



## RESEARCH ARTICLE

## Myxomycetes of Taiwan XXV. The Family Stemonitaceae

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ABSTRACT: Species of ten genera of Stemonitaceae, including *Collaria*, *Comatricha*, *Enerthenema*, *Lamproderma*, *Macbrideola*, *Paradiacheopsis*, *Stemonaria*, *Stemonitis*, *Stemonitopsis*, and *Symphytocarpus*, collected from Taiwan are critically revised. Of the 42 species recorded, *Enerthenema intermedium* and *Stemonitopsis subcaespitosa* are new to Taiwan, thus are described and illustrated in this paper. Keys to the species of all genera, and to the genera of the family are also provided.

KEY WORDS: Myxomycetes, Stemonitaceae, Taiwan, taxonomy.

## INTRODUCTION

The family Stemonitaceae is a monotypic family of the order Stemonitales. It contains 16 genera and 202 species in the world (Lado, 2005–2013). In this paper we present a list of 40 taxa including their ecological data compiled from the previous records of this family in Taiwan and 2 new records of Taiwan, *Enerthenema intermedium* and *Stemonitopsis subcaespitosa*.

The most distinguishing characters of Stemonitaceae are the dark colored spore mass, a capillitium consisting of smooth, dark threads, a prominent columella as well as the absence of lime from all parts of the fruiting body. Typically their fruiting bodies are sporangiate and stipitate, yet sessile sporangia, aethalia, pseudoaethalia, or plasmodiocarps are occasionally encountered. Characteristics that separating genera of this family are shown in the key to the genera provided. Morphological examination for the fruiting bodies of these specimens were made by light and scanning electron microscopy as described previously (Liu et al., 2002).

## TAXONOMIC TREATMENT

## Key to genera of Stemonitaceae in Taiwan

1. Fruiting body a pseudoaethalium consisting of partially merged sporangia ..... *Symphytocarpus*
- 1'. Fruiting bodies sporangiate ..... 2
2. Apex of columella expanded into a cupulate disk from which the capillitium depends ..... *Enerthenema*
- 2'. Apex of columella not expanded; capillitium usually arising from entire columella or from base of sporangium ..... 3
3. Stalk translucent, tubular and hollow throughout, showing no evidence of fibers ..... 4
- 3'. Stalk opaque, more or less solid, consisting of a network of interlaced longitudinal fibers ..... 6
4. Fruiting body minute, less than 0.5 mm tall; sporangia globose or ovate ..... *Macbrideola*

- 4'. Fruiting body more than 0.5 mm tall; sporangia cylindrical ..... 5
5. Outermost branches of capillitium united to form a delicate, complete surface net ..... *Stemonitis*
- 5'. No surface net ..... *Stemonaria*
6. Peridium persistent, usually iridescent ..... *Lamproderma*
- 6'. Peridium disappearing in mature fruiting bodies, at most leaving a collar or a few flakes ..... 7
7. Capillitium sparse, not anastomosing, with few branches ..... *Paradiacheopsis*
- 7'. Capillitium usually abundant, anastomosing ..... 8
8. Surface net of capillitium present, over at least the lower portion; sporangia cylindrical ..... *Stemonitopsis*
- 8'. Surface net of capillitium usually lacking; sporangia globose, ovate to short-cylindrical ..... 9
9. Sporangia globose, with a remnant of the peridium persisting as a collar at the base ..... *Collaria*
- 9'. Sporangia globose, ovate to short-cylindrical, without collar at base ..... *Comatricha*

Key to species of *Collaria* in Taiwan

1. Peridium fairly persistent, iridescent; columella divided below center of sporangial cavity into several stout branches which give rise to the circinate capillitium; spores minutely punctuate; sporangia globose or depressed-globose ..... *Col. arcyronema*
- 1'. Peridium disappearing early, not iridescent ..... 2
2. Columella reaching about two-thirds of sporangial cavity, giving off many large branches throughout; peridium persisting at base of sporangium as a cup or collar with capillitium attached; spores covered with fine, dispersed spinules; sporangia ovate to ellipsoid ..... *Col. rubens*
- 2'. Columella usually present, dividing from near base to middle of sporangium, rarely higher, into a few stout branches from which bulk of capillitium arises; spores covered strongly with warts; sporangia globose ..... *Col. lurida*

*Collaria arcyronema* (Rostaf.) Nann.-Bremek. ex Lado, Ruizia 9: 26. 1991.  
 ≡ *Lamproderma arcyronema* Rostaf., Sluzowce Monogr. 208. 1874.

Description and illustration: as *L. arcyronema* in Liu (1981).



***Collaria lurida*** (Lister) Nann.-Bremek., *Nederlandse Myxomyceten* (Zutphen) 236. 1975. Figs. 1A-B

≡ *Comatricha lurida* Lister, *Monogr. Mycetoza*, edn. 1: 119. 1894.

Description and illustration: as *Com. lurida* in Chiang and Liu (1991).

***Collaria rubens*** (Lister) Nann.-Bremek., *Nederlandse Myxomyceten* (Zutphen) 236. 1975.

≡ *Comatricha rubens* Lister, *Monogr. Mycetoza*, edn. 1: 123. 1894.

It was reported as *Com. rubens* without any description and illustration (Wang et al., 1981). The brighter color of the sporangia and the attachment of the capillitial free end to the peridial cup are the distinctive characters of this species.

