann. Mycol. 17: 38. 1919.

Peziza arenula Alb. & Schw.: Fr., Syst. Mycol. 2: 148. 1922.

Microscypha arenula (Alb. & Schw.: Fr.) Boud., Icon. Mycol. pl. 528.

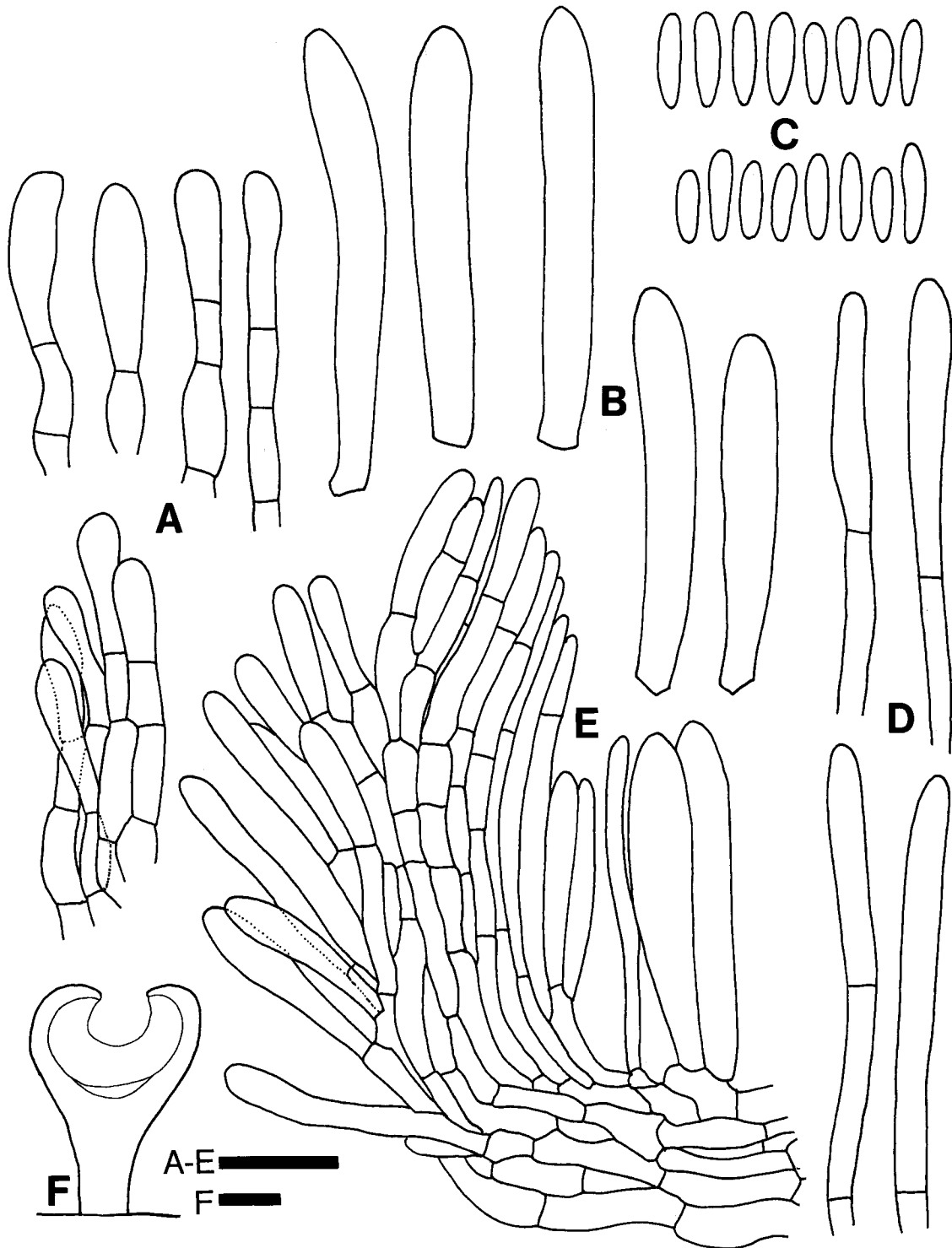


Fig. 7. *Micropodia chrysostigma* (TRL-1104).

