

Myxomycetes in Hsien-Chi-Yen, Taipei City

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Abstract. A survey was conducted to investigate the myxomycete resources in Hsien-Chi-Yen, an area of secondary forest located in a hilly section in the southern part of Taipei City. In total, 36 species and 4 varieties of 17 genera were recorded. Among these, *Crabroaria cancellatum* (Batsch) Macbr. was the predominant species, while *Comatricha parvispora* Dhillon & Nann.-Brem., *Fuligo candida* Pers., *F. septica* var. *flava* Pers., and *Tubifera dimorphotheca* Nann.-Brem. & Loerak. are four newly recorded taxa in Taiwan. Furthermore, one species of *Cribraria* may represent an undescribed taxon which deserves of further studies.

Key words: *Comatricha*, *Cribraria*, *Fuligo*, Myxomycetes, *Tubifera*.

INTRODUCTION

Hsien-Chi-Yen is located in the suburb of Ching-Mei and geographically is part of Wen-Shan District, Taipei City (Fig. 1); it is also known as Ching-Mei Mt. with an elevation of 144 m at its peak. The vegetation is a type composed of secondary forest with broadleaf trees. There are many pretty walkways and paths used by people in the city for strolling and exercise. On the side of the walkways are a lot of decaying wood, stumps and fallen leaves; these substrates are suitable for the growth of Myxomycetes. This study was designed mainly to elucidate the myxomycetes biota in this area with the hope that compiling these data will not only increase our knowledge of the biological resources of Taiwan but also be useful for further ecological studies of Myxomycetes in different vegetation types in the future.

MATERIALS AND METHODS

Field collections were made from 1996 to 1999 in the woodland of Hsien-Chi-Yen (Fig. 1). Fruiting bodies and their microscopic structures

were examined by light and scanning electron microscopy as described previously (Liu et al., 2002). Specimens were identified by consulting papers or monographs by Martin and Alexopoulos (1969), Nannenga-Bremgkamp (1991), and Yamamoto (1998).



Fig. 1. Site of Hsien-Chi-Yen in Taipei City.

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Table 1. Checklist of Myxomycetes from Hsien-Chi-Yen, Taipei City.

Taxa	Substrate
1 <i>Arcyria cinerea</i> (Bull.) Pers.	Dead wood
2 <i>Arcyria denudata</i> (L.) Wettst	Dead wood
3 <i>Arcyria insignis</i> Kalchbr. & Cooke	Dead twigs of bamboo
4 <i>Arcyria obvelata</i> (Oeder) Onsberg	Dead wood
5 <i>Ceratiomyxa fruticulosa</i> (Mueller) T. Macbr	Dead wood
6 <i>Collaria arcyrionema</i> (Rostaf.) Nann.-Brem., ex Ing	Dead wood
7 <i>Comatricha laxa</i> Rost.	Dead wood
8 <i>Comatricha parvispora</i> Dhillon et Nann.-Brem.	Dead wood
9 <i>Comatrica tenerrima</i> (M. A. Curtis) G. Lister	Fallen twigs
10 <i>Cribraria aurantiaca</i> Schrad.	Dead wood
11 <i>Cribraria cancellata</i> (Batsch) Macbr.	Dead wood
12 <i>Cribraria cancellata</i> var. <i>fuscum</i> Lister	Dead wood
13 <i>Cribraria intricata</i> var. <i>dictydioides</i> (Cooke & Balf.) Lister	Dead wood
14 <i>Cribraria intricata</i> Schrad.	Dead wood and bark of living trees: <i>Eucalyptus robussta</i>
15 <i>Cribraria languescens</i> Rex	Dead wood
16 <i>Cribraria microcarpa</i> Schrad.	Dead wood
17 <i>Cribraria tenella</i> Schrad.	Dead wood
18 <i>Cribraria violacea</i> Rex	Dead wood
19 <i>Cribraria</i> sp.	Dead wood
20 <i>Diachea leucopodia</i> (Bull.) Rostaf.	Fallen leaves
21 <i>Diderma effusum</i> (Schw.) Morgan	Fallen leaves
22 <i>Diderma hemisphaericum</i> (Bull.) Hornem.	Dead twigs and grass
23 <i>Diderma rugosum</i> (Rex) T. Macbr.	Moss
24 <i>Didymium bahiense</i> Gottsb.	Dead wood
25 <i>Didymium squamulosum</i> (Alb. & Schw.) Fr.	Dead leaves and twigs
26 <i>Fuligo candida</i> Pers.	Dead wood
27 <i>Fuligo septica</i> var. <i>flava</i> Pers.	Dead wood
28 <i>Lycogala epidendrum</i> (L.) Fr.	Dead wood
29 <i>Physarum nucleatum</i> Rex	Dead wood
30 <i>Physarum nutans</i> Pers.	Bark of living trees: <i>Eucalyptus robussta</i> .
31 <i>Physarum viride</i> (Bull.) Pers.	Dead wood
32 <i>Stemonaria longa</i> (Peck) Nann.-Bremek., Sharma & Y. Yamam. Basionym: <i>Comatricha longa</i> Peck	Dead wood
33 <i>Stemonitis axifera</i> (Bull.) T. Macbr.	Dead wood
34 <i>Stemonitis axifera</i> var. <i>smithii</i> (T. Macbr.) Hagelst	Dead wood
35 <i>Stemonitis fusca</i> Roth	Dead wood
36 <i>Stemonitis mussooriensis</i> var. <i>emotoi</i> (Nann.-Bremek. & Y. Yamam.) Y. Yamam.	Dead wood
37 <i>Stemonitopsis hyperopta</i> (Meylan) Nann.-Bremek.	Dead wood
38 <i>Stemonitopsis typhina</i> (Wiggers) Nann.-Bremek.	Dead wood
39 <i>Tubifera dimorphotheca</i> (Berk. & Curt.) G. W. Martin	Dead wood
40 <i>Tubifera microsperma</i> Nann.-Brem. & Loerak.	Dead wood