#### Key to species of *Comatricha* in Taiwan

1. Columella present, usually reaching almost to the apex ..... 2
- 1'. Columella lacking or very short, dividing at or below the center of the sporangium ..... *Com. elegans*
2. Spores more than 8 µm in diameter; shape of sporangia various, subglobose, ovate or short-cylindrical ..... 3
- 2'. Spores less than 8 µm in diameter; shape of sporangia mostly ovate to cylindrical ..... 4
3. Sporangia deep brown or blackish; stalk long, usually much more than half the total height ..... *Com. nigra*
- 3'. Sporangia reddish brown; stalks short, usually less than half the total height ..... *Com. laxa*
4. Sporangia fusiform, pinkish brown; stalks usually more than half the total height ..... *Com. tenerrima*
- 4'. Sporangia cylindrical, pale brown or brown; stalks usually less than half the total height ..... 5
5. Capillitial threads dense, with large basal branches, many anastomoses and few free ends; spores 6.5-8.0 µm in diameter ..... *Com. pulchella*
- 5'. Capillitial threads with few anastomoses and sinuous free ends; spores small, 5-7 µm in diameter ..... *Com. parvispora*

***Comatricha elegans*** (Racib.) G. Lister, in Lister, *Guide Brit. Mycetoza*, edn. 3: 31. 1909.

≡ *Collaria elegans* (Racib.) Dhillon & Nann.-Bremek. ex Ing, *Trans. Brit. Mycol. Soc.* 78: 444. 1982.

= *Collaria elegans* var. *pallens* (G. Lister) Dhillon & Nann.-Bremek. ex Nann.-Bremek., *Nederlandse Myxomyceten* 2 Suppl. (Amsterdam): 487. 1983.

Description and illustration: as *Col. elegans* var. *pallens* in Chung and Liu (1997b), and as *Col. elegans* in Chung and Liu (1997c).

It was first reported by Wang et al. (1981) without any description and illustration. The minute sporangia

and the dark color of the whole fructification make this species easily being overlooked in the field. Most of our specimens were harvested from moist-chamber culture. The distinct characters of this species are the minute globose sporangium with long and blackish stalk, and the short columella branched below the centre of the sporangium.

***Comatricha laxa*** Rostaf., *Sluzowce Monogr.* 201. 1874.

Description and illustration: Chiang and Liu (1991).

***Comatricha nigra*** (Pers. ex J.F. Gmel.) J. Schröt., in Cohn, *Krypt.-Fl. Schlesien* 3: 118. 1885.

It was reported in a list by Nakazawa (1929), but no specimen is available in Taiwan.

***Comatricha parvispora*** Dhillon & Nann.-Bremek., *Proc. Kon. Ned. Akad. Wetensch.*, C. 80: 260. 1977.

Description and illustration: Chen et al. (2005).

***Comatricha pulchella*** (C. Bab.) Rostaf., *Sluzowce Monogr. suppl.* 27. 1876.

= *Comatricha pulchella* var. *fusca* (Lister) G. Lister, in Lister, *Monogr. Mycetoza*, edn. 2: 156. 1911.

Specimens examined: **TAIWAN**: Taipei City: main campus of National Taiwan Univ., on bark, *CHL B1264*, Aug. 21, 1997. Pingtung County: Nanjenshan forest, on dead wood, *Y.F. Chen269c*, July 9, 1996.

This species was reported in a list by Nakazawa (1929), but no specimen is available in Taiwan. It is similar to *Comatricha laxa*, but the capillitium of this species has many anastomoses and few free ends, while that of *Com. laxa* has few anastomoses and many free ends. Moreover, spores of this species are smaller than that of *Com. laxa*.

***Comatricha tenerrima*** (M.A. Curtis) G. Lister, in Lister, *Guide Brit. Mycetoza*, edn 4 (London): 39. 1919.

Figs. 1C-D

Specimens examined: **TAIWAN**: Taipei City: campus of National Taiwan University, *CHL B1637*, June 23, 1999; Wenshan District, Hsien-Chi-Yen, *Y.F. Chen515*, June 26, 1999.

It was reported as a new record without any description and illustration (Wang et al., 1981). The most distinct character of this species is the fusiform sporangium with a very long stalk of more than half the total height.

