

## Myxomycetes of Taiwan XI: Two New Species of *Physarum*

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**ABSTRACT:** Two new species of *Physarum* are reported and illustrated by colored photos and scanning electron microscopy. *Physarum obpyriforme* Liu & Chen sp. nov. was found in Nanjenshan forest, Kenting National Park, southern part of Taiwan. This species is characterized by the pear-shaped or ovoid, more or less laterally compressed, yellow fructification which is sessile with a constricted base. *P. cremiluteum* Chen & Liu sp. nov. was collected in the forest of Mt. Shamoia in the vicinity of Taipei. This species is diagnosed by the creamy yellow sporangia and lime nodes, the whitish and calcareous stalk, the presence of limeless disc at the base of sporangia, and lacking of columella. Type specimens of these two species are deposited in the Mycological Herbarium of the Botany Department, National Taiwan University, Taipei.

**KEY WORDS:** Myxomycetes, Slime molds, Physarales, *Physarum*, *Physarum obpyriforme*, *Physarum cremiluteum*, Taiwan.

### INTRODUCTION

Field collections of Myxomycetes have been undertaken more frequently in recent years and several Taiwan's new taxa and three world new species, *i.e.* *Physarum taiwanianum*, *Licea tropica*, and *L. pescadorensis*, have been reported (Chung & Liu, 1996a, 1996b, 1996c; Chen & Liu, 1997; Liu & Chen, 1998). Among the specimen accumulated, we observed two other new species of *Physarum*, one is *P. obpyriforme* Liu and Chen, the other is *P. cremiluteum* Chen and Liu, the former was found fruiting on the bark surface of a piece of dead log in Nanjenshan forest, southern Taiwan, in May, 1998; the later was collected in the forest of Mt. Shamoia, northern Taiwan, in August, 1995. They both have distinct appearance different from any other members in this genus.

### MATERIALS AND METHODS

Fruiting bodies and their microscopic structures of *Physarum obpyriforme* and *P. cremiluteum* were examined by light and scanning electron microscopy (Martin and Alexopoulos, 1969; Robbrecht, 1973; Chung & Liu, 1997). Characteristics were compared with other known species of *Physarum* that are close to our specimens (Martin & Alexopoulos, 1969; Mitchell & Nannenga-Bremekamp, 1977).

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## RESULTS AND DISCUSSION

1. *Physarum obpyriforme* Liu & Chen, sp. nov.

Figs. 1-3, 9-12

**Fructificationes** dispersae ad gregariae, plerumque **sprangiatae**, parce plasmodiocarpaceae. **Sporangia** sessilia, obpyriformia ad ovata, subcompressa lateraliter, 0.44-0.65 mm altitudinem totam, 0.20-0.35 mm diam., maydi-flava in apicem, iridescentia infra, ad flavis calcareois granulis interspersis. **Peridium** simplex, membranaceum, translucidum, brunneolum, dehiscencia irregularis vel lobata. **Hypothallus** membranaceus, albus vel incoloratus. **Columella** absens. **Capillitium** abundum, nodis calcareis, rotundatis, maydi-flavis. **Sporae** per saturam atro-brunneae, purpureo-brunneae luce transmissa, subglobosae, 7-8  $\mu\text{m}$  diam., minute verruculosae.

Holotype: **Pintung County**: Nanjenshan forest, Kenting National Park, CHL B1445, May 2, 1998, on bark of dead wood. In the Mycological Herbarium, Department of Botany, National Taiwan University.

Etymology: The Latin word "*obpyriforme*" refers to the obpyriform of the sporangia.

Distribution: Known only from the type locality.