RESULTS AND DISCUSSION

A total of 36 species and 4 varieties of 17 genera were recorded (Table 1). Among them, *Dictydium cancellatum* was the predominant species, while *Comatricha parvispora*, *Fuligo candida*, *F. septica* var. *flava*, and *Tubifera dimorphotheca* are four newly recorded taxa in Taiwan. Furthermore, one species of *Cribraria* may represent an undescribed taxon worthy of further studies.

Remark of Specific Specimens:

Comatricha laxa Rost., Mon. 201. 1874.

Fig. 2A

Specimen examined: Taipei City: Wenshan District, Hsien-Chi-Yen, Y.-F. Chen 516c, June 26, 1999, on dead wood.

This specimen is a globose or ovoid form of *Comatricha laxa*. It is somewhat small in size, 0.55-1.10 mm high and 0.20-0.35 mm in sporangial diameter. In the smaller sporangia, columella usually branched at about the center of sporangia and capillitium usually formed a lax and fragmented surface net. This specimen is quite similar to *Paradiacheopsis rigida*, which was formerly named as *Comatricha laxa* var. *rigida* and was transferred to *Paradiacheopsis* by Nannenga-Bremekamp (1991). However, the capillitium in our specimen has a lot of anastomoses and a surface net, a character distinct from *P. rigida*.

Description of New Records:

Comatricha parvispora Dhillon et Nann.-Brem., Proc. Kon. Ned. Akad. Wet. C. 80: 260. 1977.

Figs. 2B~E, Fig. 4D

Fructifications gregarious, stipitate, erect, sometimes slightly nodding, (0.6-) 1.6-4.4 mm in total height. Sporangia brown, mostly cylindrical, rarely elongate-ovate, isodiametric or tapering upward, 0.24-0.32 mm in diameter. Stalk black, shining, opaque under transmitted light, about 1/3-1/2 of the total height. Hypothallus membranous, brown. Peridium early evanescent. Columella a continuation of the stalk, extending to near the apex of sporangia, black, opaque. Capillitial branches brown, arising from all parts of the columella, dichotomously branched, with a few anastomoses near surface, with many paler, sinuous free ends toward periphery. Spores brown

in mass, pale grayish brown by transmitted light, globose or subglobose, 5-7 μm in diameter, with minute warts, usually containing bright yellow oil droplets insides. Plasmodium not observed.

Specimens examined: Taipei City: Wenshan District, Hsien-Chi-Yen, CHL B1843, B1844a, B1851a, B1862b, June 28, 1999, on dead wood.