A. Hairs. B. Asci. C. Ascospores. D. Paraphyses with septa. E. Vertical section showing ectal excipulum and hairs. F. Schematic drawing of the apothecial section showing outline of the structure. Hairs not drawn.

Scales. A-E, 10 μm ; F, 50 μm .

Apothecia scattered, minute, goblet-shaped to clavate, 150–200 \times 150–200 μm , short stalked; disc strongly concave to urceolate, obscured by incurving margin

when dried; receptacle minutely downy, dark brown, paler at the margin. Ectal excipulum thin-walled *textura prismatica*, cells 5–13 \times 4–7 μm , becoming elongated at

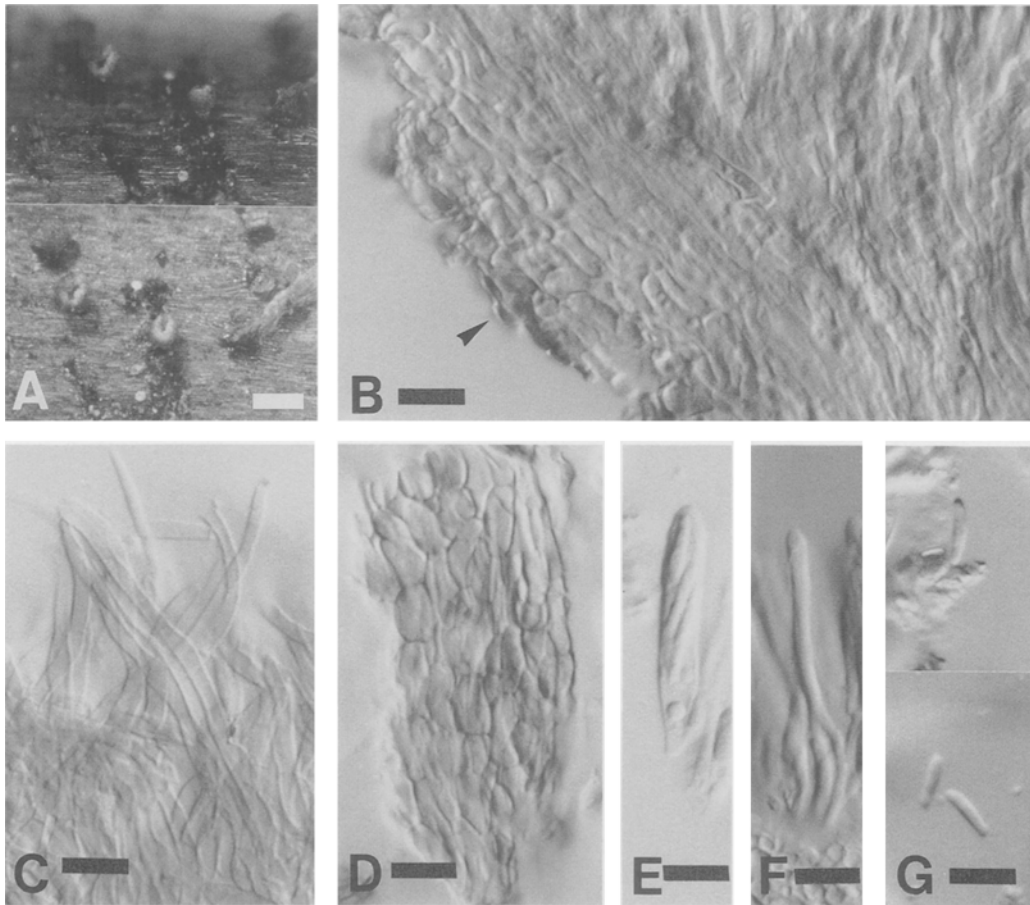


Fig. 8. *Microscypha grisella* (TRL-963).