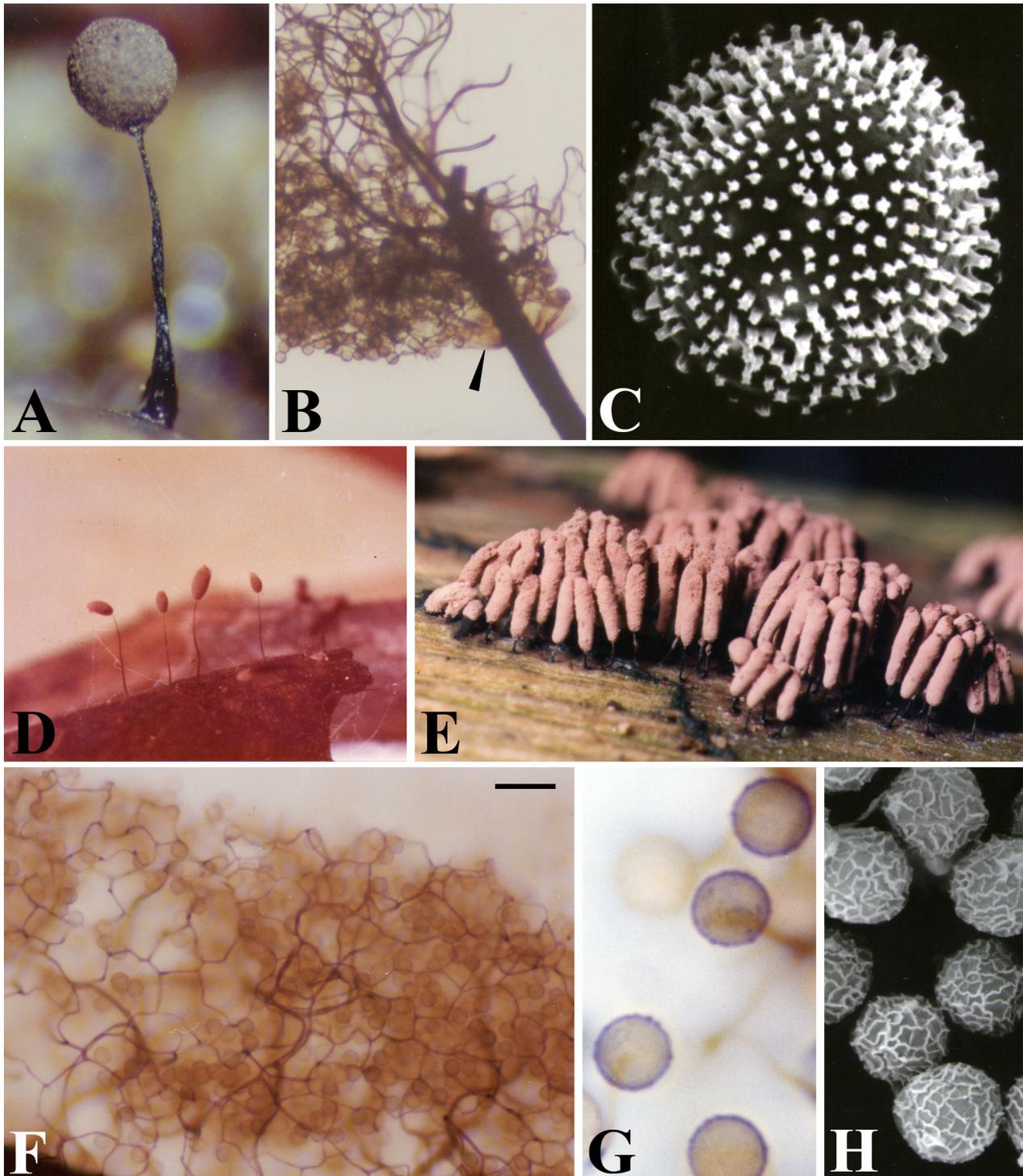


Fig. 1. A-B. *Collaria lurida*. A: Fruiting body. B: Broken sporangium, showing columella and capillitium, a membranous collar (arrow) are shown at the base of sporangium. C-D. *Comatricha tenerrima* C: Surface markings of a spore, by SEM. D: Fruiting bodies. E-H. *Stemonitopsis hyperopta*. E: Fruiting bodies. F: Surface net of capillitium. G: Marginal view of spores. H: Surface markings of spores, by SEM. Scale bars: A = 200  $\mu$ m; B = 37  $\mu$ m; C = 0.8  $\mu$ m; D, E = 1.25 mm; F = 20  $\mu$ m; G = 4  $\mu$ m; H = 2  $\mu$ m.



### Key to species of *Enerthenema* in Taiwan

1. Collar present; stalk 1/3-2/5 total height of sporangium; capillitium arising from margin of apical disc and from the side of whole columella ..... *E. intermedium*  
 1'. Collar absent; stalk almost 1/2 total height of sporangium; capillitium most arising from margin of apical disc ..... *E. papillatum*

*Enerthenema intermedium* Nann.-Bremek. & R.L. Critchf., Proc. Kon. Ned. Akad. Wetensch., C. 91: 415. 1988. Fig. 2

Fructification sporangiate, scattered, 0.58–1.03 mm in total height. Sporangia stipitate, globose or slightly depressed globose, (0.30-) 0.40-0.83 mm in diameter, blackish brown or ferruginous. Peridium fugacious, with a small collar remained at the base around the stalk. Stalk black, shining, opaque by transmitted light, slightly attenuate upward, (0.025-) 0.05-0.13 mm in diameter, about 1/3-2/5 of the total height in length. Hypothallus membranous, brown, discoid. Columella black, strongly attenuate upward, reaching to the apex of the sporangium and there expanded to form a small, funnel-shaped disc. Capillitium arising and depending from the apical disc, and /or from all parts of the columella, the threads dark, long and flexuose, sparsely branched, with forked and sharp-pointed free ends. Spores free, dark brown in mass, grayish brown by transmitted light, globose, minutely warted, (8-) 10-12 (-13)  $\mu$ m in diameter. Plasmodium white.

Specimens examined: **TAIWAN**: Hsinchu, Kuanwu, on bark of *Cryptomeria japonica*, BY1276M295, Apr. 20, 1992 (moist-chamber culture: Apr. 13 – 20, 2001); BY1284M319, May 4, 1992 (moist-chamber culture: Apr. 13 – May 4, 2001).

This genus can be recognized with the aid of a hand lens in the field by the presence of a silvery shining spot on the top of the sporangium. This shining, apical spot is a cup-like disc under the microscope. The distinctive characters of this species are the blackish and short fructifications with short stalk never reach 1/2 of the total height, the deep funnel-shaped apical disc, and the capillitial threads arising from the apical disc and the whole length of the columella, or mostly arising and depending from the apical disc. The collar around the stalk at the base of the sporangium is also observed in our specimens.

*Enerthenema papillatum* (Pers.) Rostaf., Sluzowce Monogr. suppl. 28. 1876.

Specimen examined: **TAIWAN**: Taipei City: Peitou, Yangmingshan National Park, Mt. Datun, on bark of *Persea thunbergii*, CHL B2393, Sept. 3, 2001 (moist-chamber culture: Sept. 3–22, 2001).

*Enerthenema papillatum* and *E. intermedium* are alike in the globose sporangium with short stalk, the

small apical disc and minutely warted spores. They are, however, different in the capillitium which arises from the terminal part or apical disc of columella in *E. papillatum*, while from the whole columella in *E. intermedium*. It was reported as a new record without any description and illustration (Wang et al., 1981).

### Key to species of *Lamproderma* in Taiwan

1. Stalk relatively long, representing more than half total height of the fruiting body; main branches of capillitium pale at base; spores mostly 7–9  $\mu$ m, with regularly scattered spines ..... *L. scintillans*  
 1'. Stalk short, representing 1/2 or less of total height of the fruiting body; the basal parts of the dichotomously branched capillitium not pale but brown; spores mostly large than 10  $\mu$ m, bearing sharp, irregularly scattered spines ..... *L. muscorum*

*Lamproderma muscorum* (Lév.) Hagelst., Mycologia 27: 88. 1935.

Description and illustration: Chang et al. (2003).