Distribution: Himalaya, Taiwan.

Comatricha parvispora is characterized by cylindrical sporangia, capillitial threads with few anastomoses and sinuous free ends, and small spores (Dhillon and Nannenga-Bremekamp, 1977). This species is quite similar to *C. aequalis*, *C. pulchella*, and *Stemonitopsis typhina* var. *similis*. The last one can be easily distinguished from *C. parvispora* by the presence of an incomplete surface net on the capillitium and the distinct clustered warts on the spores. Compared to *C. aequalis*, both fruiting bodies and spores of *C. parvispora* are smaller in size (*C. aequalis* is 2-6 mm, occasionally up to 15 mm in total height, spores are 8-9 μm in diameter). And *C. pulchella* can be differentiated from *C. parvispora* by the shorter stalks, smaller fruiting bodies and lack of free ends of the capillitial reticulation.

Cribraria sp.

Figs. 3A~F

Fructifications scattered or loosely gregarious, stipitate, nodding, 0.4-0.8 mm in total height. Sporangia pale salmon, globose, 0.08-0.14 mm in diameter. Stalk dark brownish red, slender, tapering, rugulose, 0.51-0.77 mm long, expanded at apex to form a small calyculus at base of sporangia, about 30 μm in diameter. Hypothallus indistinct. Peridium remaining as net at maturity, nearly without free ends, nodes rounded or elongated in outline, about 8-10 μm in diameter, dark under reflected light, brownish red under transmitted light, rather thin and flat, also composed of globose dictydine granules. Spores pale salmon in mass, nearly colorless under transmitted light, globose or subglobose, 6-7 μm in diameter, with minute warts. Plasmodium not observed.

Specimen examined: Taipei City: Wenshan District, Hsien-Chi-Yen, CHL B1849d, June 28, 1999, on dead wood.

This specimen is very similar to *Cribraria microcarpa* and *C. confusa* in having minute fruiting bodies. It differs from *C. microcarpa* in having thin and flat peridial nodes rather than

hemispherical ones, a much paler sporangium and/or spore mass, and a shorter stalk. As to *C. confusa*, the sporangia are erect, bright ochraceous or golden yellow, spore mass are golden yellow, and nodes on the peridium are pale yellowish. All of the characteristics mentioned above greatly differ from those of this specimen. We suspect that this specimen may possibly be a new taxon of *Cribraria* not yet described elsewhere.

Fuligo candida Pers., Obs. Myc. I: 92. 1796.

Figs. 2F~H, Figs. 4A~C, Fig. 5C

Fructifications aethaliate, white, solitary, sessile, pulvinate, to 1.5 cm long and 1.0 cm wide, 0.7 cm high. Cortex white, crustose, fragile, forming an irregular mass. Hypothallus colorless, membranous or crustose and perforated, pale yellowish, creamy or pure white. Capillitial threads abundant, reticulate, delicate, colorless, slightly elastic, lime nodes white, rather small, nearly lacking, sometimes just as several lime granules aggregated inside capillitial tubes. Spores dark purplish brown or nearly black in mass, dark brown by transmitted light, minutely warted or echinulate, globose, 7.5 - 8.5 μm in diameter.

Specimens examined: Taipei City: MuCha, Chang-Shan Temple, Y.-F. Chen 257, July 10, 1996, on bark of *Acacia confusa*; Wenshan District, Hsien-Chi-Yen, Y.-F. Chen 524, July 10, 1999, on dead wood.

Distribution: America, Europe, Japan, Taiwan.

Fuligo candida is similar to *F. septica* in the size of spores. However, these two species can be distinguished mainly by the color of the aethalia. The lime nodes are white in both species but sometimes scanty or nearly absent in *F. candida*.

Fuligo septica (L.) Wiggers. var. *flava* Pers., Roemers Neues Mag. Bot. I: 88. 1794.

Figs. 3G~I, Fig. 5G

Specimens examined: Taipei City: NTU campus, Y.-F. Chen 258-2, July 30, 1996, on bark of *Melaleuca leucadendron*; Wenshan District, Hsien-Chi-Yen, CHL B1861, June 28, 1999, on dead wood.

Distribution: America, Europe, Japan, Taiwan.

