

Myxomycetes of Taiwan—XII. New Records and Newly Rediscovered Species

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ABSTRACT: Four species of Didymiaceae (Myxomycetes) are described and their microphotographs are provided in this paper. Among these species, *Diderma cingulatum* Nann.-Brem. var. *rimosum* (Eliasson and Nann.-Brem.) Nann.-Brem., *D. subdictyospermum* (Rostaf.) G. Lister and *Diachea subsessilis* Peck are new records to Taiwan; *Diderma floriforme* (Bull.) Pers. is rediscovered for the second time in Taiwan since the first report in 1929.

KEY WORDS: *Diachea*, *Diderma*, Didymiaceae, Myxomycetes, Taiwan.

INTRODUCTION

Since the publication of the genus *Diderma* (Physarales) of Taiwan was published (Chung and Liu, 1998) three more species of *Diderma* have been found. *Diderma floriforme* was collected in a trip to Shi-Tou Experimental Forest in the winter, 1997. The fruiting bodies were found on mosses growing on dead wood among the ground vegetation under a managed gymnosperm forest. This specimen is the second record in Taiwan since the first report 70 years ago (Nakazawa, 1929). *Diachea subsessilis* was found on fallen leaves in a large flower bed in Yang-Ming Park (in Yangming Shan National Park) in the spring of 1998. We also found many other foliicolous myxomycetes, such as *Craterium aureum*, *Didymium squamulosum*, *D. minus*, *D. melanospermum*, *D. megalosporum*, *Physarum melleum*, from the same flower bed. Apparently this is a good site for slime moulds to grow. *Diderma cingulatum* var. *rimosum* and *D. subdictyospermum* were collected from Kenting National Park in the summer of 1988 by the senior author and identified as new to Taiwan. All specimens are deposited in the Mycological Herbarium, Department of Botany, National Taiwan University, Taipei, Taiwan, R.O.C.

MATERIALS AND METHODS

Fruiting bodies were collected directly from the field and examined by light and scanning electron microscopy as usual (Liu and Chen, 1998). For identification, the reference of Martin and Alexopoulos (1969) and Nannenga-Bremekamp (1991) are followed.

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RESULTS AND DISCUSSION

1. *Diachia subsessilis* Peck., Ann. Rep. N. Y. State Mus. 31: 41. 1879. Figs. 1-4, 12-14

Fructification densely gregarious on a common hypothallus, shortly stalked or nearly sessile, up to 0.77 mm in total height. Sporangia globose, 0.25-0.64 mm in diameter, golden-brown, with blue or purple iridescence. Peridium membranous, transparent; dehiscence lobate. Stalk short, pure white, limy, cylindrical, slightly attenuate, extending into the sporangium to form a columella. Columella conical, white, limy, reaching about 1/3-1/2 the height of sporangia. Hypothallus a continuous net, white, limy. Capillitial threads arising from the columella, radiating to the periphery, purplish brown, with a few small and globose protuberances, dichotomously branched, sparingly anastomosed, the free ends attenuate, pale. Spores brown in mass, reddish brown under transmitted light, globose, 9-11.5 μm diam., marked with minute warts connected by incomplete surface reticulation.

Specimen examined: Taipei City: Yang-Ming Park, CHL B1406, Mar. 27, 1998; CHL B1420, April 1, 1998, on fallen leaves.

