

Short Communication

Miscellaneous notes on Discomycetes of the Bonin Islands, Ani-jima Island

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Cup fungi of Ani-jima Island, the Bonin Islands, were collected in November 1990 and described for the first time from Ani-jima Island. Four species, *Diccephalospora rufocornea*, *Lachnum abnormis*, *Lachnum pritzelianum*, and *Orbilbia delicatula* were collected from the materials in the litter layer of *Livistona chinensis* var. *boninensis* community around Mt. Kita-hutago in Ani-jima Island. *Pulvinula globifera* was collected from the soil under a camellia (*Schima mertensiana*) community to the southeast of Mt. Kita-hutago. *Lachnum pritzelianum* was new to Japan.

Key Words—ascomycete; Bonin Islands; discomycete; Japan; *Livistona chinensis* var. *boninensis*.

The Bonin Islands are situated in the Northern Pacific Ocean between the parallels of Lat. 27°44' and 26°32'N. These islands are so-called ocean islands and their vegetation and fauna are considered to be uniquely developed. Thus, many endemic species of plants and animals have been described (Tuyama and Asami, 1970; Miyawaki, 1989). In terms of mycology, Berkeley and Curtis (1860) described 69 species, including 3 Discomycetes, for the first time from their collections on the Bonin Islands. Today, more than 370 fungi have been reported from the Bonin Islands (Sato et al., 1991). These reports include both macrofungi (Ito and Imai, 1937a, b, 1939a, b, 1940; Hongo, 1977, 1978, 1980; Neda and Hattori, 1991) and microfungi (Kobayasi and Konno, 1969; Doi, 1977, 1978; Harada, 1979; Harada and Katumoto, 1981; Tokumasu, 1985; Sato, 1987; Sato et al., 1991). The vegetation of Ani-jima Island is poorly developed because of the rocky soil and dry climate, and comprises communities of xeric scrub. *Livistona chinensis* R. Br. var. *boninensis* Becc. is endemic to the Bonin Islands and there was a good litter layer under the community of *L. chinensis* var. *boninensis* around Mt. Kita-hutago, Ani-jima Island. In this litter layer, three kinds of cup fungi uniquely colonized the fallen leaves of *L. chinensis* var. *boninensis*, presumably contributing to the decomposition of these hard leaves. In this paper, five species are newly reported from Ani-jima Island, of which *Lachnum pritzelianum* (Henn.) Spooner is new to Japan. A part of this study has already been briefly reported (Sato et al., 1991).

Exploration was conducted at three sites around Mt. Kita-hutago. A community of *L. chinensis* var. *boninensis* was the best place to find cup fungi, especially in the litter layer (Fig. 1). Collected cup fungi were dried at 60°C and stored in the laboratory. All materials are deposited in the Herbarium of the National Science Muse-

um, Tokyo (TNS). All specimens were also indicated by Nagao's sampling number. All materials were rehydrated with distilled water. Sectioned materials were examined. Materials were observed under the microscope using a ×100 oil-immersion objective, and under a Nomarsky interference microscope. Iodine reaction was examined with Melzer's reagent. Pheloxine B was treated to observe septation.

1. *Diccephalospora rufocornea* (Berk. et Br.) Spooner, Bibl. Mycol. 116: 272. 1987. Fig. 2
Basionym: *Helotium rufocorneum* Berk. et Br., J. Linn. Soc., Bot. 14: 108. 1873.
Synonym: *Hymenoscyphus rufocorneus* Dennis, Persoonia 3: 62. 1964.
Lanzia rufocornea (Berk. et Br.) Dumont, Mycotaxon 12: 272. 1980.
Helotium subserotinum Henn. et Nyman, Monstoria 1: 33. 1900. *teste* Dumont, 1980.
Hymenoscyphus subserotinus (Henn. et Nyman) Dennis, Persoonia 3: 74. 1964.
Helotium fuscopurpureum Rehm, Hedwigia 39: 94. 1900. *teste* Dumont, 1980.
Hymenoscyphus fuscopurpureus (Rehm) Dennis, Persoonia 3: 74. 1964.
Lanzia flavo-aurantia Henn., Hedwigia 41: 26. 1902. *teste* Dumont, 1980.
Helotium flavo-aurantia (Henn.) Rick, Broteria, Sér. bot. 25: 115. 1931.
Helotium miniatum Pat. in Duss, Enumération champ. Guadeloupe et Martinique: 65. 1903. *teste* Dumont, 1980.
Hymenoscyphus miniatus (Pat. in Duss) Dennis, Persoonia 3: 74. 1964.
Helotium camerunense Henn. var. *braziliensis* Rick, Broteria, Sér. bot. 25: 114. 1931. *teste* Dumont,