The specimens differ from the type var. *septica* in having yellow lime nodes. In the var. *septica*, the lime nodes are white.

Tubifera dimorphothea Nann.-Brem. & Loerak., Proc. K. Ned. Akad. Wet. C. 84: 237. 1981.

Figs. 3J~K, Fig. 4E, Fig. 5F

Pseudoaethalia gregarious to crowded, 3.6-7.2 mm in diameter, 2.5-3.6 mm high. Sporangia reddish brown, cylindrical or obovoid, usually narrowed at base, tufted on spongy hypothallus. Hypothallus white, distinct, spongy, and perforated, forming a stalk-like structure, densely covered by small, globose or subglobose sporangia of 0.07-0.13 mm in diameter. Peridium membranous, brownish, transparent, with blue, purple, pink and golden iridescence; dehiscence beginning from top, operculate in some, irregular below. Spores reddish brown in mass, pale yellowish brown by transmitted light, globose, 5-6 μm in diameter, banded reticulate on about 4/5-5/6 of surface, meshes delicate, smooth or subreticulate on the remaining surface.

Specimens examined: Taipei County: Shih-ting, Wenshan Botanical Gardens of National Taiwan Univ., Yang A6-38, June 12, 1999, on dead wood; Taipei City: Wenshan District, Hsien-Chi-Yen, CHL B1853a, June 28, 1999, on dead wood.

Distribution: Belgium, India, Japan, Netherlands, Taiwan.

This species is characterized by having two different types of sporangia in one pseudoaethalium which is distinct and not shown in other species of *Tubifera*.

REFERENCES

- Dhillon, S.S. and N.E. Nannenga-Bremekamp. 1977. Notes on some Myxomycetes from the north western part of the Himalaya. Proc. of Koninkl. Nederl. Akad. van Wetenschappen. Ser. C 80: 257-266.
- Liu, C.H., F.H. Yang and J.H. Chang. 2002. Myxomycetes of Taiwan XIV. Three New Records of Trichiales. Taiwaniana 47: 97-105.
- Martin, G.W. and C.J. Alexopoulos. 1969. The Myxomycetes. University of Iowa Press, IO, USA. 477 p.
- Nannenga-Bremekamp, N.E. 1991. A guide to temperate Myxomycetes. An English translation by A. Feest and Y. Buggraaf., Biopress Limited, Bristol, UK. 409 p.
- Yamamoto, Y. 1998. The Myxomycetes Biota of Japan. Toyo Shorin Publishing, Tokyo, Japan. 700 p.