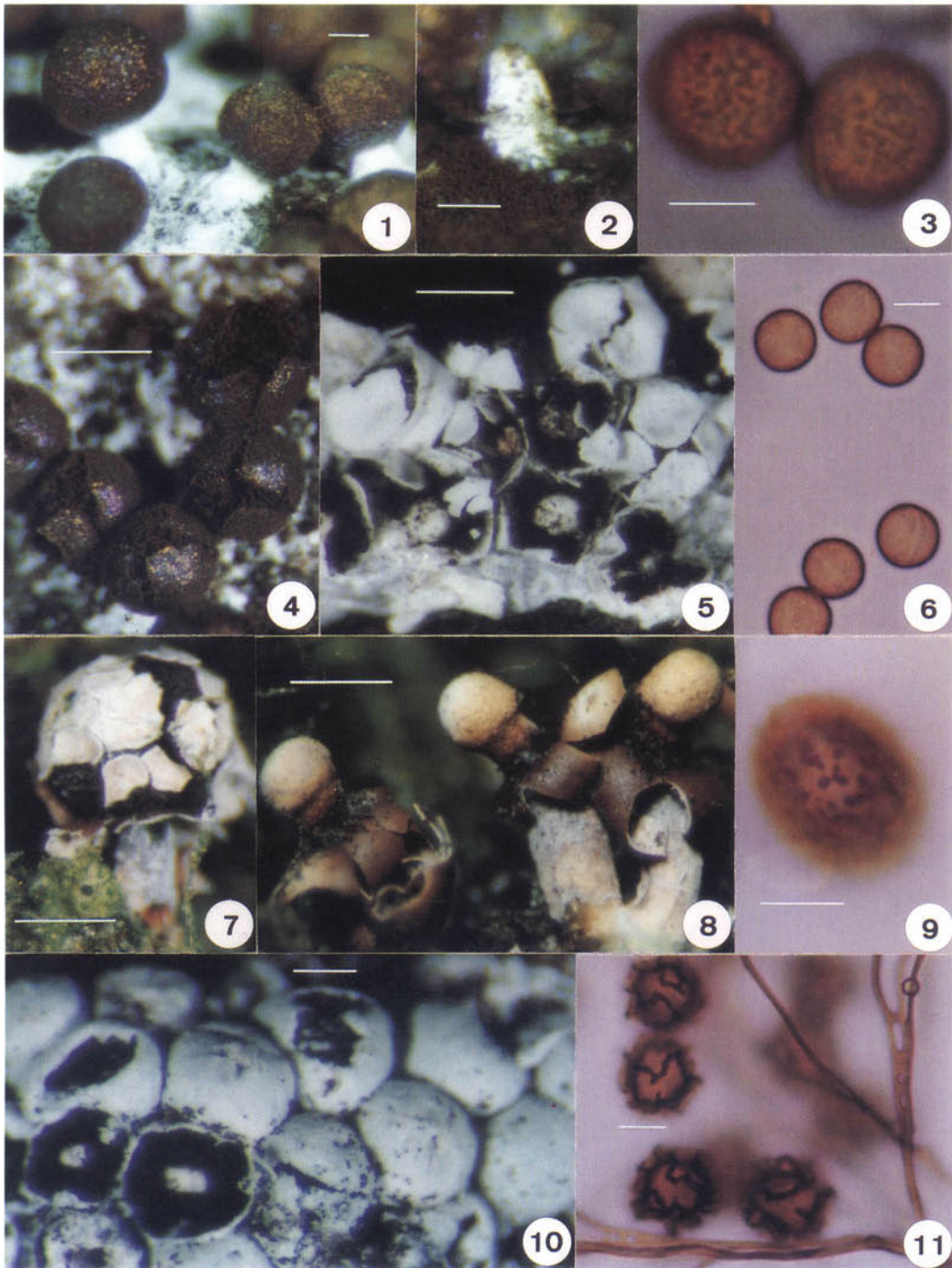
A new record of Taiwan. The distinctive features are the short stalk, conical columella and subreticulately warted spores.