A. Dried apothecia. B. Vertical section showing ectal excipulum. Note amorphous resinous matter attaching to the outer wall of the excipulum (arrowhead). C. Hairs. D. Cells from the middle flank. E. Asci with ascospores. F. Paraphyses. G. Ascospores. Scales. A, 0.2 mm; B-G, 10 μ m.

the margin and giving rise to hairs; the outer cells brown, externally vested by amorphous to scurfy resinous matter partially deep stained by MLZ, lined by more slender and paler inner cells, running along the external surface. Hairs cylindrical, thin-walled, aseptate or multi-septate, hyaline to subhyaline, up to 60 μ m long; such variation occurs within a single apothecium, 2–3 μ m wide at the base, constant in width, occasionally slightly constricted at septa, narrowed at the apex, MLZ– with or without KOH pretreatment. Asci 28–36 \times 5–6 μ m, cylindrical clavate to saccate with a broad base, 8-spored, arising from croziers; apex slightly conical, MLZ+ without KOH pretreatment. Ascospores 7–9(–12) \times 1.5–2 μ m, ellipsoid, hyaline, aseptate, mostly uniseriate in the asci. Paraphyses cylindrical to filiform, aseptate or 1–2-septate, occasionally broader toward the obtuse tip, 2–3 μ m thick at the widest point, not exceeding the asci.

Colony of SANK 18096 on PDA low, dense, pruinose, radially sulcate, context tough and glutinous, pale yellow (4A3) from the surface, same color from the reverse. Sectors and zonation absent. Aerial mycelium white, poorly developed to give pruinose appearance, not forming strands. Margin distinct, weakly undulate, su-

perficial. Soluble pigment not produced. Anamorph not seen.

Specimens examined. HONSHU: Suwa-no-sawa, Aomori-shi, Aomori Pref., on decaying fern stem, 6-V-94, TRL-963 (culture SANK 18096).

Notes. The conceptual problem concerning the identity of *M. arenula* and *M. grisella*, proposed by Dennis (1949) and Svrček (1976), was discussed by Korf (1985).

Micropodia grisella is distinguished from *M. chryso stigma* by its larger apothecia with remarkable brown color. The species has been placed in eight genera, but most of them cannot be adopted in the present taxonomy. Since the present species is related to *Micropodia chryso stigma*, it should also be classified in the same genus.

5. *Phialina lacrimiformis* Hosoya, sp. nov. Figs. 10, 11

Apothecia gregaria, sessilia, 100–200 μ m diam, paulo cupulata, alba, margine piloso minute floccoso vestita, in sicco brunneo-aurantiaca, globosa vel lacrimiformia ob marginem involutam et pilos convergentes super hymenium. Excipulum ectale "textura prismatica," ex