*Lamproderma scintillans* (Berk. & Broome) Morgan, J. Cincinnati Soc. Nat. Hist. 16: 131. 1894.

Description and illustration: Shi (1981).

### Key to species of *Macbrideola* in Taiwan

1. Spores adhering in a cluster of 3–6 ..... *Macbrideola* sp.  
 1'. Spores free, not in clusters ..... 2  
 2. The total height over 0.6 mm; capillitial threads stout, uniform in thickness to the periphery ..... *M. cornea*  
 2'. The total height up to 0.6 mm; capillitial threads dichotomously branched 4–6 times with pale and tapering free ends ..... *M. martinii*

*Macbrideola cornea* (G. Lister & Cran) Alexop., Mycologia 59: 112. 1967.

Description and illustration: Liu (1983).

*Macbrideola martinii* (Alexop. & Beneke) Alexop., Mycologia 59: 114. 1967.

Description and illustration: Chiang and Liu (1991).

*Macbrideola* sp.

Description and illustration: Chiang and Liu (1991).

The spores of this specimen adhering in a cluster of 3-6 to form a globe of 25  $\mu$ m in diameter, and the spore diameter 12.5-15  $\mu$ m are unique. This character is not found in any known species of *Macbrideola*. The voucher specimen from a moist chamber culture on bark of *Pinus* is not available but the characters of it are fully recorded and documented (Chiang and Liu, 1991).

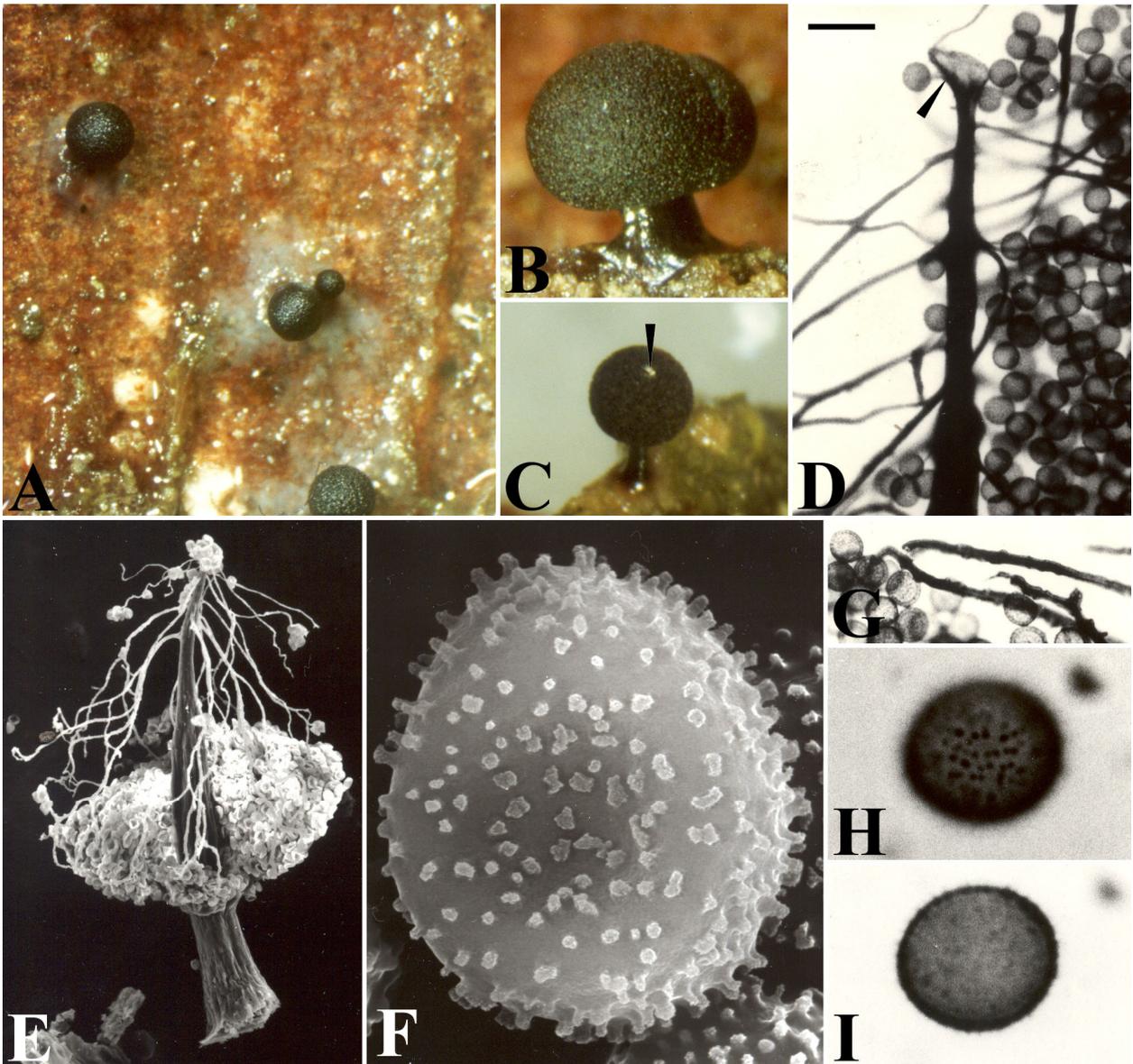


Fig. 2. *Enerthenema intermedium*. A-B: Fruiting bodies. C: Top view of sporangium, showing apical plate of sporangium (arrow). D: Top of columella, showing membranous funnel-shaped plate (arrow). E: Broken sporangium, by SEM. F: Surface markings of a spore, by SEM. G: The ends of capillitial threads. H: Surface view of a spore. I: Marginal view of a spore. Scale bar: A = 0.6 mm, B = 200  $\mu$ m, C = 400  $\mu$ m, D = 25  $\mu$ m, E = 50  $\mu$ m, F = 1.3  $\mu$ m, G = 20  $\mu$ m, H-I = 4  $\mu$ m.