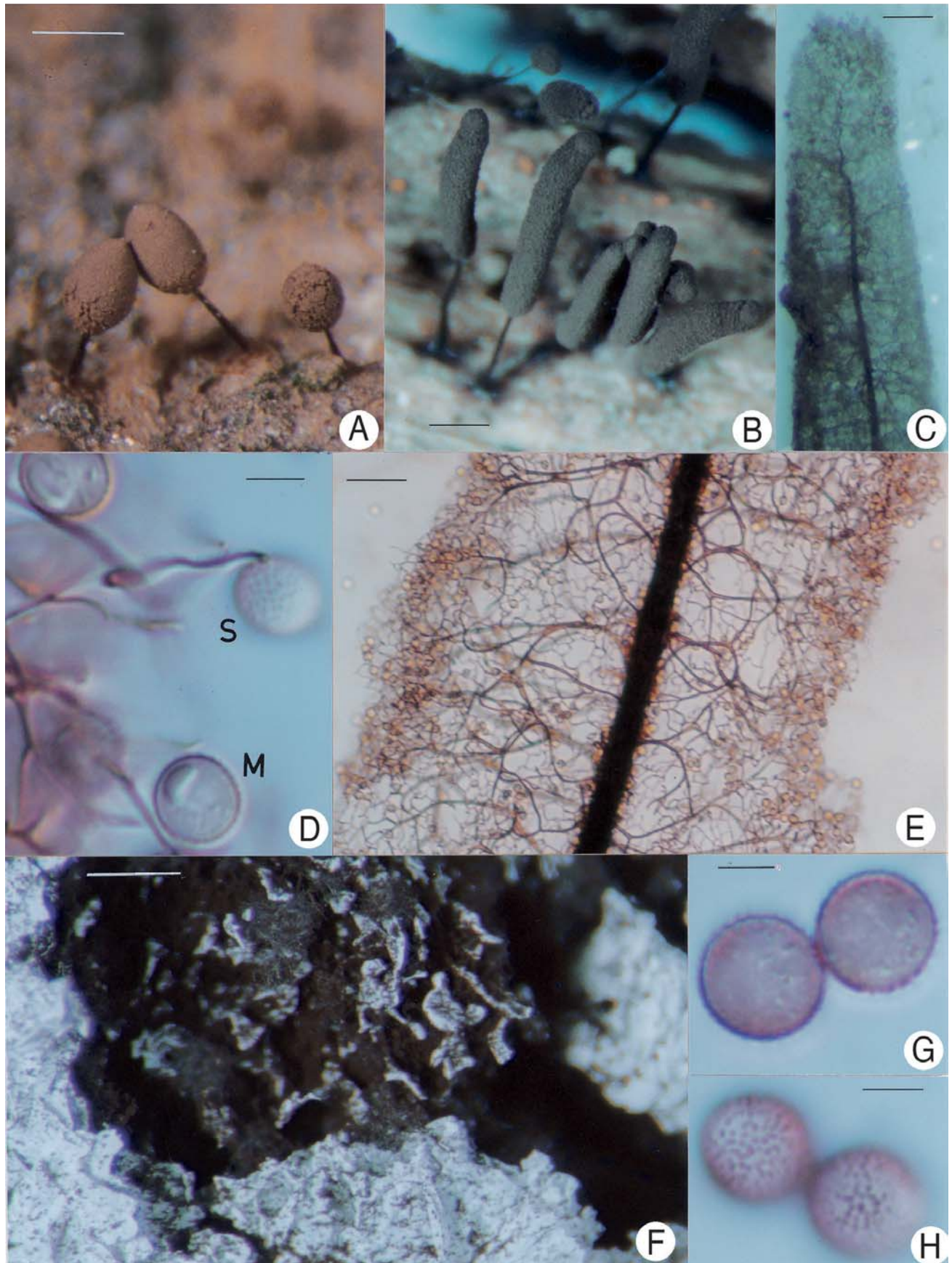


Fig. 2. A. Fruiting bodies of *Comatricha laxa*, bar = 500 μ m. B~E. *Comatricha parvispora*. B. Fruiting bodies, bar = 500 μ m; C. Columella, extending near the apex of the sporangium, bar = 100 μ m; D. Spores, marginal (M) and surface (S) view, bar = 5 μ m; E. Capillitium and surface net, bar = 50 μ m. F~H. *Fuligo candida*. F. Dehiscent aethalium, showing the blackish brown spore mass, bar = 500 μ m; G. Spores, marginal view, bar = 4 μ m; H. Spores, surface view, bar = 4 μ m

