Myxomycetous Genera *Perichaena* and *Trichia* in Taiwan

Chin-Hui LIU¹,* , Jong-How CHANG², and Fu-Hung YANG³

¹ Institute of Plant Science, National Taiwan University, Taipei 106, Taiwan
² 2F, 72, Sec. 2, Pei-Hsin Rd., Hsin-Tien, Taipei County 231, Taiwan
³ Institute of Life Science, National Defense Medical Center, Taipei, Taiwan

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**ABSTRACT.** Five species and one variety of the genus *Perichaena*, and seven species and three varieties of *Trichia* have previously been reported from Taiwan. In this paper two newly recorded species, *P. pedata* and *T. papillata*, and a new species, *P. papulosa*, are described and illustrated. Keys to the *Perichaena* and *Trichia* species of Taiwan are also provided.

**Keywords:** Myxomycetes; *Perichaena*; Taiwan; *Trichia*; Trichiales; True slime molds.

**INTRODUCTION**

The genera *Perichaena* and *Trichia*, belonging to Arcyriaceae and Trichiaceae of Trichiales, respectively, are characterized by having tubular capillitial threads. While the capillitial threads of *Perichaena* are slightly roughened or marked by warts or spines on the surface, those of *Trichia* are of free elaters with acute or acuminate ends and marked by 2-5 spiral bands on the surface. Their spores are bright-colored and usually yellow in mass (Martin and Alexopoulos, 1969). To date, five species and one variety of *Perichaena*, and seven species and three varieties of *Trichia*, have been recorded in Taiwan (Nakazawa, 1929; Liu, 1980, 1982, 1983, 2005; Wang et al., 1981; Chung and Liu, 1997; Chung et al., 1998; Chung and Tzean, 1998; Liu et al., 2002a, 2002b). In this paper two newly recorded species, *P. pedata* (A. & G. Lister) G. Lister and *T. papillata* Adamonyte, and a new species, *P. papulosa* Liu & Chang, are described and illustrated. Voucher specimens were deposited at the herbarium of the National Museum of Natural Science, Taichung, Taiwan (TNM).

**TAXONOMY**

**Key to species of *Perichaena* in Taiwan (inspired by Martin and Alexopoulos, 1969)**

1. Fructifications predominantly plasmodiocarpous 2
   Fructifications predominantly sporangiate 4
2. Plasmodiocarps dull yellow-brown to dark-brown, long slender, curved or net-like 3
   Plasmodiocarps dark reddish brown, often elongated or ring-like, varying to sporangiate, rarely stipitate; capillitium strongly spinulate, with long spines, sometimes marked by reticulate ridges .................. *P. chrysosperma*
3. Spores 10-14 µm diam .................. *P. vermicularis*
   Spores 7.5-10 µm diam .......................... *P. vermicularis* var. *microsperma*
4. Sporangia flattened on a broad, continuous base, usually densely aggregated and angular from pressure; dehiscence circumsiccile .................. *P. depressa*
   Sporangia not flattened, often clustered but not angular; dehiscence circumsiccile or irregular ............. 5
5. Sporangia mostly stalked .......................... 6
   Sporangia sessile, short-plasmodiocarpous or annulate ............................................................. 7
6. Peridium bearing one prominent wart on the top of sporangium .................. *P. papulosa*
   Peridium not as above .................. *P. pedata*
7. Sporangia dehiscing by a clearly preformed lid; the line of dehiscence wavy; capillitium usually scanty, minutely warted or spiny, rarely smooth ....*P. corticalis*
   Sporangia dehiscing irregularly; capillitium scanty, or absent, smooth .......................................................... *P. liceoides*

*Corresponding author: E-mail: huil4951@ntu.edu.tw.
fructification and the thicker capillitial threads (2-4 μm diam) are distinct characters separating the present species from *P. tessellata*, which is sporangiate with capillitial threads of 1.5 μm diam.

**Perichaena depressa** Libert, Pl. Crypt. 378. 1837.
Description and illustration: Liu (1982).

**Perichaena liceoides** Rostaf., Mon. 293.1875.
Description and illustration: Nakazawa (1929); Chung and Liu (1997).

**Perichaena papulosa** Liu & Chang, sp. nov. (Figure 1)

*Etymology.* Latin, *papulosus* = pustular, referring to the sporangium with a prominent papilla.