2. *Diderma cingulatum* Nann.-Brem. var. *rimosum* (Eliasson and Nann.-Brem.) Nann.-Brem., Proc. Kon. Ned. Akad. Wet. C 98(3): 321. 1995. Figs. 5-6, 16-19

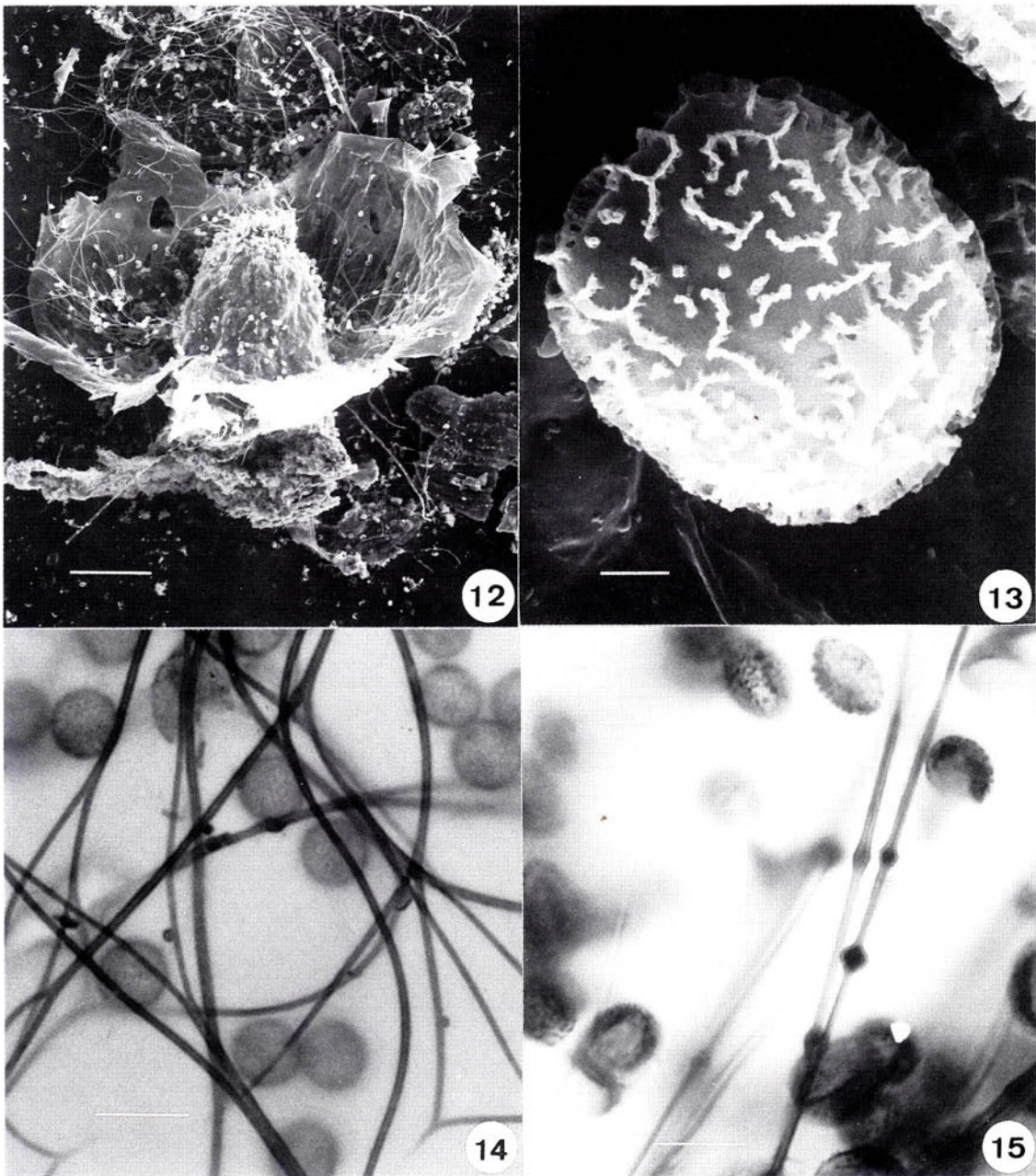
Fructification densely gregarious or clustered, sporangiate, sessile on a broad base. Sporangia white, nearly globose, slightly depressed, 0.58-0.77 mm in diameter, wrinkled, with polygonal ridges on the surface. Peridium double, outer layer composed of white lime granules, rugose, fragile; rugose, fragile; inner layer membranous, transparent, and iridescent, closely adhering to the outer peridium; dehiscence along the polygonal ridges on the outer peridium. Hypothallus white, limy, continuous. Columella pale yellowish or whitish, calcareous, hemispherical or depressed globose, 190-260 μm in diameter, with reticulate ornamentation on the surface under SEM. Capillitial threads dark brown, purplish brown by transmitted light, papery at tips, radiating from columella to peridium, slightly elastic, rigid, sparingly branched and anastomosed, with transverse inner connection between two neighboring threads, 1-2 μm diam. spores dark brown in mass, lilac-brown by transmitted light, globose or subglobose, 9-9.5 (-12.5) μm diam, minutely warted, with a transverse pale line.