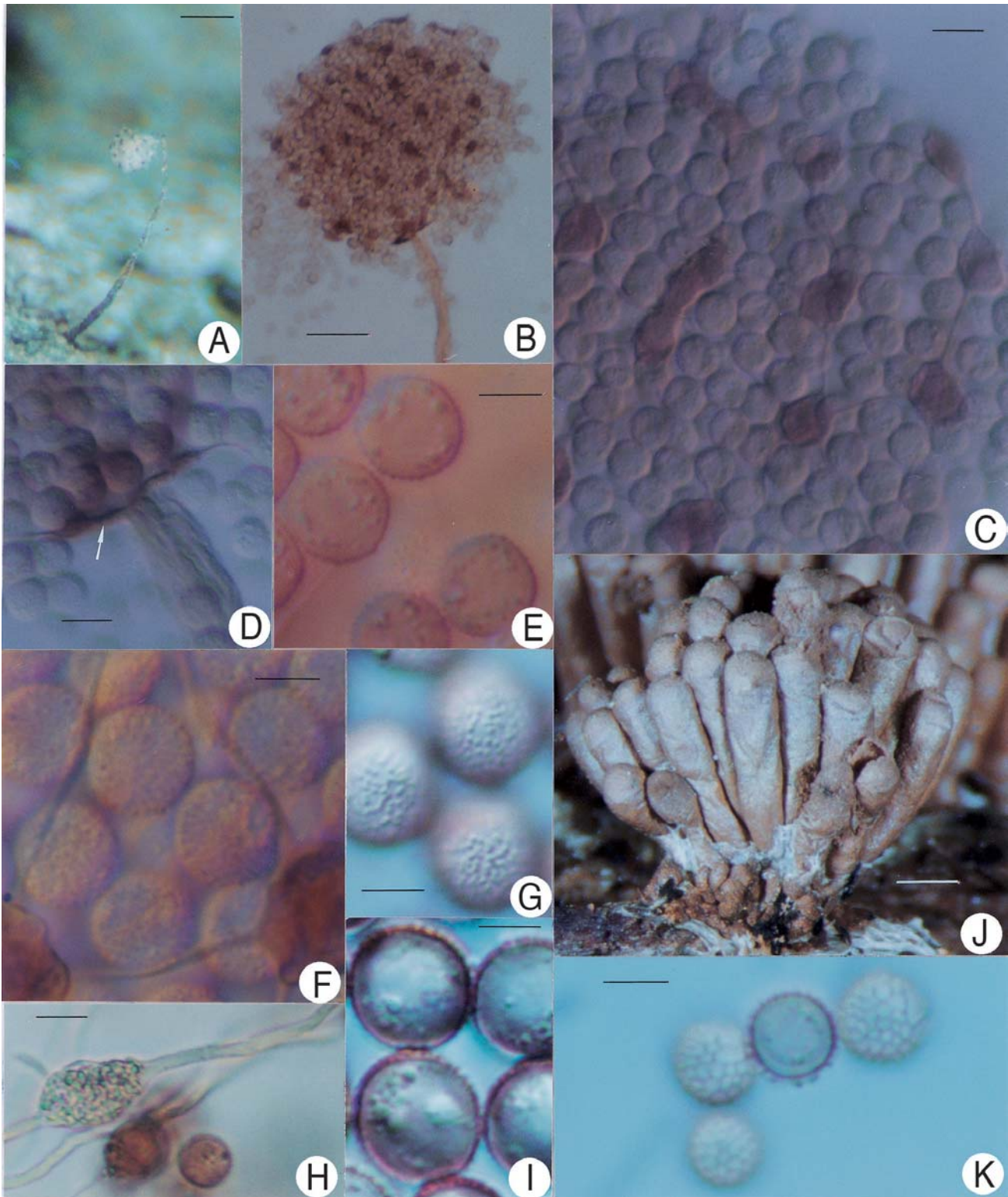


Fig. 3. A~F. *Cribraria* sp. A. Fruiting body, bar = 100 μ m; B. One sporangium under transmitted light, bar = 50 μ m; C. Various peridial nodes and spores, bar = 10 μ m; D. Calyculus (arrowed), bar = 10 μ m; E. Spores, marginal view, bar = 5 μ m; F. Spores, surface view, bar = 5 μ m. G~I. *Fuligo septica* var. *flava*. G. Spores, surface view, bar = 5 μ m; H. Lime node, bar = 10 μ m; I. Spores, marginal view, bar = 5 μ m. J~K. *Tubifera dimorphotheca*. J. Fruiting body, bar = 500 μ m; K. Spores, marginal and surface view, bar = 5 μ m.