Fructificationes dispersae, sporangiatae, 0.2-0.44 mm altitudinem totam. Sporangia stipitata, globosa, depressa globosa, vel oblonge ovata, 0.11-0.25 mm diam., ochracea, brunneo-aurantiaca vel fusca, tuberculofusco ad nigello summo. Stipes erectus, brevis, cylindricus, 0.05-0.20 mm longus, fuscus. Hypothallus membranaceus, fuscus. Peridium simplex, translucidum, cum basilari...
parte disciformi post dehiscentem. Capillitium elasticum, abundum, sordide flavum, bruneolum luce transmissa, dense notatum et verrucis in annulari facie, 3-4 μm diam. Sporae in cumulos ochraceae vel sordide flave, bruneolae luce transmissa, subglobosae vel ovatae, 9-10 μm diam., minute echinulatae. Plasmodium ignotum.

Fructifications sporangiate, scattered, 0.20-0.44 mm in total height. Sporangia globose, depressed globose, or oblong ovate, 0.11-0.25 mm in diameter, stipitate, ochraceous, brownish orange or darker, orange brown when young, spotted with one dark brown to blackish protuberance at the top. Stalks erect, short, cylindrical, 0.05-0.20 mm in length, dark brown, filled with amorphous matters under transmitted light, arising from a membranous dark brown hypothallus. Peridium single-layered, transparent, upwardly dehiscent leaving a disk-like or wok-like basal part. Capillitium elastic, abundant, dull yellow, tinted with brownish color by transmitted light, marked by closely arranged warts in ring-like appearance, 3-4 μm in diameter. Spores in mass ochraceous or dull yellow, brownish by transmitted light, subglobose or ovate, 9-10 μm in diameter, spinulate. Plasmodium not observed.

Holotype. Taipei City, Yangmingshan National Park, on fallen twigs and leaves, CHL B2206 (TNM F19096), Jul. 21, 2000 (moist-chamber culture: 8/1/2000-10/7/2000).


Distribution. Known only from Taiwan.

This species is distinct in having stipitate sporangia marked on the top with one prominent wart or papilla. Compared with Perichaena pedata, another species with stalked fruiting bodies, this species is much smaller (less than 1/2) in total height, stalk length, and sporangial diameter but similar in spore size, color, and surface markings. The surface markings of capillitial threads of these two species are also quite different. The capillitial threads of P. papulosa are marked by low warts arranged in a ring-like manner while those of P. pedata are marked by prominent spines that are arranged irregularly.

**Figure 2.** *Perichaena pedata*. A-B, fruiting bodies; C, capillitium; D, spore by SEM; E, capillitial thread by SEM; F, inner peridium by SEM. Scale bar: A-B = 150 μm, C = 15 μm, D, F = 5 μm, E = 3 μm.

Fructifications sporangiate, scattered, solitary, occasionally two in a cluster with sporangia united, 0.75-0.95 mm in total height. Sporangia stipitate, globose to subglobe, pale yellowish to orange brown, 0.3-0.6 mm in diameter. Stalks erect, cylindrical, stout, roughened, dark brown to black, 0.45-0.60 mm high. Peridium single, membranous, with deposition of granular matter. Hypothallus inconspicuous. Capillitium consisting of yellow threads, the threads scarcely branched, with occasional bulbous expansions, prominently marked with spines or minute scattered warts, 3-5 µm in diameter. Spores orange yellow in mass, pale yellowish by transmitted light, globose to subglobe, minutely warted, 9.5-10.0 µm in diam. Plasmodium not observed.

Specimens examined. TAIPEI COUNTY: Shih-ting, Wenshan Botanical Gardens of National Taiwan University, on fallen twigs and leaves, CHL B2382 (TNM F19091), Jun 12 1999 (moist-chamber culture: 9/20-10/22/1999); on plant litter, CHL B2384 (TNM F19093), Oct 9 1999.

Distribution. America, Europe, Asia (Japan, Taiwan).