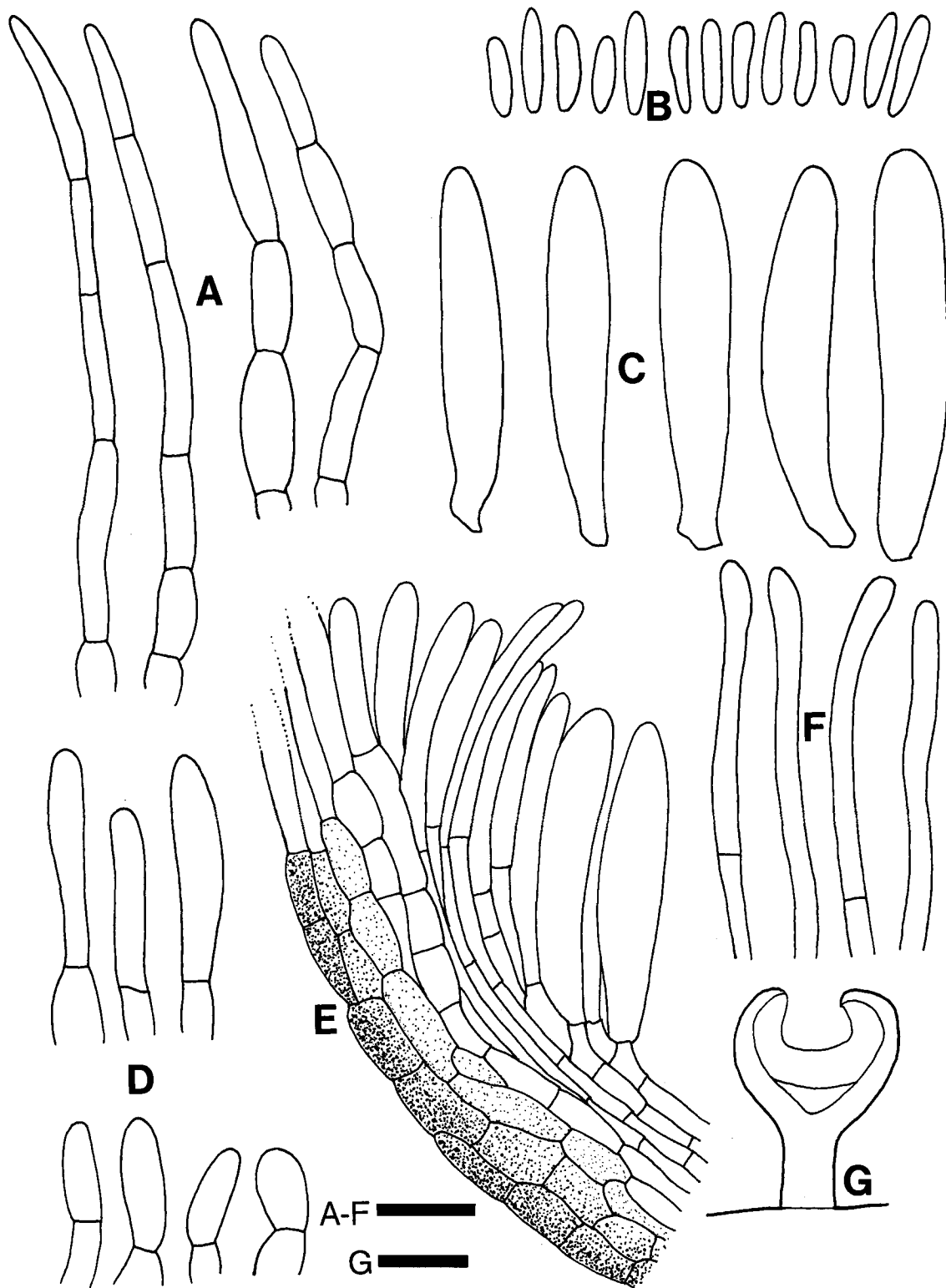


Fig. 9. *Microscypha grisella* (TRL-963).

A. Hairs, long and well developed, from the marginal area. B. Ascospores. C. Asci. D. Short hairs (hyphoid protrusions) developed at the marginal area. E. Vertical section of apothecium showing ectal excipulum and hymenium structure. Note the gradation of the color toward the medullary excipulum. Hairs drawn only for basal portion. F. Paraphyses. G. Schematic drawing of the apothecial section showing outline of the structure. Hairs not drawn.

Scales. A-F, 10 μm ; G, 50 μm .