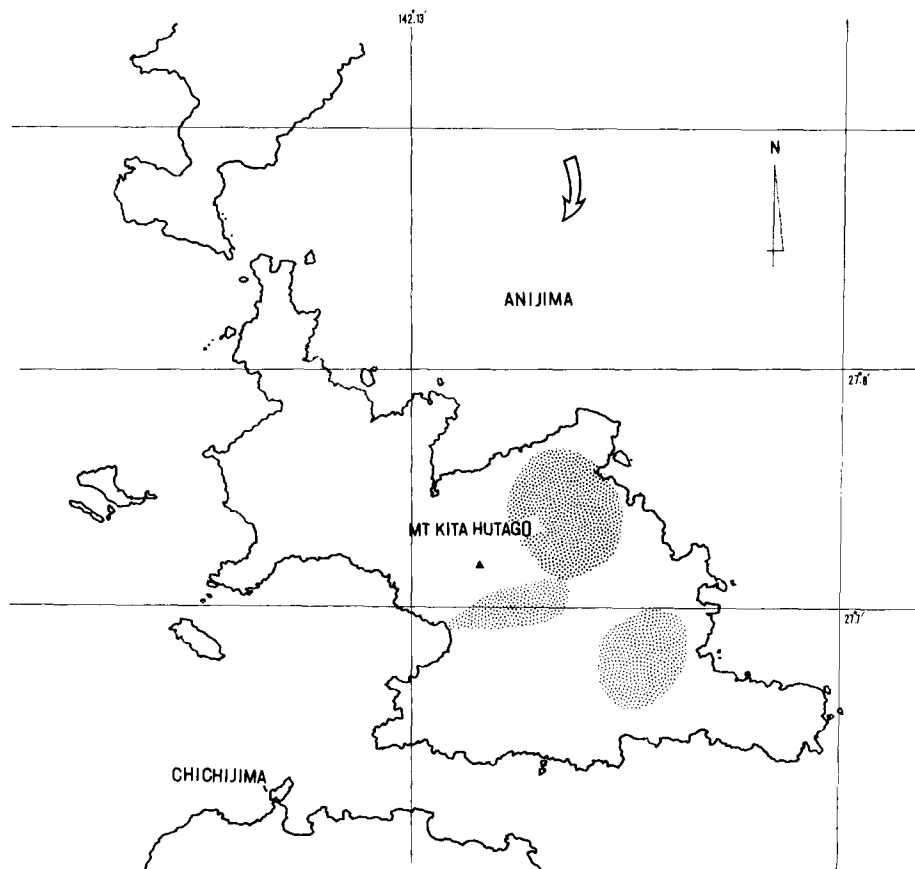


Fig. 1. Collection sites of Discomycetes in Ani-jima Island.

1980.

Apothecium small, stipitate, dark red. Dark brown streak lineated at the base of stalk. Asci cylindrical, broad at the middle part, $82-103 \times 8-11 \mu\text{m}$ (average $92.9 \times 9.4 \mu\text{m}$), markedly blue at the apex in Melzer's reagent. Ascospores $21-27 \times 3.5-4.5 \mu\text{m}$ (average $24.2 \times 4.0 \mu\text{m}$), hyaline, smooth, multicellular, capped with a small, obconical gelatinous collar. Paraphyses filiform, $2.5-3.0 \mu\text{m}$ in width. Ectal excipulum composed of textura prismatica.

Distribution: Widely distributed throughout tropical and subtropical areas, Japan.

Specimen examined: TNS-F-180388 (Nagao-A05).

This fungus has previously been reported in Japan but was newly collected in Ani-jima Island, on decayed branch from the southeast community of Mt. Kita-hutago.

2. *Lachnum abnormis* (Mont.) Haines et Dumont, Mycotaxon **19**: 10. 1984. Fig. 3

Basionym: *Peziza abnormis* Mont., Ann. Sc. Nat. sér. 2, 3: 351. 1835.

Synonym: *Trichopeziza abnormis* (Mont.) Sacc., Syll. Fung. **8**: 429. 1889.

Dasyscyphus abnormis (Mont.) Dennis, Kew Bull. **17**: 320. 1963.

Peziza leucophaea Berk. et Curtis, Proc. Am. Acad. Arts Sci. **4**: 128. 1860. (non *Peziza leucophaea* (Pers.) Nyl.

teste Haines et Dumont, 1984.)

Erinella leucophaea (Berk. et Curtis) Sacc., Syll. Fung. **8**: 509. 1889. teste Haines et Dumont, 1984.

Lachnum longisporum P. Karsten, Hedwigia **28**: 191. 1889.

Erinella longisporum (P. Karsten) Sacc., Syll. Fung. **8**: 507. 1889.

Erioscyphella longispora (P. Karsten) Kirschstein, Ann. Mycol. **36**: 384. 1938.

Erinellina longisporum (P. Karsten) Seaver, The North American cup fungi (Inoperculates): 293. 1951.

Erinella corticola Massee, Bull. Misc. Inf. 1898: 115. 1898.

Dasyscyphus corticola (Massee) Dennis, Kew Bull. **15**: 197. 1961.

Erinellina corticola (Massee) S. C. Teng, Chung-Kuo Ti chen-chun (Fungi of China): 760. 1964.

Erinella avellaneomellea Stårback, Bih. K. Svenska Vet.-Akad. Handl. (Stockholm) 25, afd. 3, 1: 6. 1899.

Dasyscyphus avellaneomelleus (Stårback) Dennis (as *D. avellaneomellea*), Kew Bull. **9**: 300. 1954. teste Haines et Dumont, 1984.