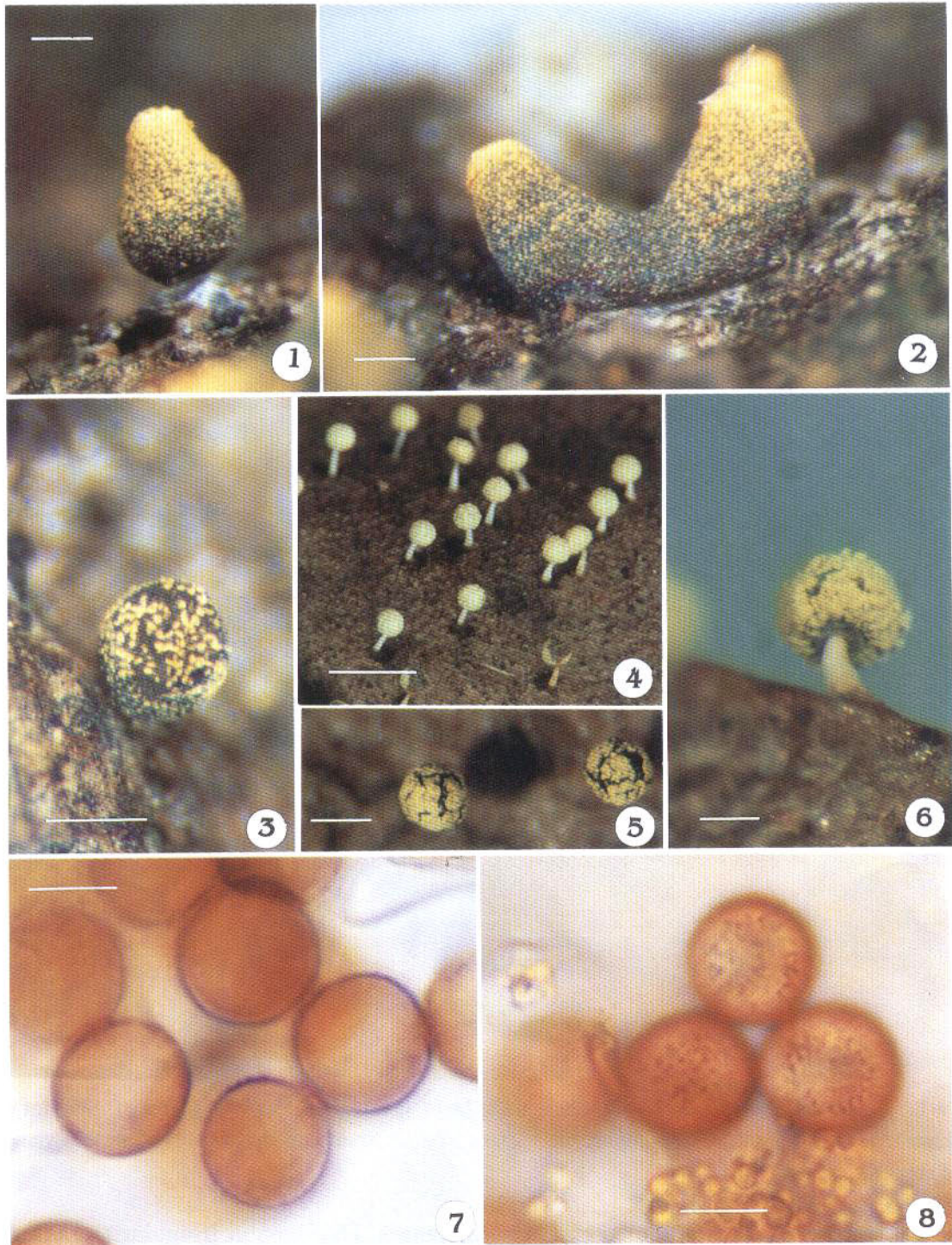
**Fructification** scattered to gregarious, mostly sporangiate and sessile, rarely short plasmodiocarpus, occasionally two sporangia connected at basal part. **Sporangia** obpyriform to ovate, more or less laterally compressed, maize-yellow, the yellow lime deposition thicker and more compact at the top, sometimes forming a crust and breaking away as a piece, basal part iridescent, with scattered lime granules, 0.20-0.35 mm in diameter at the widest part, 0.44-0.65 mm in total height. **Peridium** membranous, transparent, brownish, dehiscent lobately or irregularly. **Hypothallus** membranous, whitish or colorless, slightly crust-like in some. **Columella** absent. **Capillitium** abundant, lime nodes maize-yellow, rounded, connected by short, colorless, threads. **Spores** dark brown in mass, purplish brown by transmitted light, minutely warted or nearly smooth, subglobose, 7-8  $\mu\text{m}$  in diameter. **Plasmodium** not seen.