**Key to species of *Paradiacheopsis* in Taiwan**

- 1. Capillitium consisting of fine threads with flattened, expanded tips ..... *Pa. fimbriata*
- 1'. Capillitium without expanded tips, the tips long and tapering ..... *Pa. acanthodes*

*Paradiacheopsis acanthodes* (Alexop.) Nann.-Bremek., in Nannenga-Bremekamp & Yamamoto, Proc. Kon. Ned. Akad. Wetensch., C. 89: 236. 1986.

$\equiv$  *Comatricha acanthodes* Alexop., Mycologia 50: 55. 1958.

Description and illustration: as *Com. acanthodes* in Chiang and Liu (1991).

*Paradiacheopsis fimbriata* (G. Lister & Cran) Hertel ex Nann.-Bremek., Nederlandse Myxomyceten (Zutphen) 232. 1975.

$\equiv$  *Comatricha fimbriata* G. Lister & Cran, in G. Lister, J. Bot. 55: 122. 1917.

It was reported as *Com. fimbriata* without any description and illustration (Wang et al., 1981).



### Key to species of *Stemonaria* in Taiwan

1. Spores with a conspicuous pale area, distinctly warted with small dark warts ..... *Stemonaria irregularis*
- 1'. Spores warted-reticulate or spinulose-reticulate ..... 2
2. Capillitium lax, open; consisting mostly of dichotomously branched threads or of penicilliate branches; sporangia black ..... *Stemonaria longa*
- 2'. Capillitium forming a lax internal net throughout, with many small bulbous swellings in the interior, with many short, free branches pointing outwards; sporangia brown ..... *Stemonaria pilosa*

*Stemonaria irregularis* (Rex) Nann.-Bremek., R. Sharma & Y. Yamam., in Nannenga-Bremekamp, Yamamoto & Sharma, Proc. Kon. Ned. Akad. Wetensch., C. 87: 456. 1984.

= *Comatricha irregularis* Rex, Proc. Acad. Nat. Sci. Philadelphia 43: 393. 1891.

It was reported as *Com. irregularis* in a list by Nakazawa (1929), but no specimen is available in Taiwan.

*Stemonaria longa* (Peck) Nann.-Bremek., R. Sharma & Y. Yamam., Proc. Kon. Ned. Akad. Wet. C. 87: 453. 1984.

= *Comatricha longa* Peck, Ann. Rep. New York State Mus. 43: 70. 1890.  
= *Comatricha longa* var. *flaccida* Minakata, in Lister, Monogr. Mycetozoa, edn. 3 (London): 149. 1925.

Description and illustration: as *Com. longa* in Liu (1981); Chung and Liu (1997a).

*Stemonaria pilosa* Nann.-Bremek., in Nannenga-Bremekamp, Yamamoto & Sharma, Proc. Kon. Ned. Akad. Wetensch., C. 87: 455. 1984.

Description and illustration: Chung and Liu (1997b).

This species somewhat resembles *Stemonaria longa* in the dense mass and great length of the sporangia which are usually bending or pendant. Nevertheless the capillitium of them are quite different. In *Stemonaria longa* the presence of the swellings in capillitial threads are distinctive, and the threads are not dense and the ultimate free ends are much longer comparing with those of *Stemonaria pilosa*.

### Key to species of *Stemonitis* in Taiwan

1. Spores reticulate, rarely without reticulated surface markings ..... 2
- 1'. Spores spiny to warted, not reticulate ..... 5
2. Sporangia vinaceous to violaceous brown, usually fruiting in loose groups; spores verrucose-reticulate; stalk one-third of the total height, or much longer ..... *S. virginensis*
- 2'. Sporangia deep fuscous to black, usually fruiting in dense groups; spores warted-reticulate, or without reticulated surface markings; stalk 1/4 of the total height, or much shorter ..... 3

3. Spores densely papillate or warted, not reticulate ..... *S. fusca* var. *papillosa*
- 3'. Spores reticulate ..... 4
4. Fruiting body 6–20 mm tall, clusters large, conspicuous, fuscous to deep reddish brown; stalk nearly 1/4 of the total height ..... *S. fusca* var. *fusca*
- 4'. Fruiting body 2–5 mm tall, clusters small, black; stalk usually less than 1/4 of the total height ..... *S. fusca* var. *nigrescens*
5. Spores united in clusters, 4–12 spores or more in a cluster ..... *S. uvifera*
- 5'. Spores free ..... 6
6. Meshes of surface net larger, more than 20 µm in diameter; capillitium often coarse ..... 7
- 6'. Meshes of surface net smaller, less than 20 µm in diameter; capillitium delicate ..... 8
7. Fruiting body less than 3 mm tall; spores 10.5–12.5 µm in diameter ..... *S. mussooriensis*
- 7'. Fruiting body when matured more than 10 mm tall; spores smaller, 7–9 µm in diameter ..... *S. splendens*
8. Spores 5.0–6.5 µm in diameter, faintly warted, or nearly smooth ..... *S. axifera*
- 8'. Spores usually larger than 7 µm in diameter; spores distinctly warted or punctate ..... 9
9. Sporangia bright brown, stalk less than one-third of the total height or much shorter ..... *S. herbatica*
- 9'. Sporangia dull brown or pallid; stalk usually one-third of the total height ..... 10
10. Columella expanded into a cup-like enlargement at tip; capillitium with membranous expansions, many spine-like ends on surface net ..... *S. flavogenita*
- 10'. Columella often dispersed well below tip; capillitium delicate ..... *S. pallida*

*Stemonitis axifera* (Bull.) T. Macbr., N. Amer. Slime-Moulds, edn. 1 (New York): 120. 1899.

= *Stemonitis axifera* var. *smithii* (T. Macbr.) Hagelst., Mycetozoa N. Amer. 154. 1944.  
= *Stemonitis smithii* T. Macbr., Bull. Iowa Univ. Lab. Nat. Hist. 2: 381. 1893.  
= *Stemonitis ferruginea* Ehrenb., Sylv. Myc. Berol. 25. 1818.  
= *Stemonitis ferruginea* var. *violacea* Meyl., Bull. Soc. Bot. Genève 2: 264. 1910.