Erinella isabellina Stårback, Bih. K. Svenska Vet.-Akad. Handl. (Stockholm) 25, afd. 3, 1: 6. 1899. teste Haines et Dumont, 1984.

Dasyscyphaella schroeteriana Rehm, Hedwigia **39**: 95. 1900. teste Haines et Dumont, 1984.

Dasyscypha schroeterianus (Rehm) Dennis (as *D.*

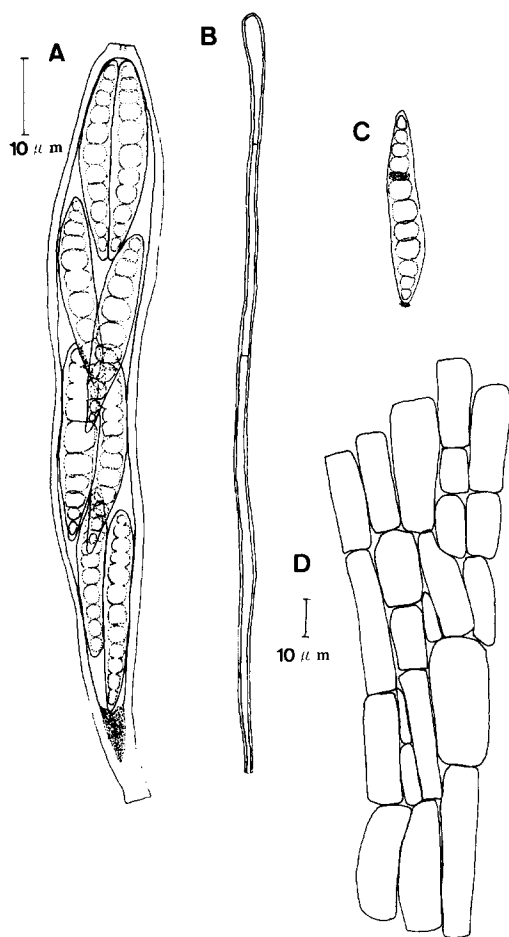


Fig. 2. *Dicephalospora rufocornea*, TNS-F-180388.
A. Ascus and ascospores. B. Paraphysis. C. Ascospore.
D. Vertical section of ectal excipulum. Scale bars for B and C are shown in A.

schroeteriana), Kew Bull. 9: 301. 1954.

Erinella heterotricha Speg., Bol. Acad. Nac. Cienc. (Córdoba) 23: 511. 1919. teste Haines et Dumont, 1984.

Apothecium small, 0.3–0.5 mm, stipitate. Receptacle dark red with faintly brown hairs. Hymenium dark red when dry and pale orange when rehydrated. Asci $75.0\text{--}92.5 \times 3.8\text{--}6.3 \mu\text{m}$ (average $83.3 \times 5.1 \mu\text{m}$). Ascospores filiform, $47.5\text{--}78.0 \times \text{ca. } 1.3 \mu\text{m}$ (average $63.8 \times \text{ca. } 1.3 \mu\text{m}$). Ectal excipulum composed of textura angularis. Medullary excipulum textura intricata. Hairs long, finely granulate, but smooth near the base and emerged from the outer cells of receptacle, which were elongated in comparison with the inner cells.

Distribution: Tropical area. Japan.

Specimen examined: TNS-F-180386 (Nagao-A03).

This fungus was reported as *Peziza leucophaea* Berk. et Curtis in Japan (Berkeley and Curtis, 1860). Although the original report simply noted "on dead sticks, Japan," sampling data of this fungus were indicated as "Shimoda, May 14, 1855" with this specimen No. 372 (Otani, personal communication). *Lachnum abnormis* may be new to the Bonin Islands. This fungus was collected on the decayed leaves and stalks of *L.*

chinensis var. *boninensis* from the southeast community around Mt. Kita-hutago.

3. *Lachnum pritzelianum* (Henn.) Spooner, Bibl. Mycol. 116: 480. 1987. Fig. 4

Basionym: *Erinella pritzelianum* Henn., Hedwigia 42, Beiheft: 86. 1903.

Synonym: *Dasyscyphus pritzelianus* (Henn.) Dennis, Kew Bull. 13: 328. 1958.

Apothecium small, 0.3–0.5 mm, stipitate, ca. 0.5 mm. Receptacle white to whitish yellow with white hairs. Hymenium pale orange to bright yellow when dry and pale orange when rehydrated. Asci $70\text{--}100 \times 6.3\text{--}10 \mu\text{m}$ (average $81.9 \times 7.6 \mu\text{m}$). Ascospores filiform and $37.5\text{--}67.5 \times \text{ca. } 1.2 \mu\text{m}$ (average $55.6 \times \text{ca. } 1.2 \mu\text{m}$). Ectal excipulum composed of prismatic or angular cells. Medullary excipulum composed of thin-walled interwoven hyphae. This layer was compact. Hairs long, granulate but smooth at the base.

Distribution: Australia (New South Wales, Queensland). New to Japan.

Specimen examined: TNS-F-180389 (Nagao-A13).