This species is a distinct member of *Physarum*, characterized by the sessile, obpyriform to ovoid shaped, laterally compressed, yellow sporangia. *Physarum retisporum* Martin, Thind & Rehill is one of the *Physarum* species close to our specimen in outer appearance (Martin & Alexopoulos, 1969). However, it is distinguished from *P. obpyriforme* by its strongly reticulate spores and the two layers of peridium. *P. serpula* Morgan deviates from *P. obpyriforme* in having elongate and curved plasmodiocarps, or if in the form of sporangia, it is globose, not obpyriform (Farr, 1976; Martin & Alexopoulos, 1969). The fruiting bodies of *P. virescens* Ditermar are crowded or superimposed in habits, with fragile and rugose peridium and larger spores (8-10  $\mu\text{m}$ ) (Farr, 1976; Martin & Alexopoulos, 1969; Nannenga-Bremekamp, 1991).

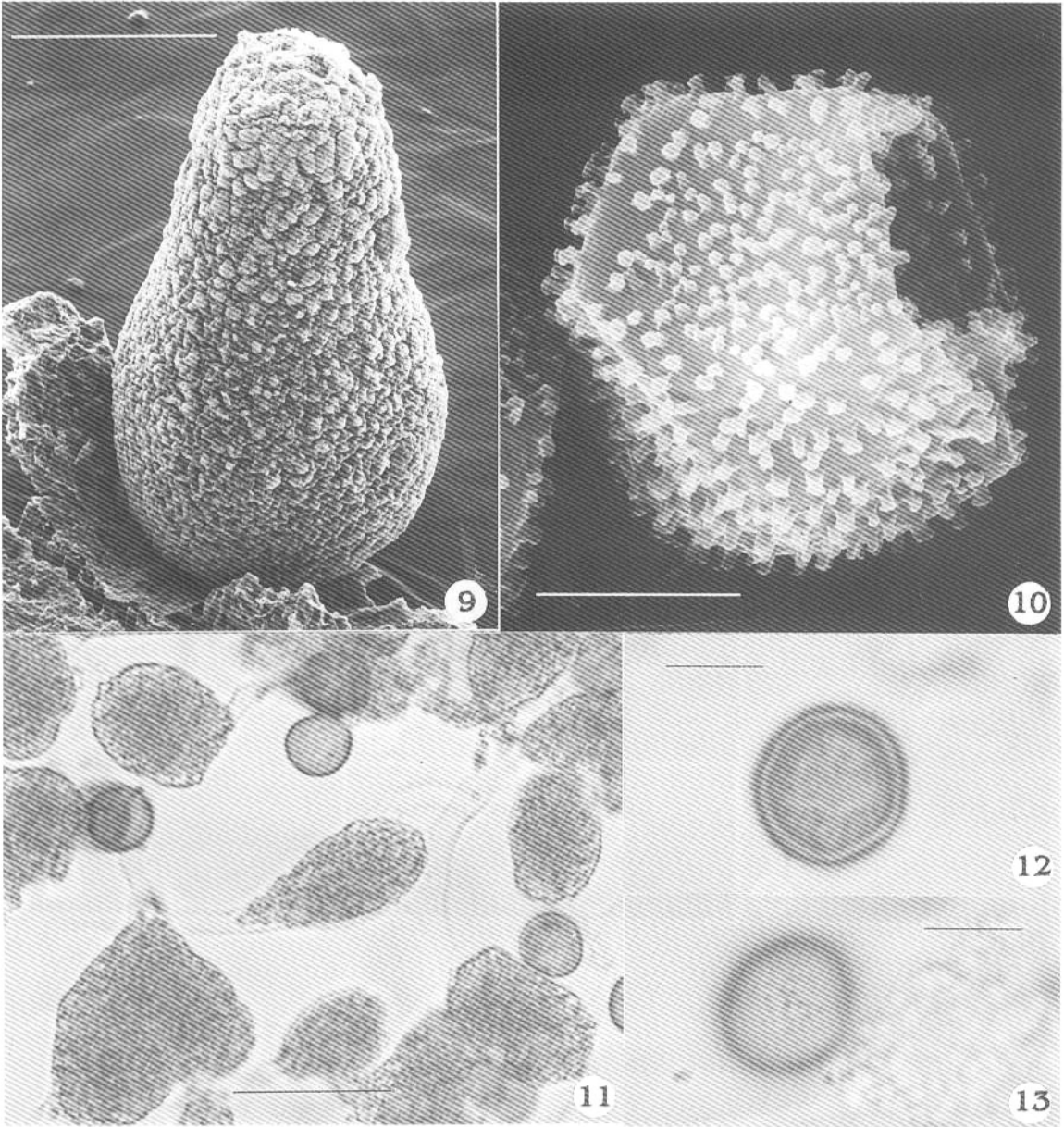
2. *Physarum cremiluteum* Chen & Liu sp. nov.