Specimen examined: Pingtung County: Kenting National Park, CHL B1105, Aug. 23, 1988, on fallen twigs.

The distinct characteristics of *Diderma cingulatum* are the prominent white columella and the pale line or lines on the spore surface. According to the literatures (Eliasson and Nannenga-Bremekamp, 1983; Nannenga-Bremekamp, 1991; Yamamoto and Nannenga-Bremekamp, 1995), *D. cingulatum* var. *cingulatum* and *D. cingulatum* var. *rimosum* have some differences. For the former, the surface of sporangia is more smooth, not ridged; the columella are cylindrical and attenuate upwards; and each spore has a few fine ridges



Figs. 1-4. *Diachea subsessilis*. Fig. 1. Fruiting bodies, bar = 0.2 mm; Fig. 2. The white, conical columella, bar = 0.2 mm; Fig. 3. Spores, surface view, bar = 5 μ m; Fig. 4. The dehiscent sporangia, bar = 0.5 mm; Figs. 5-6. *Diderma cingulatum* var. *rimosum*. Fig. 5. Broken sporangia, showing the white, globose columella, bar = 0.5 mm; Fig. 6. Spores, showing the pale lines on the surface, bar = 5 μ m. Figs. 7-9. *D. floriforme*. Fig. 7. Broken sporangia, showing the ridges on the peridium, bar = 0.5 mm; Fig. 8. Dehiscent sporangia, showing the prominent columella and the strongly reflexed peridium, bar = 0.5 mm; Fig. 9. Surface view of spore, bar = 5 μ m; Figs. 10-11. *D. subdictyospermum*. Fig. 10. Sporangia, bar = 0.2 mm; Fig. 11. Spores and capillitial threads, bar = 5 μ m.



Figs. 12-14. *Diachea subsessilis*. Fig. 12. A broken sporangium, showing the conical columella, bar = 100 μm ; Fig. 13. Spores, bar = 1 μm ; Fig. 14. Capillitial threads and spores, bar = 10 μm . Fig. 15. Spores and capillitial threads of *Diderma floriforme*, bar = 10 μm .

forming a lax reticulation, usually also has a narrow, white line which runs around most of the spore. For the latter, the surface of sporangia are polygonally ridged; the columella are globose; and the surface of spores are with a few pressure lines and forming a broken reticulation. In our specimen, the characteristics of sporangia and columella are similar to the variety *rimosum*, however, every spore has only a pale pressure line. Also, the spore surface ridges are never found in this specimen. Our specimen is more close to the variety *rimosum* and tentatively placed in this taxon. The variations among the species, *D. cingulatum*, may need further investigation.

3. *Diderma floriforme* (Bull.) Pers., Neues Mag. Bot. 1: 89. 1794.

Figs. 7-9, 15

Fructification sporangiate, gregarious, stipitate, erect, 1.5-1.9 mm in total height. Sporangia pale (brownish white or gray), occasionally deep brown, globose to subglobose, 0.77-0.85 mm in diameter. Stalk cylindrical, pale (brownish), calcareous, with longitudinal furrows, occasionally orange-brown. Hypothallus membranous, orange-brown. Peridium double, the outer layer cartilaginous, opaque, pale (brownish), the inner layer membranous, closely adherent to the outer layer, orange-brown to deep brown, crack opened by forming polygonal flakes at the top, petaloid below which often strongly reflexed and persistent. Columella prominently protruding, stalked with a globose head, orange brown, calcareous. Capillitial threads dark brown, rigid, sparingly branched and anastomosed, with scattered globose thickening, radiating from columella to the periphery. Spores black in mass, dark brown in transmitted light, irregularly marked with large warts, about (8-) 10-11 (-15) μm diam.