Spooner (1987) described ascospores as non-septate, but observations by Nomarsky microscope and by staining with pheloxicine B showed the presence of septa in most specimens (Figs. 7C–E). This fungus is known to colonize *Livistona* species in Australia. This is the first report of *L. pritzelianum* in Japan. This fungus was also collected on the decayed leaves of *L. chinensis* var. *boninensis* from the northeast community around Mt. Kita-hutago.

4. *Orbilia delicatula* (P. Karsten) P. Karsten, Notis. Sallsk. Fauna Fl. Fenn. Forh. 11: 248. 1870. Fig. 5

Basionym: *Peziza delicatula* P. Karsten, Notis. Sallsk. Fauna Fl. Fenn. Forh. 10: 173. 1869.

Synonyms: *Orbilia coccinella* (Sommerf.) Fr. **delicatula* (P. Karsten) P. Karsten, Mycol. Fenn. 1: 98. 1871.

Orbilia botulispora Hohnel, Sitz. K. Akad. Wissensch. Wien, Math.-nöt. Kl. 116: 131. 1907.

Orbilia microspora Velen., Monog. Discom. Boh.: 95. 1934. teste Svrček, 1954.

Orbilia paradoxa Velen., Monog. Discom. Boh.: 102. 1934. teste Svrček, 1954.

Orbilia hypothalloso Velen., Novit. Mycol. Noviss.: 101. 1947. teste Svrček, 1954.

Orbilia faginea Velen., Novit. Mycol. Noviss.: 102. 1947. teste Svrček, 1954.

Apothecium orange to orange-brown when dry and pale yellow when rehydrated. Asci $19\text{--}28 \times 2\text{--}3 \mu\text{m}$ (average $25.1 \times 2.5 \mu\text{m}$). Ascospores ca. $3 \times \text{ca. } 1 \mu\text{m}$, strongly curved or deeply reniform with rounded, slightly enlarged ends. Paraphyses $28\text{--}32 \times 2\text{--}3 \mu\text{m}$ (average $30.2 \times 2.8 \mu\text{m}$), with enlarged, round-headed apex. Paraphyses obviously emerged from asci. Epithecium not formed. Asci and paraphyses not agglutinated. Ectal excipulum composed of textura angularis. Medullary excipulum obscure. Subiculum-like hyphal mat beneath the receptacle. This hyphal mat does not come out from

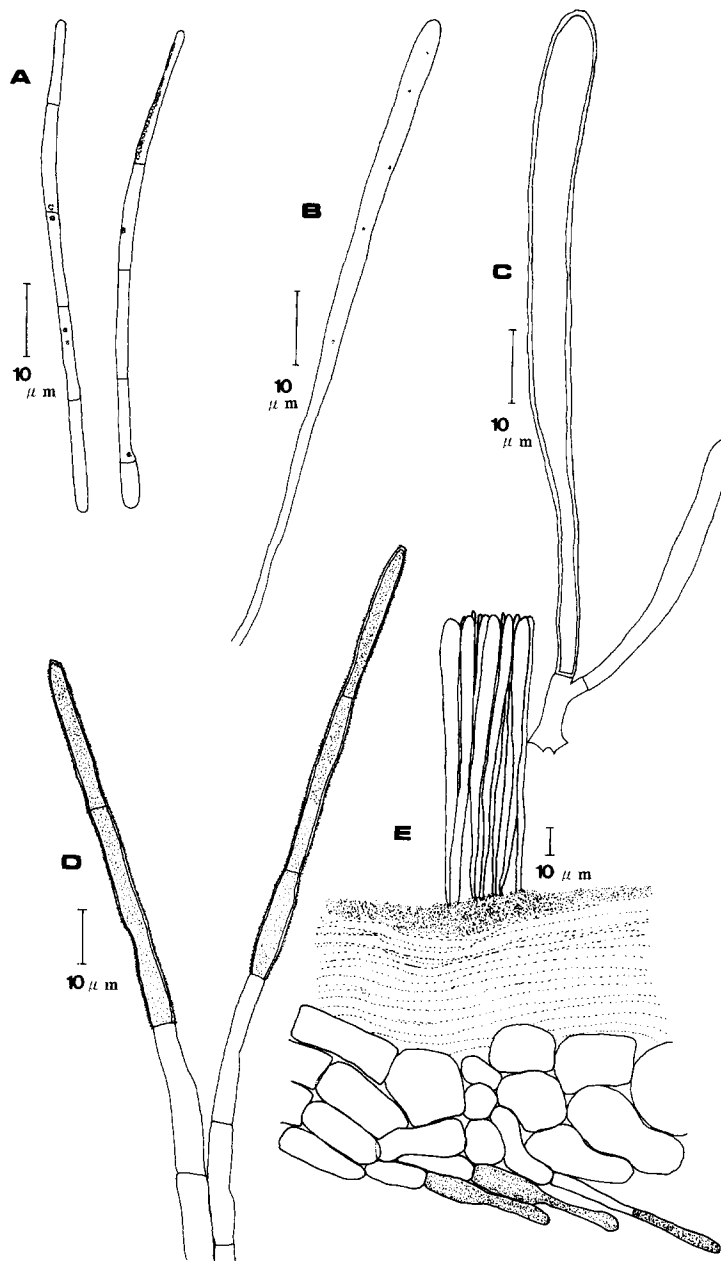


Fig. 3. *Lachnum abnormis*, TNS-F-180386. A. Ascospores. B. Paraphysis. C. Asci. D. Hairs. E. Vertical section at margin.

the margin of attaching surface of receptacle.