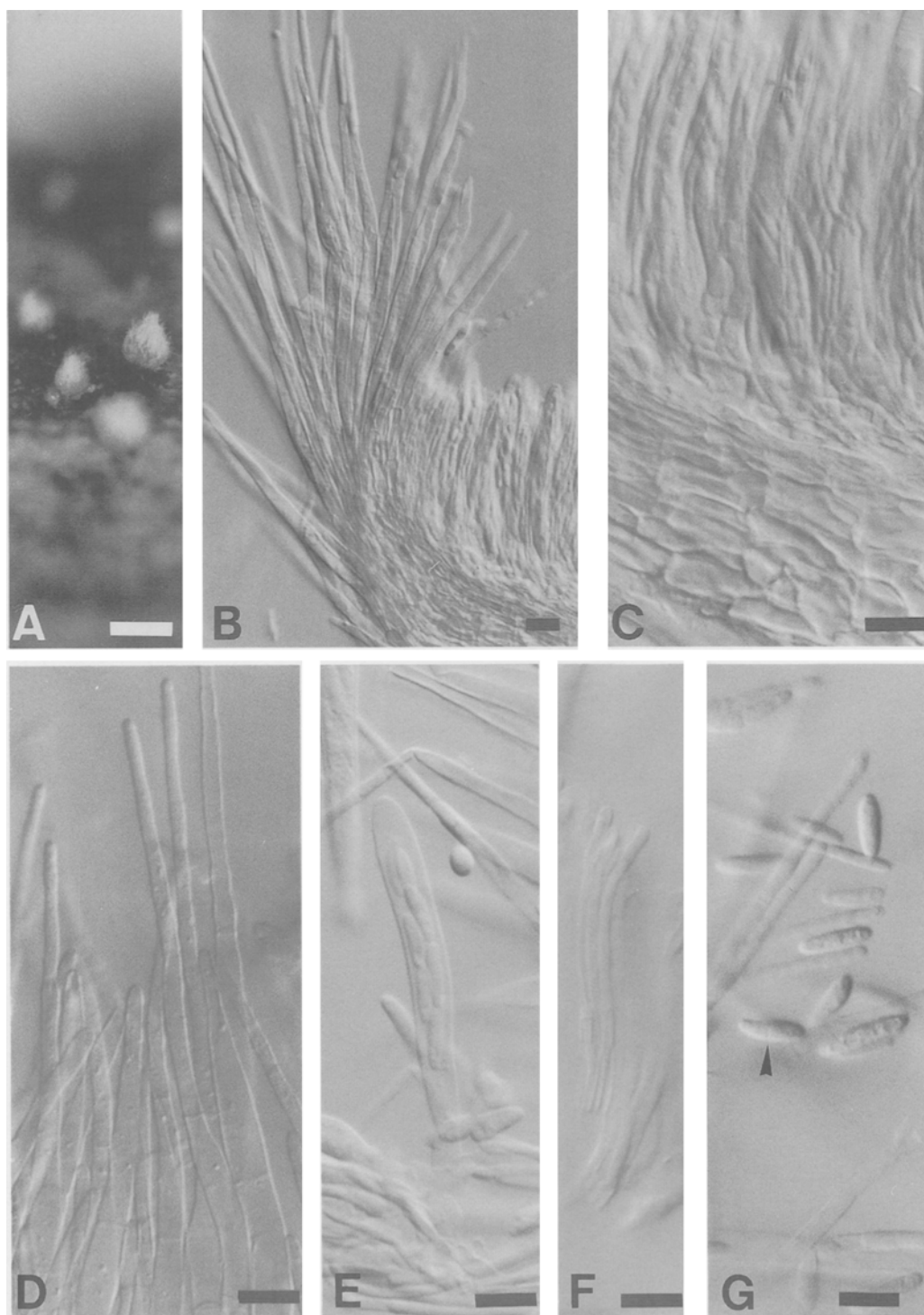


Fig. 10. *Phialina lacrimiformis* (TRL-705).

A. Dried apothecia. Note the onion-shape due to the hairs fasciated toward a point above the hymenium. B. Vertical section of apothecium showing margin with hairs. C. Close-up of ectal excipulum below the hymenium near the margin. D. Close-up of hair apex. Note coarsely granulate appearance due to resinous material. E. Ascus with ascospores. F. Paraphyses. G. Ascospores. Septation indicated by an arrowhead. Scales. A, 0.5 mm; B-G, 10 μ m.