Specimen examined: Natou County: Lu-Ku Hsiang, Shi-tou Experimental Forest (of National Taiwan University), CHL B13442, Dec. 7, 1997, on mosses growing on a fallen log.

This is the 2nd collection since the first one in 1929 by Nakazawa. Apparently it is a rare species in Taiwan. The distinct features are the floriformic dehiscence of the peridium, the prominently stalked columella, and the spore surface marked by sparse but coarse warts. Spores of our specimen are difficult to swell in 2% KOH, and are often collapsed.

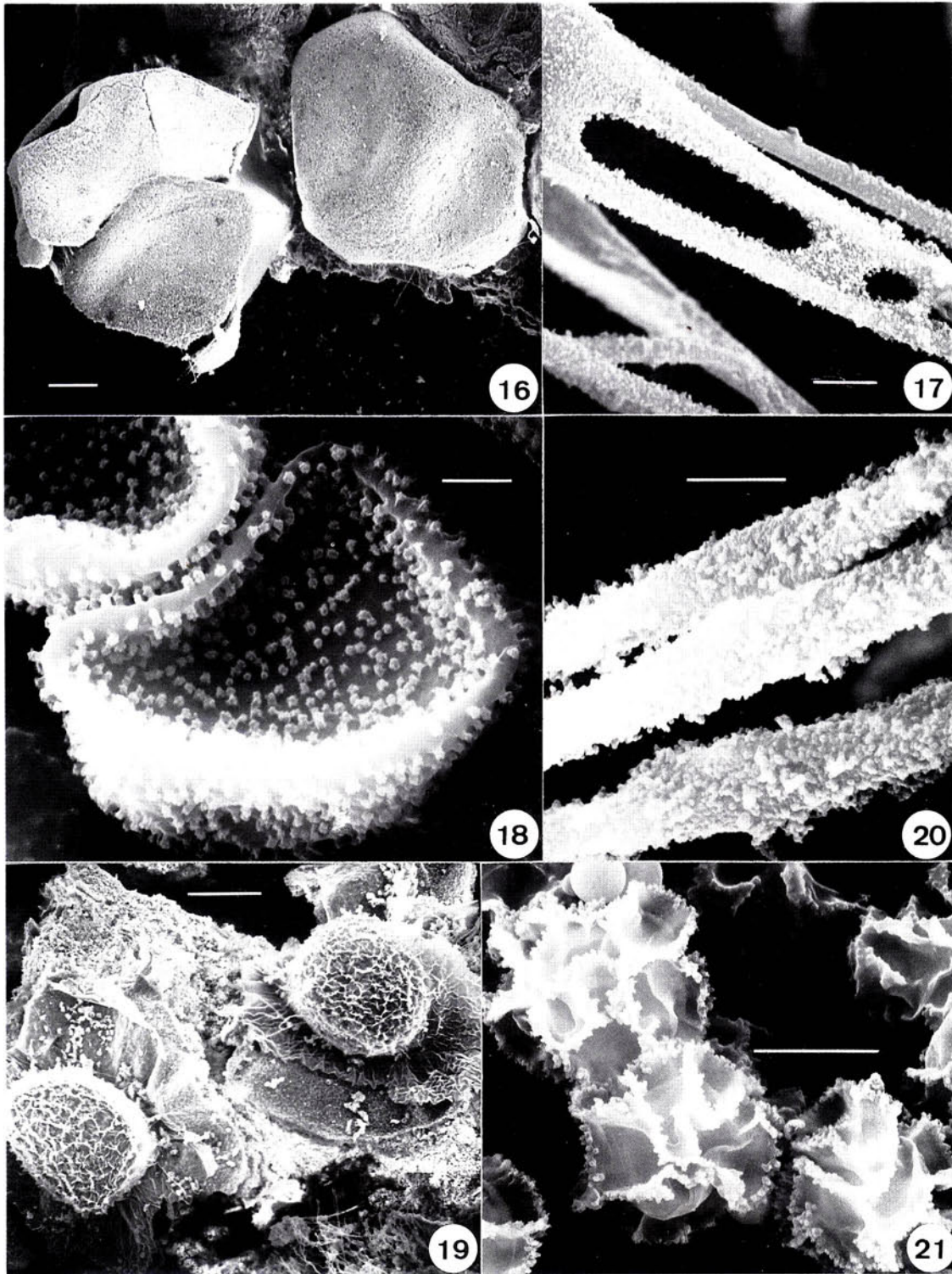
4. *Diderma subdictyospermum* (Rost.) G. Lister, Mycetozoa ed. 2. 101. 1911.