Distribution: Australasia (Australia and New Zealand), Europe, Japan, North America.

Specimen examined: TNS-F-180390 (Nagao-A12).

Orbilia coccinella was described as having minute, orange to orange-brown apothecium and egg-shaped ascospores. I reported the presence of *O. coccinella* in Nikko, Japan (Nagao-93415, Nagao, 1994) by the observation of egg-shaped ascospores. Spooner (1987) reduced *O. coccinella* to a synonym of *O. delicatula* by his careful examinations comparing the materials in Kew distributed by Nannfeldt. When I reexamined these two Japanese materials (Nagao-93415 and TNS-F-180390), reniform ascospores were observed in mature apothecia

of both materials. However ovoid ascospores were also recognized in these materials. In the case of previous observation with a x40 objective, reniform shape of ascospores was overlooked and an immature apothecium may be examined. Why ovoid ascospores were observed in mature apothecia was supposed that the ovoid feature of ascospores appeared when the ascospores were observed from dorsal direction. The specimen was collected on a decayed stalk of *L. chinensis* var. *boninensis* from the northeast community around Mt. Kita-hutago.

5. *Pulvinula globifera* (Berk. et Curtis apud Berk.) Le Gal sensu Rifai.

Figs. 6, 9

Basionym: *Peziza (Humaria) globifera* Berk. et Curtis

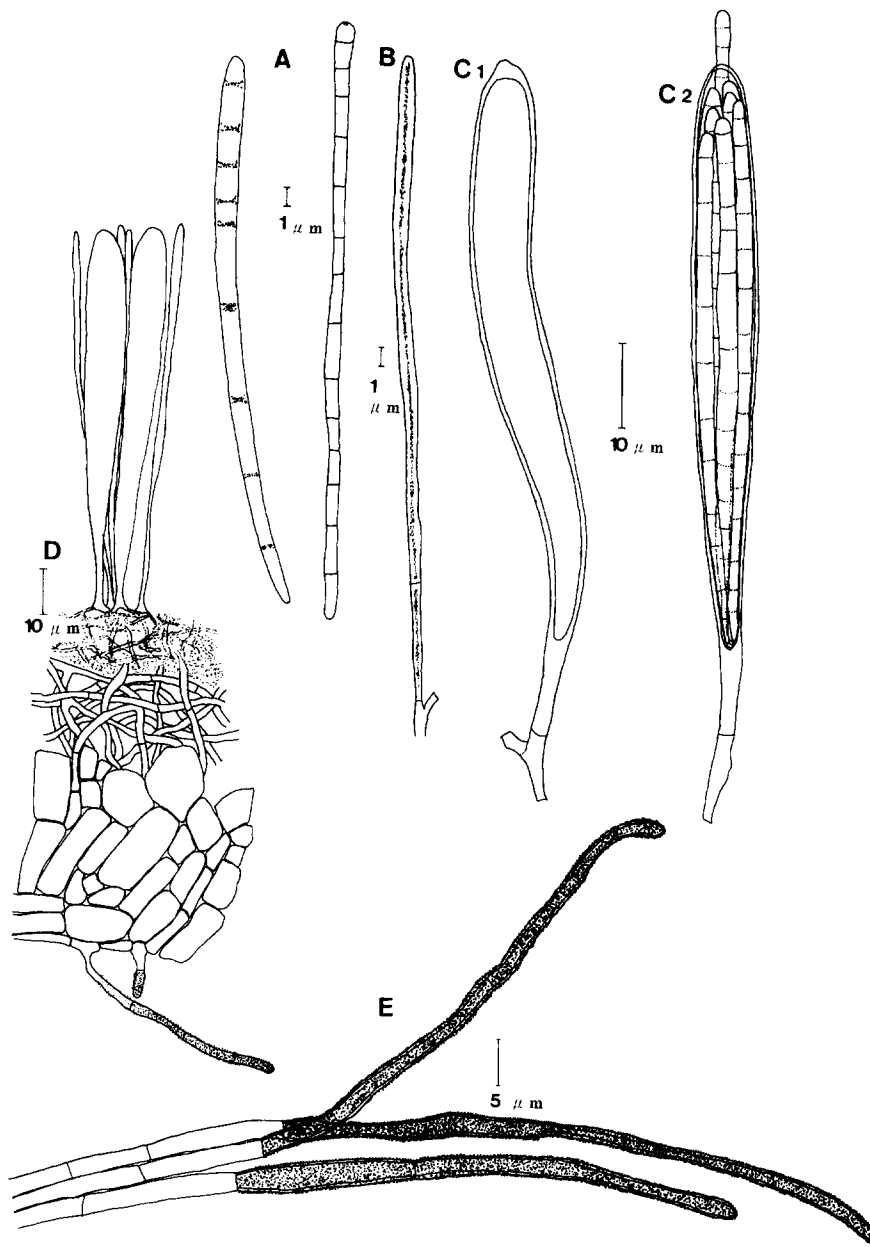


Fig. 4. *Lachnum pritzelianum*, TNS-F-180389.