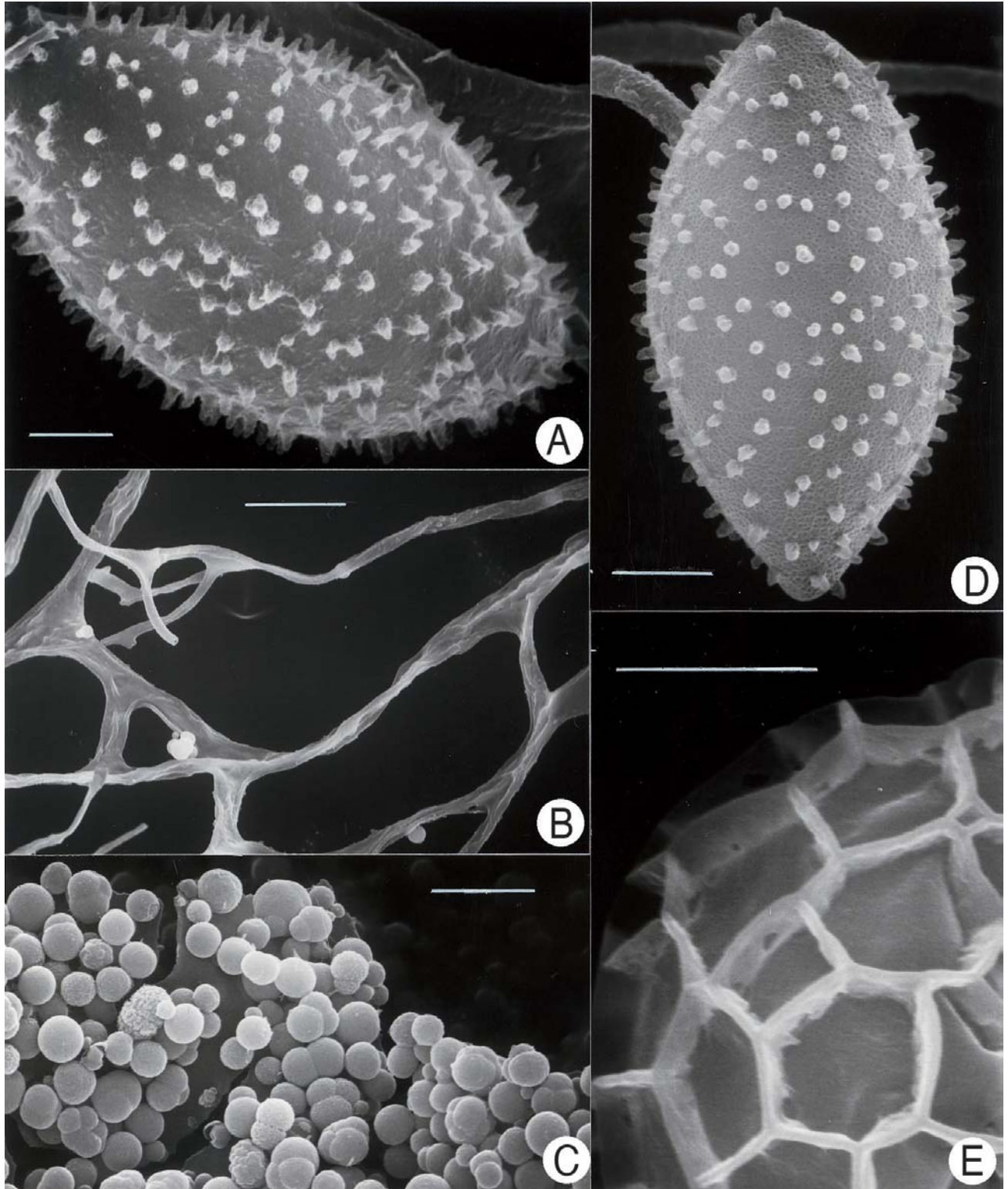


Fig. 4. A~C. SEM of *Fuligo candida*. A. Spore, bar = 1 μm ; B. Capillitium, bar = 7.5 μm ; C. Lime granules of the crust on the peridium, bar = 3 μm . D. Spore of *Comatricha parvispora*, SEM, bar = 1 μm . E. Spore surface markings of *Tubifera dimorphothecca*, SEM, bar = 1 μm .