Figs. 10-11, 20-21

Fructification sporangiate, crowded and densely aggregated, sessile, seated on a common hypothallus, white, subglobose or hemispherical, 0.32-0.51 mm in diameter, rough on the surface, sometimes with a small pit at the top due to the lacking of outer peridium. Hypothallus thick, limy and white, continuous. Peridium double, the two layers adherent closely and appearing as single, the outer layer white, calcareous, fragile, the inner layer membranous, colorless; dehiscence irregular. Columella often lacking; when present, white, subglobose or hemispherical, occasionally triangular, erect on the center of sporangial base. Capillitial threads purplish brown, rigid, sparingly branched and anastomosed, rough under SEM. Spores nearly black in mass, pale brown by transmitted light, surface markings subreticulate or banded reticulate, globose, 12-14.5 μm diam. (bands included), the bands about 2 μm high which, viewed under SEM, densely ornamented with teeth or warts along the top margins

Specimen examined: Pingtung County: Kenting National Park, CHL B1104, Aug. 23, 1988, on fallen twigs; CHL B1107, Aug. 24, 1988, on fallen leaves and dead stems of vines.

A new record of Taiwan. The distinctive features of our specimens are the white and sessile sporangia which are densely aggregated; the unique spore surface markings (subreticulate or banded reticulate with a band of 2 μm high) and the rigid dark purple brown capillitium, which are identical with that described in the references (Lister, 1925; Martin and Alexopoulos, 1969; Lakhanpal and Mukerji, 1981). The spores of our specimen, however, are 2 μm larger; and the columella are usually lacking in the sporangia, when present they are variable in shape.



Figs. 16-19. SEM ultrastructures of *Diderma cingulatum* var. *rimosum*. Fig. 16 Sporangia, bar = 100 μm ; Fig. 17. Part of capillitium, bar = 2 μm ; Fig. 18. Spores, bar = 1 μm ; Fig. 19. Two broken sporangia, showing the globose columella, bar = 100 μm . Figs. 20-21. SEM ultrastructures of *D. subdictyospermum*. Fig. 20. Capillitial threads, bar = 1 μm ; Fig. 21. Spores, bar = 5 μm .

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臺灣黏菌（十二）：新記錄和再發現種

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摘 要

本文描述四種鈣皮黏菌科之黏菌並提供其顯微特徵照片。這些種類中，籬孢雙皮黏菌裂片變種(*Diderma cingulatum* var. *rimosum*)、網孢雙皮黏菌(*D. subdictyospermum*)和短白柄黏菌(*Diachea subsessilis*)為臺灣的新記錄；而花狀雙皮黏菌(*Diderma floriforme*)乃自1929年以來，在臺灣地區第二次採獲。

關鍵詞：白柄黏菌屬，雙皮黏菌屬，鈣皮黏菌科，黏菌，絨泡黏菌目，臺灣。

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