A. Ascospores. B. Paraphysis. C1. Ascus. C2. Ascus and ascospores. D. Vertical section at margin of apothecium. E. Hairs.

apud Berk., J. Linn. Soc. Bot. **10**: 366. 1868.

Synonym: *Barlaea globifera* (Berk. et Curtis apud Berk.)

Sacc., Syll. Fung. **8**: 114. 1889.

Humaria (*Crovania*) *globifera* (Berk. et Curtis apud Berk.)

Cooke, Handb. Austral. Fungi: 256. 1892.

Barlaeina globifera (Berk. et Curtis apud Berk.) Sacc. et

Trav., in Sacc., Syll. Fung. **19**: 139. 1910.

Pulvinula globifera (Berk. et Curtis apud Berk.) Le Gal,

Discom. Madag.: 94. 1953.

Peziza (*Humaria*) *globifera* Berk. et Curtis apud Berk. var.

etiolata Cooke, Mycograph. **1**: 236. 1879.

Barlaea globifera (Berk. et Curtis apud Berk.) Sacc. var.

etiolata (Cooke) Sacc., Syll. Fung. **8**: 114. 1889.

Barlaeina globifera (Berk. et Curtis apud Berk.) Sacc. et

Trav. apud Sacc. var. *etiolata* (Cooke) Sacc., Syll.

Fung. **19**: 139. 1910.

Pulvinula etiolata (Cooke) Le Gal, Discom. Madag.: 91.

1953.

Apothecium astipitate, grayish white when fresh and amber when dry (Fig. 9A). Asci $187.5\text{--}235.0 \times 12.5\text{--}20.0\ \mu\text{m}$ (average $213.9 \times 15.6\ \mu\text{m}$), with fork-shaped base. Ascospores $10\text{--}13.8\ \mu\text{m}$ in diam (average $12.0\ \mu\text{m}$), rounded containing a small oil drop. Paraphyses slightly curved at the apices longer than asci, $2.5\text{--}3.8\ \mu\text{m}$ in diam (average $2.5\ \mu\text{m}$). Ectal excipulum composed of textura globulosa with thin, short hyphae

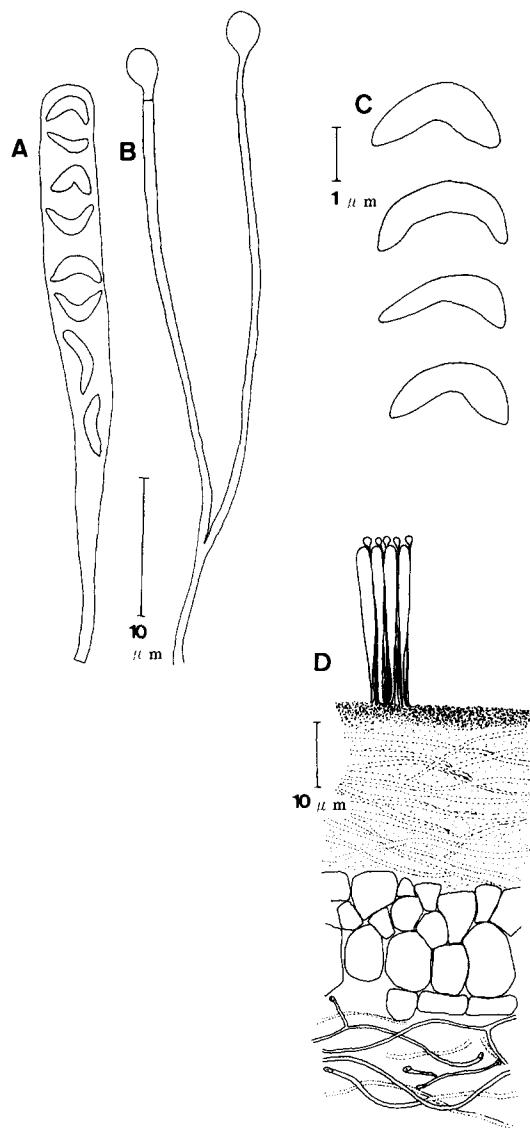


Fig. 5. *Orbilia delicatula*, TNS-F-180390.

A. Ascus and ascospores. B. Paraphysis. C. Ascospores. D. Vertical section at margin.

emerging from the outer cells. Medullary excipulum composed of textura intricata.

Distribution: Tropical America, Ceylon, Japan.

Specimen examined: TNS-F-180387 (Nagao-A04).