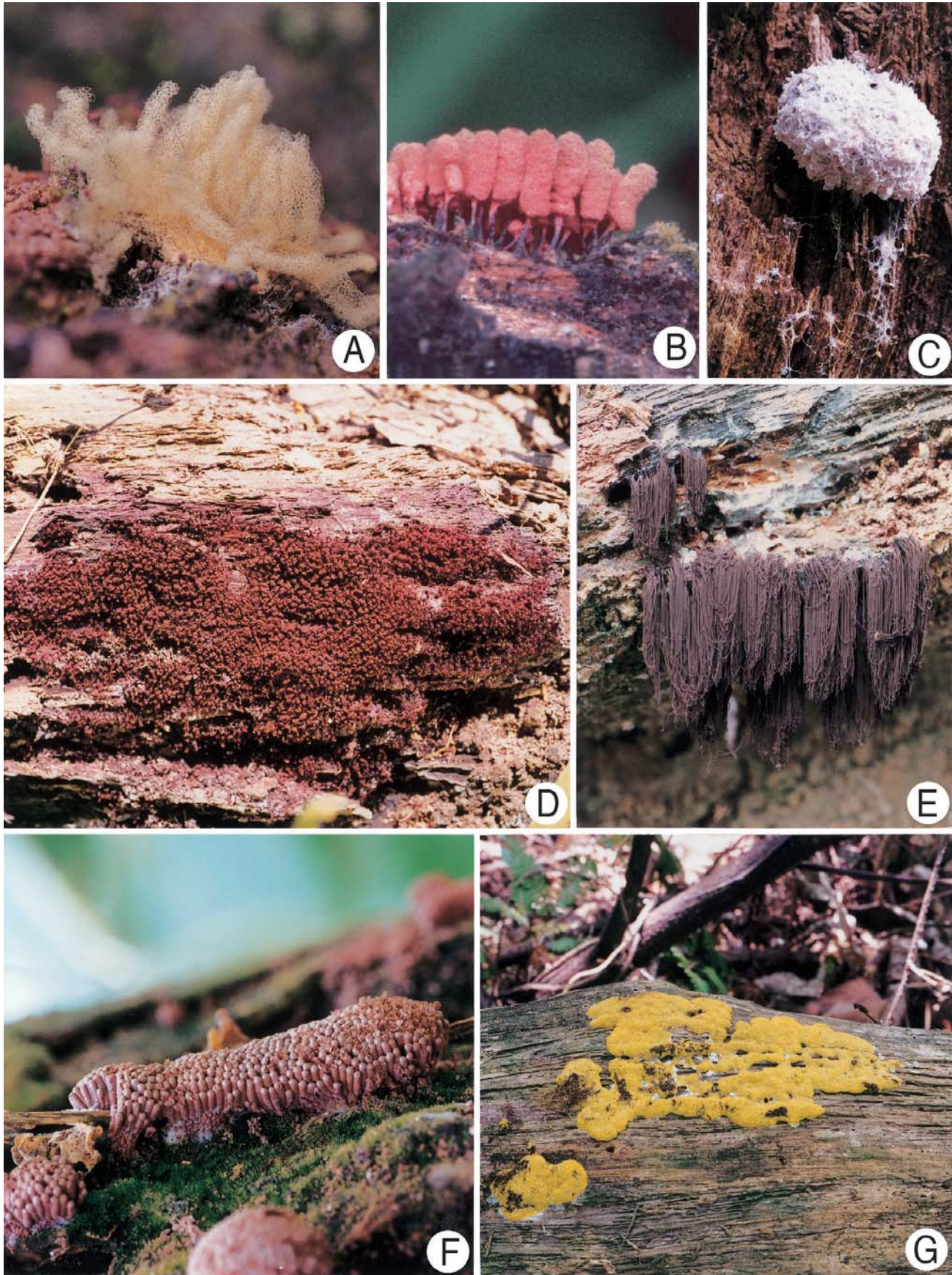


Fig. 5. Various fruiting bodies in habit (Nikon FM2, 60 mm Micro lens). A. *Arcyria obvelata*. B. *Arcyria denudata*. C. *Fuligo candida*. D. *Cribraria cancellata*. E. *Stemonaria longa*. F. *Tubifera dimorphotheca*. G. *Fuligo septica* var. *flava*.

臺北市仙跡岩的黏菌

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本篇報告以仙跡岩次生林為對象，調查該區的黏菌資源，共獲17屬36種又4變種。其中以 *Cribraria cancellata* (Batsch) Macbr. (燈籠黏菌) 為最優勢種，而 *Comatricha parvispora* Dhillon et Nann.-Brem. (小孢髮黏菌)、*Fuligo candida* Pers. (白煤絨黏菌)、*F. septica* var. *flava* Pers. (煤絨黏菌黃色變種) 和 *Tubifera dimorphotheca* Nann.-Brem. & Loerak. (二型孢囊筒黏菌) 為臺灣新記錄之黏菌；另有 *Cribraria* sp. 疑為世界新種。

關鍵詞：髮黏菌，篩黏菌，煤絨黏菌，黏菌，囊筒黏菌。