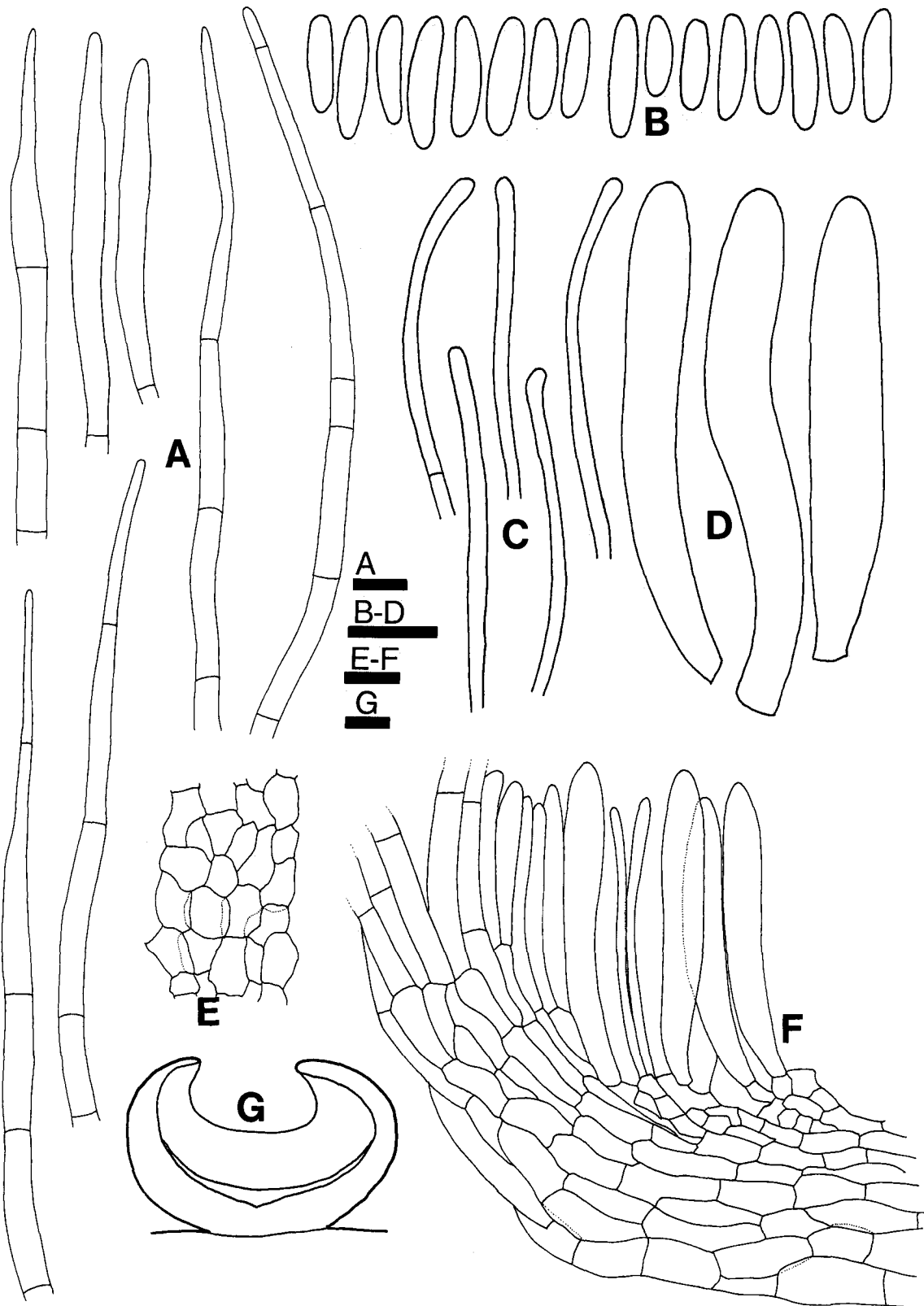


Fig. 11. *Phialina lacrimiformis* (TRL-705).

A. Hairs. B. Ascospores. C. Paraphyses. D. Asci. E. Ectal excipular cells from the middle of the receptacle in squash mount. F. Vertical section of apothecium showing the margin. Hairs drawn only for basal portion. G. Schematic drawing of the apothecial section showing outline of the structure. Hairs not drawn. Scales. A-F, 10 μm ; G, 50 μm .

cellulis leptodermis ad partem exteriorem parallere dispositis 7–11 × 4–9 μm compositum. Pili anguste conici, recti, leptodermi, septati, hyalini, basi 5 μm crassi, usque ad 150 μm longi, apicem obtusatum 1.0–1.5 μm crassum paulatim attenuati. Asci 50–55 × 6–8 μm , cylindraco-clavati, basi uncinati, octospori, poro iodo caerulescenti. Ascospores (8–)10–12(–14) × 2.5–3 μm , ellipsoideae vel oblongae, aseptatae vel uniseptatae, hyalinae. Paraphyses cylindraco-clavatae, septatae, 2 μm crassae, apice frequenter leviter expansae, ascos non superantes.