Rifai (1968) discussed the characteristics of *P. globifera* sensu lato and its related species. He examined the materials of Kew herbarium and compared them with the description of Le Gal. In his careful examination, these species were distinguished by apex shape and curvature of paraphysis, and base shape of ascus. He clarified three species as follows: *P. orichalcea* (Cooke) Rifai, paraphyses are thread-like and forked at the apex, and asci gradually taper into a subcylindrical base; *P. globifera* (Berk. et Curtis apud Berk.) Le Gal sensu Rifai, paraphyses are almost straight and do not branch at the apex, and asci show forked base; and *P. tetraspora* (Hansf.) Rifai, paraphyses are thread-like and

do not branch at the apex, and asci show forked base. *Pulvinula tetraspora* shows four ascospores at maturity. All these species are described as showing bright coloration in the apothecium, i.e., yellow to orange when fresh.

Rifai (1968) also discussed the taxonomic position of *Peziza globifera* Cooke and placed it as a synonym of *Pulvinula globifera*. *Peziza globifera* Cooke was described as having eight ascospores and the same morphology of asci and paraphyses except coloration. Le Gal (1953) proposed *Pulvinula etiolata* for a strain with four ascospores and white coloration. Rifai (1968) reexamined *P. etiolata* and doubted the significance of spore numbers. He also pointed out that paraphyses in Cooke's specimens were slightly curved, but those in Le Gal's were strongly curved or hooked, and thread-like. Then *P. tetraspora* was newly described by Rifai but the coloration of apothecium was not stressed for the key of speciation. Moravec (1969) described two white *Pulvinula* species, *P. lacteoalba* J. Moravec and *P. niveoalba* J. Moravec. These two species were different in size and morphology of asci, ascospores and paraphyses from my specimen (TNS-F-180387).

My specimen is conspecific with *P. globifera* (Berk. et Curtis apud Berk.) Le Gal sensu Rifai (Rifai, 1968). In Japan, this fungus is reported from Yaku-shima Island where it was collected on burnt ground (Otani and Tubaki, 1976) and from Tochigi among mosses (Otani, 1990). However, this specimen was collected from a different niche, that is, on the ground of a camellia (*Schima mertensiana* (Sieb. et Zucc.) Koidz.) community situated southeast of Mt. Kita-hutago. Although *Pulvinula* species are known to grow in damp conditions (Rifai, 1968), *P. globifera* is found under sparsely wooded xeric scrubs in Ani-jima Island. So *P. globifera* may grow in other part of the Bonin Islands.

Acknowledgements—This exploration in Ani-jima Island was a part of the second general survey on natural environment of the Ogasawara (Bonin) Islands by Tokyo Metropolitan University. I am grateful to Dr. Y. Otani for his kind advice concerning *L. abnormis*.

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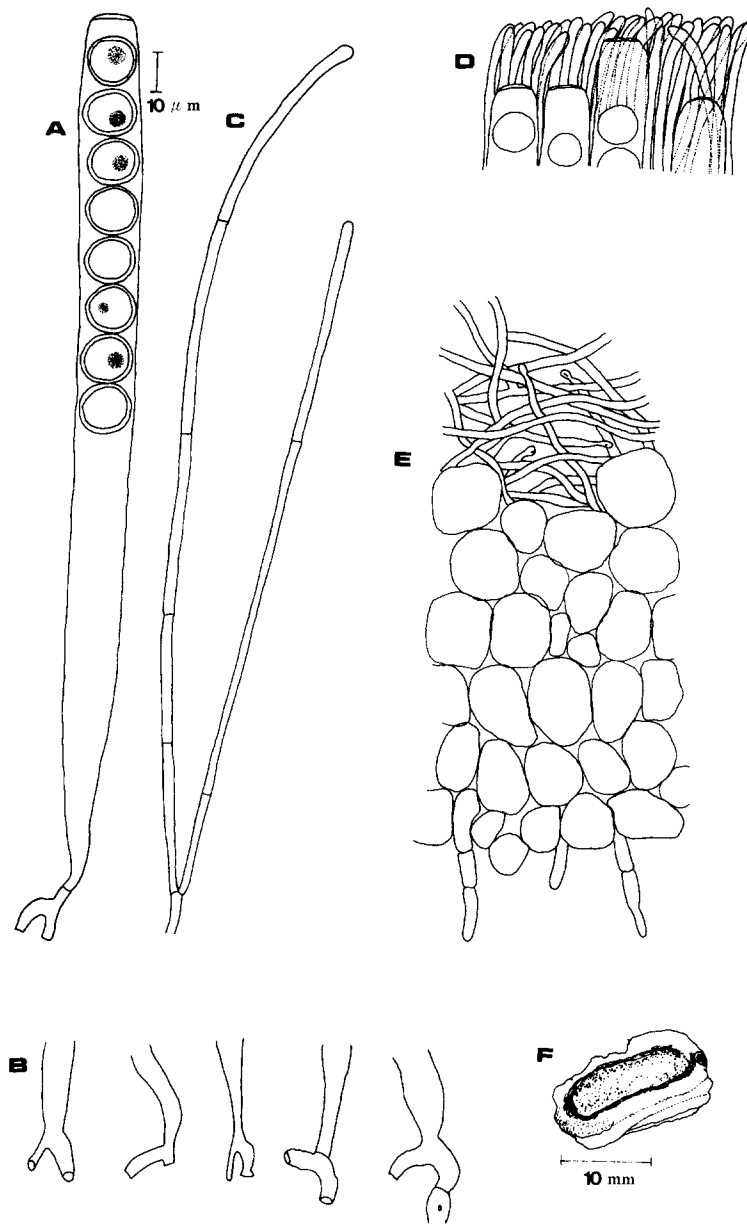


Fig. 6. *Pulvinula globifera*, TNS-F-180387.