Figs. 4-7, 14-17

**Fructificatio** gregaria, stipitata, 0.50-0.65 mm altitudinem totam. **Sporangia** globosa ad subglobosa, (0.19-) 0.29-0.41 mm diam., limonea vel pallide flava, propter granulas calcareas squamulosas, basilaris pars membranacea, noncalcareae. **Stipes** erectus, albus,



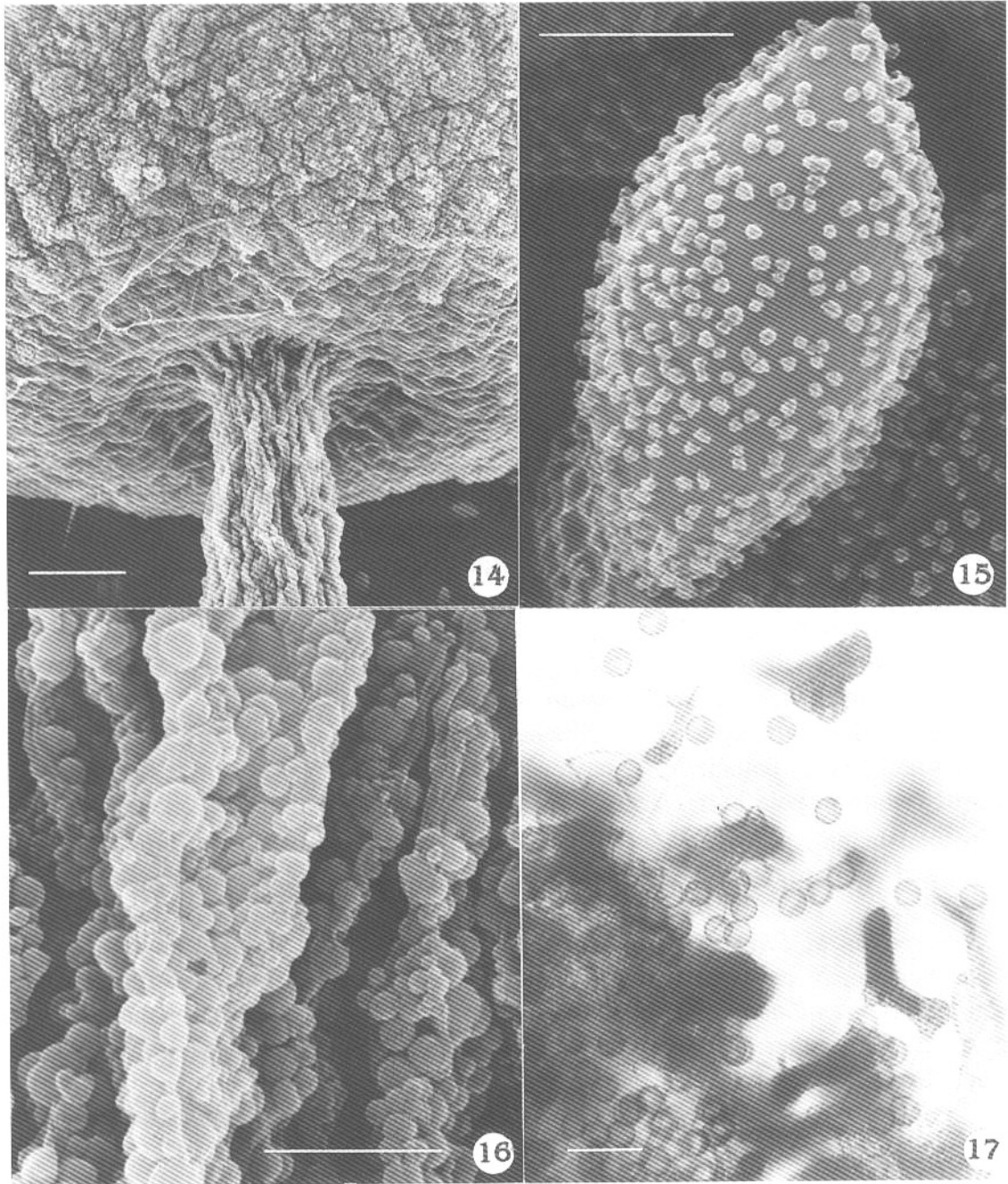
Figs. 1-3. *Physarum obpyriforme* Liu & Chen. 1-2. Fruiting bodies, bar = 200 $\mu$ m; 3. One broken fruiting body, showing the yellow lime nodes, bar = 200 $\mu$ m. Figs. 4-8. *Physarum cremiluteum* Chen & Liu. 4. Fructifications in habit, bar = 1000 $\mu$ m; 5. Sporangia, showing the irregular dehiscence, bar = 300 $\mu$ m; 6. One fruiting body, showing the limeless basal disc, bar = 200 $\mu$ m; 7-8. Spores, marginal (7) and surface view (8), bar = 5 $\mu$ m.



Figs. 9-13. *Physarum obpyriforme* Liu & Chen. 9. SEM of sporangium, bar =  $200\mu\text{m}$ ; 10. SEM of spore ornamentation, bar =  $2.5\mu\text{m}$ ; 11. Capillitium, bar =  $20\mu\text{m}$ ; 12-13. Spores, marginal (12) and surface view (13), bar =  $5\mu\text{m}$ .

calcareus, circa 1-1.5 plo longior diametrum sporangia. Dehiscencia irregularis. **Columella** nulla. **Hypothallus** membranaceus, disciformis, incoloratus. **Capillitium** reticulatum, nodis calcareis, palide flavis, angulares. Sporae in cumulos atro-brunneae, violaceo-brunneae luce transmissa, globosae,  $7.5-8\mu\text{m}$  diam., minute verruculosae. Plasmodium ignotum.

Holotype: Taipei City: Mt. Shamo, Aug. 7, 1995. Y.-F. Chen 502, on dead leaves. In Mycological Herbarium of the Department of Botany, National Taiwan University.



Figs. 14-17. *Physarum cremiluteum* Chen & Liu. 14. SEM of part of sporangium, showing the limeless basal disc, bar =  $30\mu\text{m}$ ; 15. SEM of spore ornamentation, bar =  $2.5\mu\text{m}$ ; 16. SEM of stalk surface, bar =  $4\mu\text{m}$ ; 17. Capillitium, bar =  $20\mu\text{m}$ .