Description and illustration: Liu (1980); Chung and Liu (1995).

*Stemonitis flavogenita* E. Jahn, Verh. Bot. Vereins Prov. Branderburg 45: 165. 1904.

It was reported in a list by Nakazawa (1929), but no specimen is available in Taiwan.

*Stemonitis fusca* Roth, Bot. Mag. (Römer & Usteri) 1: 26. 1787. Figs. 3A-B

Description and illustration: Liu (1980); Shi (1981); Chung and Liu (1997a).

*Stemonitis fusca* var. *nigrescens* (Rex) Torrend, Brotéria, Sér. Bot. 7: 81. 1908. Fig. 3C

= *Stemonitis nigrescens* Rex, Proc. Acad. Nat. Sci. Philadelphia 43: 392. 1891.

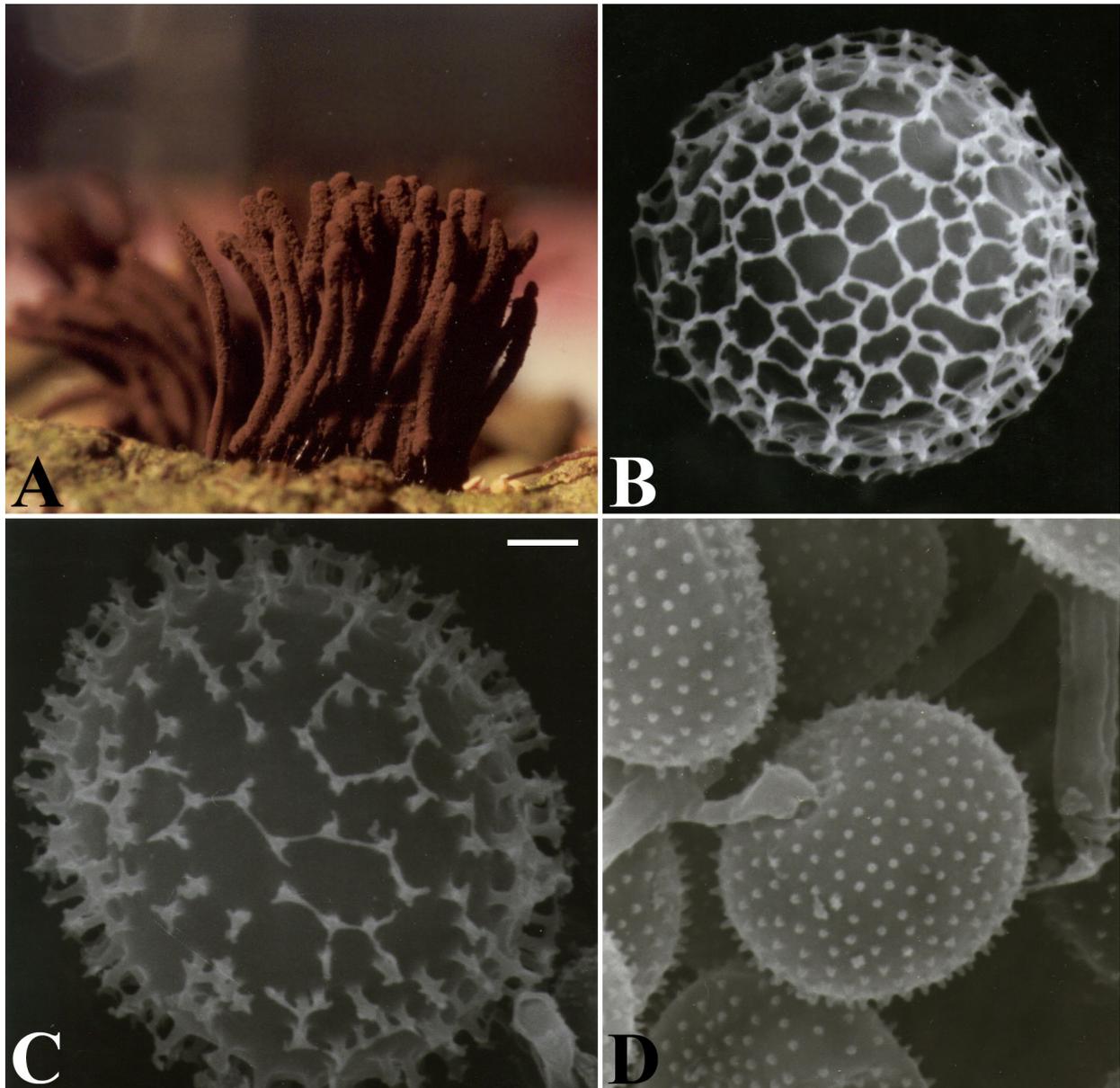


Fig. 3. A: Fruiting bodies of *Stemonitis fusca*. B-D: Surface markings of spores, by SEM. B: *S. fusca* var. *fusca*. C: *S. fusca* var. *nigrescens*. D: *S. fusca* var. *papillosa*. Scale bars: A = 4 mm; B-C = 1 µm; D = 1.5 µm.

Description and illustration: Liu (1981).

This variety is distinct from the var. *fusca* by its short and dark-colored fructification, and the comparatively short stalks. They nevertheless, are similar in the spore surface marking (spiny-reticulate). SEM pictures of the spores by Rammeloo (1975) show that the spore surface is banded reticulate, with conspicuous pillars surpassing the bands. The bands are perforated, very thin that probably beyond the resolving power of the light microscope, thus only the pillars are observed as spines or warts by light microscopy.

*Stemonitis fusca* var. *papillosa* Meyl., Bull. Soc. Vaud. Sci. Nat. 58: 322. 1935. Fig. 3D

Description and illustration: Liu (1981).