Holotypus. HONSHU: Daimyojin water fall, Tsukuba Univ. Sugadaira Montane Research Center, Nagano Pref., on unidentified decaying wood, 24-V-93, col. T. Hosoya, TRL-705, TNSF-181594 (culture SANK 18196).

Etymology. Latin, *lacrimiformis*, refers to apothecial shape when dried.

Apothecia gregarious, sessile, seated on a broad base, 100–200 μm in diam; disc shallow cupulate, pure white, clothed with minutely downy hairs at the margin; apothecia when dried becoming globular to typically tear-like to onion-shaped due to the incurving margin and hairs apically fasciated to a point above the disc, concealing the hymenium; receptacle concolorous with the disc, finely downy when fresh, becoming brownish orange (7C5), paler toward the margin, obscured by white hairs. Ectal excipulum of thin-walled *textura prismatica*, cells from middle flank 7–11 × 4–9 μm , arranged in parallel to the outside. Hairs narrowly conical, straight, thin-walled, septate, hyaline, 5 μm thick at the base, up to 150 μm long, gradually tapered to a blunt apex of 1–1.5 μm thick, often containing and bearing CB+ resinous matter, sometimes fasciated to form denticulate appearance around the apothecia, reduced to hyphoid

protrusions at the margin. Asci 50–55 × 6–8 μm , cylindrical clavate; arising from croziers, 8-spored; apex hemispherical to conical, pore MLZ+ without KOH pretreatment. Ascospores (8–)10–12(–14) × 2.5–3 μm , elliptical to elongate elliptical, often slightly curved, aseptate but infrequently bearing one septum, hyaline. Paraphyses cylindrical, septate, 2 μm thick, often slightly expanded at the tip, as long as the asci.

Colony of SANK 18196 on PDA plane, umbonate at the center, slightly velvety to almost bold, black with white margin from the surface, brownish grey (4E2) from the reverse. Context glutinous. Zonations and sectors absent. Aerial mycelium developed only at the center, floccose or forming well-developed mycelial strands, extending into the air, black. Margin distinct, entire, flat.

Notes. Huhtinen (1989) monographed *Phialina* Höhn. species. The characteristics of the present specimen are close to those of *P. setiigera* Huhtinen. However, there are some important differences. The gross morphology of dried apothecia is very characteristic. It becomes onion-shaped, due to the crowded hairs obscuring the hymenium. This feature is not given by Huhtinen (1989) for any *Phialina* species. The L/W ratio of the ascospores is much larger ($Q=3.5$ in *P. setiigera*, $Q=3.9$ in our material). *Phialina setiigera* is found on *Alnus* leaves in September, while our fungus is found on a decorticated wood in April. As very few specimens of *P. setiigera* have been reported (Huhtinen, 1989), the species delimitation does not appear to be clarified at present. The present specimen should be placed near *P. setiigera*, but at present still segregated.

The genus *Phialina* is reported for the first time from Japan.

Key to the genera of the tribe Hyaloscypheae in Japan

Family Hyaloscyphaceae

Subfamily Hyaloscyphoideae

Tribe Hyaloscypheae

1. Hairs without glassy portion or glassy portion not always present 2
 2. Hairs uncinatè *Hamatocanthoscypha*
 2. Hairs straight 3
 3. Hairs hyphoid, bladder-like or with blunt apex *Micropodia*
 3. Hairs conical or lageniform, with relatively sharply pointed apex 4
 4. Excipulum dark-colored *Dematioscypha*
 4. Excipulum hyaline 5
 5. Hairs lageniform to conical, typically aseptate *Hyaloscypha*
 5. Hairs conical, typically septate *Phialina*
1. Hairs with glassy portion always present at least in part 6
 6. Glassiness lost on 10% KOH pretreatment *Urceolella*
 6. Glassiness stable on 10% KOH pretreatment 7
 7. Glassy portion delimited to the apex *Mollisina*
 7. Glassy portion present along the length of the hairs *Hyalopeziza*

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