Etymology: The Latin "*cremiluteum*" refers to the cream-yellow color of the sporangia and the lime nodes.

Distribution: Known only from the type locality.

**Fructification** gregarious, stipitate, 0.50-0.65 mm in total height. **Sporangia** globose, or subglobose, (0.19-) 0.29-0.41 mm in diameter, cream-yellow or lemon yellow, covered with light yellow lime granules in patches or in squamulose form except at the disk-like basal portion, where exposing the membranous peridium with blue or purple iridescence. **Peridium** dehiscent irregularly from the top of sporangia. **Stalk** cylindrical or attenuate upwards, whitish, calcareous, sometimes weak, about 1-1.5 times the sporangial diameter. **Hypothallus** inconspicuous, discoid, membranous, colorless or pale brownish. **Columella** absent. **Capillitium** netted, with abundant lime nodes of creamy yellow and angular in shape, the connecting threads colorless. Spores dark brown in mass, violaceous brown by transmitted light, nearly smooth under high dry lens, minutely warted under oil lens, globose, 7.5-8  $\mu\text{m}$  in diameter.

This species is very close to *Physarum melleum* (Berk. & Br.) Masee in the gregarious habitat of the fruiting bodies, outer appearance (with globose and creamy yellow sporangia, white and calcareous stalk) and lime nodes (creamy yellow) (Farr, 1976; Martin & Alexopoulos, 1969). *P. cremiluteum*, however, can be distinguished from *P. melleum* by the obviously iridescent, noncalcareous basal part of sporangia and the lacking of columella. In addition, *P. cremiluteum* is smaller in size of the fructification.

The somewhat squamulose feature on sporangial surface and the white stalk of calcareous in nature that *Physarum cremiluteum* has make it also similar with *Didymium squamulosum* (Alb. & Schw.) Fries (Farr, 1976; Martin & Alexopoulos, 1969). Nevertheless, *P. cremiluteum* has distinctive physaraceous capillitium and creamy yellow sporangia, characteristics that never found in *D. squamulosum*.

Sporangia of *P. pusillopse* D. W. Mitchell & Nann.-Brem. are also flat and limeless at basal part and lack of columella. It, however, deviates from *P. cremiluteum* in the color of sporangia (white to pale buff), larger fruiting bodies (0.8-1.4 mm in diameter and 0.8-1.2 mm in total height), dark-brown stalk and much larger spores, which are 11-13  $\mu\text{m}$  in diameter and with groups of larger warts on the surface (Mitchell & Nannenga-Bremekamp, 1977).

Other species of *Physarum* that have stipitate and yellow tint sporangia, such as *P. citrinum* Schum., *P. carneum* G. Lister & Sturgis, *P. auripigmentum* Martin, etc., are all similar with *P. cremiluteum* by sights. But the basal parts of their sporangia are all limy and their stalks are neither white nor calcareous (Farr, 1976; Lakhanpal, 1981; Martin & Alexopoulos, 1969).

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## 臺灣黏菌(十一)：絨泡黏菌屬之兩新種

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### 摘 要

本文發表兩種絨泡黏菌屬新種，並以彩色和掃描式電子顯微鏡圖示。倒梨形絨泡黏菌於墾丁國家公園南仁山森林中採獲，主要診斷特徵為孢子囊無柄、倒梨形或卵形、兩側略扁平、表面覆蓋黃色鈣質顆粒。乳黃絨泡黏菌採獲於臺北近郊的紗帽山，主要特徵為孢子囊及鈣質石灰結皆為乳黃色，柄白色調，鈣質，不具中柱，孢子囊基部無鈣質。此兩種模式標本置放於台大植物系菌類標本室。

關鍵詞：真黏菌，黏菌，絨泡黏菌目，絨泡黏菌屬，倒梨形絨泡黏菌，乳黃絨泡黏菌，臺灣。

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