The sporangia of this species and those of Hemitrichia minor are similar in shape and color. They both have stalked sporangia. The capillitial threads of our specimens also resemble those of H. minor (Yamamoto, 1998) in diameter and surface markings except the spiral bands. The capillitial threads of H. minor bear faint spiral bands (Lister, 1911; Ing, 1999). The spiral bands, nevertheless, were not found by SEM in our specimens (Figure 2E).


Description and illustration: Liu et al. (2002a).

Perichaena vermicularis (Schw.) Rost., Mon. App. 34. 1876.

Description and illustration: Liu (1982).

Key to species of Trichia from Taiwan (inspired by Martin and Alexopoulos, 1969)

1. Typically sessile, sporangiate or plasmodiocardous ... 2
2. Typically sporangiate and distinctly stalked ............ 5
3. Spores externally reticulate, bands of reticulation pitted, 12-15 µm diam. ... 6
   Spores delicately reticulate, 8-10 µm diam. T. verrucosa
4. Elaters smooth, with several large rounded expansions along the length ... T. contorta var. iowensis

5. Spores prominently reticulate .......................... 6
   Spores spinulate or warted ........................... 7
6. Spores coarsely reticulate, bands of reticulation pitted, 12-16 µm diam. T. verrucosa
   Spores delicately reticulate, 8-10 µm diam. T. decipiens
7. Peridium not bearing protuberances ........................ 8
   Peridium bearing prominent protuberances ............... 9
8. Elaters with long acuminate tips .......................... 9
   Elaters with short acute tips .......................... 10
9. Peridium black or dark purple, without wax scales ...... 10
   Peridium covered with gray-green or yellow wax scales ........................ T. botrytis var. cerifera
10. Elaters, smooth, marked with regular spirals ............ 10


Description and illustration: Liu (2005).

Trichia botrytis var. cerifera G. Lister, J. Bot., Lond. 53: 211. 1915.

Description and illustration: Nakazawa (1929).

Trichia contorta var. iowensis (T. Macbr.) Torrend, Broteria 7: 55. 1908.

Description and illustration: Nakazawa (1929).


Description and illustration: Liu (1983).


Description and illustration: Liu (2005).


Description and illustration: Chung and Tzean (1998).


Description and illustration: Liu (1980).


Description and illustration: Liu et al. (2002b).


(Figure 3)

Fructifications sporangiate, scattered, solitary or gregarious, 0.77-1.30 mm in total height. Sporangia stipitate, turbinate or globose, 0.25-0.64 mm diam, brown
to blackish brown. Peridium double, the inner layer membranous, translucent, appearing as narrow bands separating the outer peridium into reticulate pattern, outer layer opaque, composed of dark granular thickenings, separating before dehiscence and forming areolae, with a protuberance at the center of each areola, dehiscing along the membranous bands of the inner peridium. Stalks up to 0.6 mm long (about 1/3-1/2 of total height), dark, cylindrical. Capillitium composed of yellow brown tubular threads, the capillitial threads unbranched, nearly identical in diameter along the length and often with acuminated ends, 3.0-3.5 μm in diameter, bearing 3-4 spinulate spiral bands. Spores bright yellow brown in mass, brownish by transmitted light, subglobose or ovoid, (7.2-) 8.0-8.5 (-9.0) μm in diameter, minutely warted. Plasmodium yellow.


Distribution. Lithuania (Adamonyte, 2003), Taiwan.

Figure 3. *Trichia papillata*. A-C, fruiting bodies; D-E, H, capillitium; F-G, young fruiting bodies; I, outer (O) and inner (I) peridium; J, spore by SEM; K-L, marginal and surface view of spores. Scale bar: A, C = 400 μm, B = 500 μm, D, H = 20 μm, E = 6 μm, F-G = 900 μm, I = 2.5 μm, J = 1.5 μm, K-L =8 μm.
The distinct character of this species is the turbinate or nearly globose sporangia with conspicuous protuberances on the nut-brown-colored outer peridium, a character not known in any other species of \textit{Trichia}. All the specimens are harvested from moist-chamber culture.

\textbf{Trichia scabra} Rost., Mon. 258. 1875.  
Description and illustration: Liu (1982).

Description and illustration: Nakazawa (1929).

**LITERATURE CITED**