The distinct characteristics of this variety have been reassured by Kowalski (1975) from his reexamination of the holotype. He stated the only difference between the two varieties (var. *fusca* and var. *papillosa*) is in the spores. The spores in var. *fusca* are minutely spinulose and the spinules are arranged in a distinct reticulate pattern, while in var. *papillosa* the spinules are random-



ly scattered.

*Stemonitis herbatica* Peck, Ann. Rep. New York State Mus. 26: 75. 1874.

Description and illustration: Liu (1981).

*Stemonitis mussooriensis* G.W. Martin, K.S. Thind & Sohi, Mycologia 49: 128. 1957.

= *Stemonitis emotoi* Nann.-Bremek. & Y. Yamam., in Nannenga-Bremekamp, Proc. Kon. Ned. Akad. Wetensch., C. 87: 463. 1984.

Description and illustration: Wang and Chien (1988), and as *Stemonitis emotoi* in Chung and Liu (1997c).

*Stemonitis pallida* Wingate, in Macbride, N. Amer. Slime-Moulds, edn. 1 (New York): 123. 1899.

Specimen examined: TAIWAN: Pingtung County: Nanjenshan forest, on bark, CHL B1439, May 2, 1998.

The species was reported firstly in a list by Nakazawa (1929), but no specimen is available in Taiwan. The short and tufted sporangia, the bright reddish brown color, the short stalk, the warted spores and the small-meshed surface net are the distinct characters of this species. *Stemonitis pallida* shares common features with *S. flavogenita* and *S. herbatica* in outer appearance and spores. It differs from the latter in the surface net (angular in *S. pallida*, tend to be more rounded in *S. herbatica*). The capillitium in *S. pallida* lacks the membranous expansions, that appeared in *S. flavogenita*.

*Stemonitis splendens* Rostaf., Sluzowce Monogr. 195. 1874.

= *Stemonitis splendens* var. *fenestrata* (Rex) Torrend, Brotéria, Sér. Bot. 7: 82. 1908.

Description and illustration: Liu (1981).

*Stemonitis uvifera* T. Macbr., N. Amer. Slime-Moulds, edn. 2 (New York): 161. 1922.

It was reported in a list by Nakazawa (1929), but no specimen is available in Taiwan.

*Stemonitis virginensis* Rex, Proc. Acad. Nat. Sci. Philadelphia 43: 391. 1891.

Description and illustration: Liu (1981).

#### Key to species of *Stemonitopsis* in Taiwan

1. Spores reticulate ..... 2

- 1'. Spores spinulose or warted ..... 4  
 2. Spores less than 5 µm in diameter ..... *Stemonitopsis microspora*  
 2'. Spores more than 5 µm in diameter ..... 3  
 3. Spores 5-7 µm in diameter, banded reticulate; sporangia liliaceous brown; surface net of capillitium with angular meshes .....  
 ..... *Stemonitopsis hyperopta*  
 3'. Spores 7-9 µm in diameter, faintly banded-reticulate; sporangia dark brown; surface net of capillitium mostly absent with abundant free ends ..... *Stemonitopsis reticulata*  
 4. Sporangia with a silvery, shining, semi-persistent peridium which falls away in large flacks; stalk surrounded by a silvery sheath; spores 6-8 µm in diameter ..... *Stemonitopsis typhina*  
 4'. Peridium fugacious; stalk without a silvery sheath ..... 5  
 5. Spores 5-7 µm in diameter, faintly warted .....  
 ..... *Stemonitopsis gracilis*  
 5'. Spores more than 8 µm in diameter ..... 6  
 6. Sporangia slender, cylindrical; stalk up to half total height; surface net of capillitium fragile and with irregular meshes in size and shape, the meshes with numerous free ends .....  
 ..... *Stemonitopsis aequalis*  
 6'. Sporangia stout, cylindrical; stalk up to a quarter of the total height; surface net of capillitium almost complete, with thin wavy threads forming angular meshes with few free ends .....  
 ..... *Stemonitopsis subcaespitosa*

*Stemonitopsis aequalis* (Peck) Y. Yamam., Myxomycete Biota Japan 625. 1998.

= *Comatracha aequalis* Peck, Annual Rep. New York State Mus. 31: 42. 1879.

It was reported as *Com. aequalis* without any description and illustration (Wang et al., 1981).

*Stemonitopsis gracilis* (G. Lister) Nann.-Bremek., Nederlandse Myxomyceten (Zutphen) 210. 1975.

= *Comatracha pulchella* var. *gracilis* G. Lister, in Lister, Monogr. Mycetozoa, edn. 2: 156. 1911.

It was reported as *Com. pulchella* var. *gracilis* in a list by Nakazawa (1929), but no specimen is available in Taiwan.

*Stemonitopsis hyperopta* (Meyl.) Nann.-Bremek., Nederlandse Myxomyceten (Zutphen) 206. 1975.

Figs. 1E-H

= *Stemonitis hyperopta* Meyl., Bull. Soc. Vaud. Sci. Nat. 52: 97. 1918.

Description and illustration: as *Stemonitis hyperopta* in Wang and Chien (1988).

*Stemonitopsis microspora* (Lister) Nann.-Bremek., Nederlandse Myxomyceten (Zutphen) 208. 1975.

= *Stemonitis hyperopta* var. *microspora* (Lister) G. Lister, in Lister, Monogr. Mycetozoa, edn. 3: 134. 1925.

= *Stemonitis microsperma* Ing, Trans. Brit. Mycol. Soc. 48(4): 648. 1965.



It was reported in a list by Nakazawa (1929), but no specimen is available in Taiwan.

***Stemonitopsis reticulata*** (H.C. Gilbert) Nann.-Bremek. & Y. Yamam., in Yamamoto & Nannenga-Bremekamp, Proc. Kon. Ned. Akad. Wetensch. 98: 325. 1995.

= *Comatricha dictyospora* L.F. Celak., Arch. Naturwiss. Landesdurchf. Böhmen 7: 49. 1893.

It was reported as *Com. dictyospora* without any description and illustration (Wang et al., 1981).