A. Ascus and ascospores. B. Bases of asci. C. Paraphysis. D. Apices of asci and paraphyses. E. Vertical section at margin. F. Apothecium. Scale bars for B-E are shown in A.

Japan 22: 409-411.

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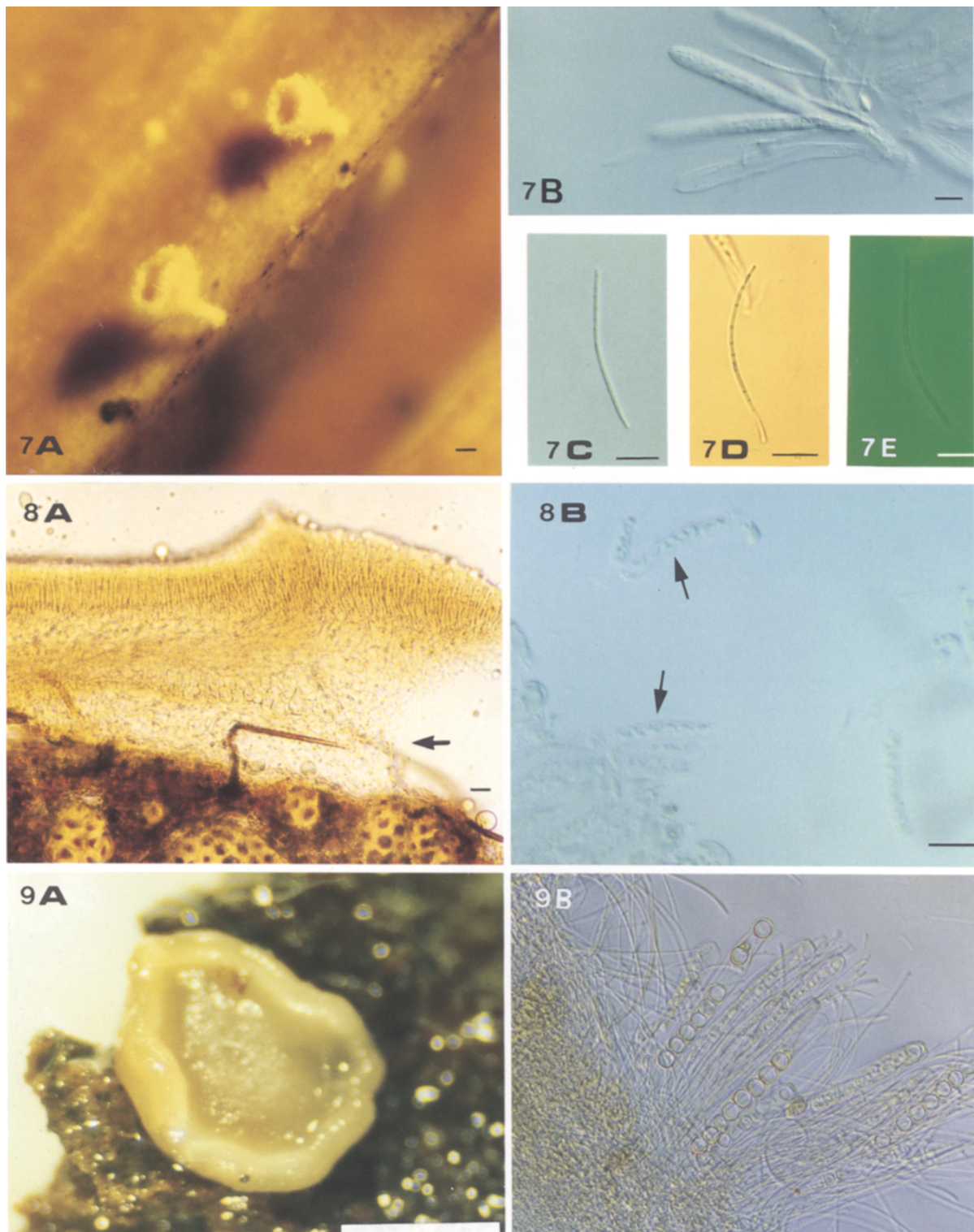


Fig. 7. *Lachnum pritzelianum*, TNS-F-180389.

A. Apothecia. B. Asci and ascospores. C. Ascospore observed by Normarsky microscope. D. Ascospore stained with phloxine. E. Ascospore observed by phase contrast microscope. Scale bars: A=100 μm ; B-E=10 μm .

Fig. 8. *Orbilia delicatula*, TNS-F-180390.

A. Vertical section of apothecium. Arrow indicates hyphal mat. B. Asci and ascospores (arrows). Scale bars: A=10 μm ; B=10 μm .

Fig. 9. *Pulvinula globifera* TNS-F-180387.

A. Apothecium. B. Asci, ascospores, and paraphyses. Scale bars: A=1000 μm ; B=10 μm .

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