***Stemonitopsis subcaespitosa*** (Peck) Nann.-Bremek., Nederlandse Myxomyceten (Amsterdam): 211. 1974. Fig. 4

= *Comatricha subcaespitosa* Peck, Annual Rep. New York State Mus. 43: 71. 1890.

Fructification sporangiate, gregarious, scattered or in clusters, 1.5-2.5 mm in total height. Sporangia stipitate, cylindrical, obtuse, fuscous (dark brown). Peridium early evanescent. Stalk black, short, 1/4-1/3 of the total height. Hypothallus silvery, usually inconspicuous. Columella straight, reaching nearly to the apex, then merging into the capillitium. Capillitium dense, branching and anastomosing, forming irregular net all over, with few free ends. Spores violaceous brown in mass, brownish by transmitted light, prominently warted, 10-11 µm in diameter. Plasmodium not observed.

Specimen examined: TAIWAN: Haulien County: Chihnan, on dry twigs, CHL B517, Mar. 8, 1985.

The sporangia of this collection are more acuminate in the outer appearance, the stalks are somewhat longer and the spores slightly larger and more coarsely warted compared with the species description given by Martin and Alexopoulos (1969) and Nannenga-Bremekamp (1991). An authentic specimen from Meylan also possesses the above listed characters as mentioned by Martin and Alexopoulos (1969) for *Comatricha subcaespitosa*, a synonym of *Stemonitopsis subcaespitosa*. Apparently this specimen is much more close to that from Meylan. It is a new record for Taiwan.

***Stemonitopsis typhina*** (F.H. Wigg.) Nann.-Bremek., Nederlandse Myxomyceten (Zutphen) 209. 1975. Fig. 5

= *Comatricha typhina* (F.H. Wigg.) Rostaf., Sluzowce Monogr. 197. 1874.

= *Comatricha typhoides* var. *similis* G. Lister, in Lister, Monogr. Mycetoza, edn. 2: 158. 1911.

= *Stemonitopsis typhina* var. *similis* (G. Lister) Nann.-Bremek. & Y. Yamam., Proc. Kon. Ned. Akad. Wetensch., C. 90: 348. 1987.

Specimens examined: TAIWAN: Nantou County: Yuchih Hsiang, Menshan Farm, on decaying wood, CHL M120, Sept. 15, 1980. Taipei City: main campus of National Taiwan Univ., on bark of *Bischofia javanica*, CHL B393a, June 8, 1984. Pingtung County: Kenting National Park, on bark, CHL B747, July 1, 1987; Nanjenshan forest, on dry twigs, CHL B1492b, Oct. 31, 1998.

The species was reported in a list by Nakazawa (1929), but no specimen is available in Taiwan. The distinctive spore surface markings (with clusters of larger warts scattered on the wall surface), and the relative dark sporangia are the features separating this species from *Stemonitopsis hyperopta*. It also can be recognized by the peridial fragments persisting on the sporangium.

#### Key to species of *Symphytocarpus* in Taiwan

1. Spores reticulate ..... *Sym. amaurochaetoides*
- 1'. Spores with warts or spines but not reticulate ..... 2
2. Sporangia red brown or brown; spores 7-10 µm in diameter ..... *Sym. flaccidus*
- 2'. Sporangia nearly black; spores 11-13 µm in diameter ..... *Sym. trechisporus*

***Symphytocarpus amaurochaetoides*** Nann.-Bremek., in Ing & Nannenga-Bremekamp, Proc. Kon. Ned. Akad. Wetensch., C. 70: 220. 1967.

= *Stemonitis fusca* var. *confluens* Lister, Monogr. Mycetoza, edn. 1: 110. 1894.

= *Stemonitis fusca* var. *flaccida* G. Lister, in Lister, Monogr. Mycetoza, edn. 2: 144. 1911.

The genus *Symphytocarpus* is characterized by its pseudoaethalium, which look as an aethalial *Stemonitis fusca*, of partly merged sporangia which are sessile or most nearly sessile. There are 3 species of this genus all were reported in a list by Nakazawa (1929), but no specimen is available in Taiwan.

***Symphytocarpus flaccidus*** (Lister) Ing & Nann.-Bremek., Proc. Kon. Ned. Akad. Wetensch., C. 70: 217. 1967.

= *Stemonitis splendens* var. *flaccida* Lister, Monogr. Mycetoza, edn. 1: 112. 1894.

***Symphytocarpus trechisporus*** (Berk. ex Torrend) Nann.-Bremek., in Ing & Nannenga-Bremekamp, Proc. Kon. Ned. Akad. Wetensch., C. 70: 219. 1967.

= *Stemonitis fusca* var. *trechispora* Berk. ex Torrend, Brotéria, Sér. Bot. 7: 81. 1908.

= *Stemonitis trechispora* (Berk. ex Torrend) T. Macbr., N. Amer. Slime-Moulds, edn. 2: 159. 1922.

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## 台灣黏菌(二十五)：髮網黏菌科

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摘要：本篇整理與訂正臺灣產髮網黏菌科的成員，包括 *Collaria* (項圈黏菌屬)、*Comatricha* (髮黏菌屬)、*Enerthenema* (傘絲黏菌屬)、*Lamproderma* (亮皮黏菌屬)、*Macbrideola* (空柄黏菌屬)、*Paradiacheopsis* (半碎膜黏菌屬)、*Stemonaria* (假髮黏菌屬)、*Stemonitis* (髮網黏菌屬)、*Stemonitopsis* (半髮網黏菌屬) 和 *Symphytocarpus* (果網黏菌屬)，並描述兩種臺灣新記錄之黏菌：中間型傘絲黏菌 (*Enerthenema intermedium*) 和叢生半髮網黏菌 (*Stemonitopsis subcaespitosa*)。內文並提供台灣已紀錄的髮網黏菌科內各屬與各種的檢索表。

關鍵詞：真黏菌綱、髮網黏菌科、臺灣、分類。