

## The Merosporangiferous Fungi from Taiwan (IV): Two New Records of *Piptocephalis* (Piptocephalidaceae, Zoopagales)

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**ABSTRACT:** Two merosporangiferous fungi, *Piptocephalis curvata* and *Piptocephalis fimbriata* are reported for the first time from Taiwan. Descriptions, photographs and variations noted for their morphological characters are provided.

**KEY WORDS:** Merosporangiferous fungi, *Piptocephalis*, Taiwan, Zygomycetes.

### INTRODUCTION

Species of the genus *Piptocephalis* (Piptocephalidaceae, Zoopagales, Zygomycetes) are obligate parasites mostly in the members of Mucorales. They are commonly found on dung, leaf litter or in soil. The genus is characterized by the production of dichotomously branching sporophores which usually form, at the branch apices, a sterile deciduous head cell bearing many cylindrical, uniseriate merosporangia containing a variable number of spores (Benjamin, 1959; Zycha, *et al.*, 1969; Kirk, 1978; Grafenhan, 1998; Ho, 2003). Of the twenty species of *Piptocephalis* described (Kirk *et al.*, 2001), only one species – *P. indica* has been described in Taiwan (Ho, 2003). This paper hereto describes two additional new records of *Piptocephalis* from Taiwan.

### MATERIALS AND METHODS

Soil samples were collected from country roadsides and forests and brought to the laboratory in sterilized plastic bags. Two to three milligrams of soil particles were placed on corn meal agar plates. The plates were incubated at 24°C for nearly a week. Then, the plates were observed under a dissecting microscope. Sporophores of *Piptocephalis* were transferred along with its host, to another fresh corn meal agar plate and incubated at 24°C. After one week, the regenerated, mature sporangia of *Piptocephalis* were again transferred by touching mature sporangia with a sterilized needle to pre-marked spots onto a new corn meal agar plate. A day after inoculation of *Piptocephali* sporangia, the spores of mucoraceous host were also inoculated in the vicinity of the parasite. After 4-7 days, the host was found parasitized by the *Piptocephalis* species.

### SEM

Pertinent materials were selected under a dissecting microscope and fixed for 1 hr with 2.5% glutaraldehyde in distilled water, and post-fixed for 1 hr with 1% osmium tetroxide in

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distilled water. The materials were washed with distilled water and dehydrated in a graded acetone series. Specimens were dried in a critical point dryer, coated with gold, observed, and photographed with a Hitachi S-520 scanning electron microscope (SEM) at 20 KV.

### LM

Materials observed were selected under a dissecting microscope and mounted in a drop of water or lactophenol cotton blue. Photographs were taken with a Leica MPS32 light microscope (LM).

All examined slides and cultures are deposited at the mycology laboratory, Department of Natural Science Education, National Taipei Teachers College, Taipei, Taiwan.

## TAXONOMY

***Piptocephalis curvata*** Baijal & B. S. Mehrotra, 1968. Zentralbl. Baktedol. Parasitenk. Infektionskrankh. Hyg. 2. Abt. 122: 181-184, Figs. 1-18. Fig. 1

Aerial mycelium fine, hyaline. Sporophores growing from vegetative mycelium, erect or ascending, hyaline, smooth, becoming septate in age; main stalk simple, 10-62.5  $\mu\text{m}$  high, narrowest at the base, gradually enlarging upward to about 4.5-5.8  $\mu\text{m}$  wide, forming fertile branch system on top, which consists of 3 to 6 successive dichotomies; ultimate branches mostly curved, (5-)10-25  $\times$  1.5-2.5  $\mu\text{m}$ ; penultimate branches 15-22.5(-50)  $\times$  2.0-3.8  $\mu\text{m}$ ; head-cells deciduous, hyaline, with stalks, usually furrowed to form 4 lobes on top, each lobe studded with 3-4 projections bearing up to 16 merosporangia per head, 5.0-6.5(-8)  $\mu\text{m}$  diam.; merosporangia 2-spored, initially oblongly ellipsoidal, later the apical spore blown out to form a  $\pm$  cylindrical merosporangium with a circumscissile restriction, 10-13  $\mu\text{m}$  long; spores barrel-shaped to ellipsoidal with blunt ends, two distinct oil droplets visible inside, smooth-walled, becoming brownish, 5-7  $\times$  2-2.5  $\mu\text{m}$ ; spore-heads forming a liquid droplet at maturity. Zygosporangia not observed.

Notes: The fungus is characterized by: Firstly, the curvature ultimate branches of sporophores; secondly, the fertile successive dichotomies; thirdly, the lobed head cells and then, the 2-spored merosporangia (Grafenhan, 1998).

Host: *Backusella circinella*

Specimen examined: *Symg0108*, from soil, Yangmingshan, Taipei.

Distribution: Japan; Malaysia; Taiwan.

***Piptocephalis fimbriata*** M. J. Richardson & Leadbeater, 1972. Trans. Brit. Mycol. Soc. 58: 205-215, Figs. 1-3. Fig. 2

Sporophores growing from mycelium in agar media, ascending, later prostrate, hyaline, remaining smooth or becoming slightly striated and septate in age; main stalk simple, up to 1.5 cm long, about 3.0-4.2  $\mu\text{m}$  wide, forming fertile branch system on top, which consists up to 5 successive dichotomies, ultimate branches 15-35(-52)  $\times$  1.5-2.0  $\mu\text{m}$ ; penultimate branches 15-22.5(-50)  $\times$  2.0-3.8  $\mu\text{m}$ ; head-cells deciduous, hyaline, studded with projections bearing 11(-26) merosporangia per head, 5-6.5(-8)  $\mu\text{m}$  diam., lysing at maturity to leave a ragged fringe at the tip of the sporophores; merosporangia (2-)3-4(-5)-spored, 12-14.5  $\times$  1.8-2.2  $\mu\text{m}$ ; spores cylindrical with two truncate ends or round at one end, (4-)4.5-5  $\times$  2  $\mu\text{m}$ , distinct oil droplets usually present, smooth-walled; spore-heads forming a liquid droplet at maturity. Zygosporangia not observed.

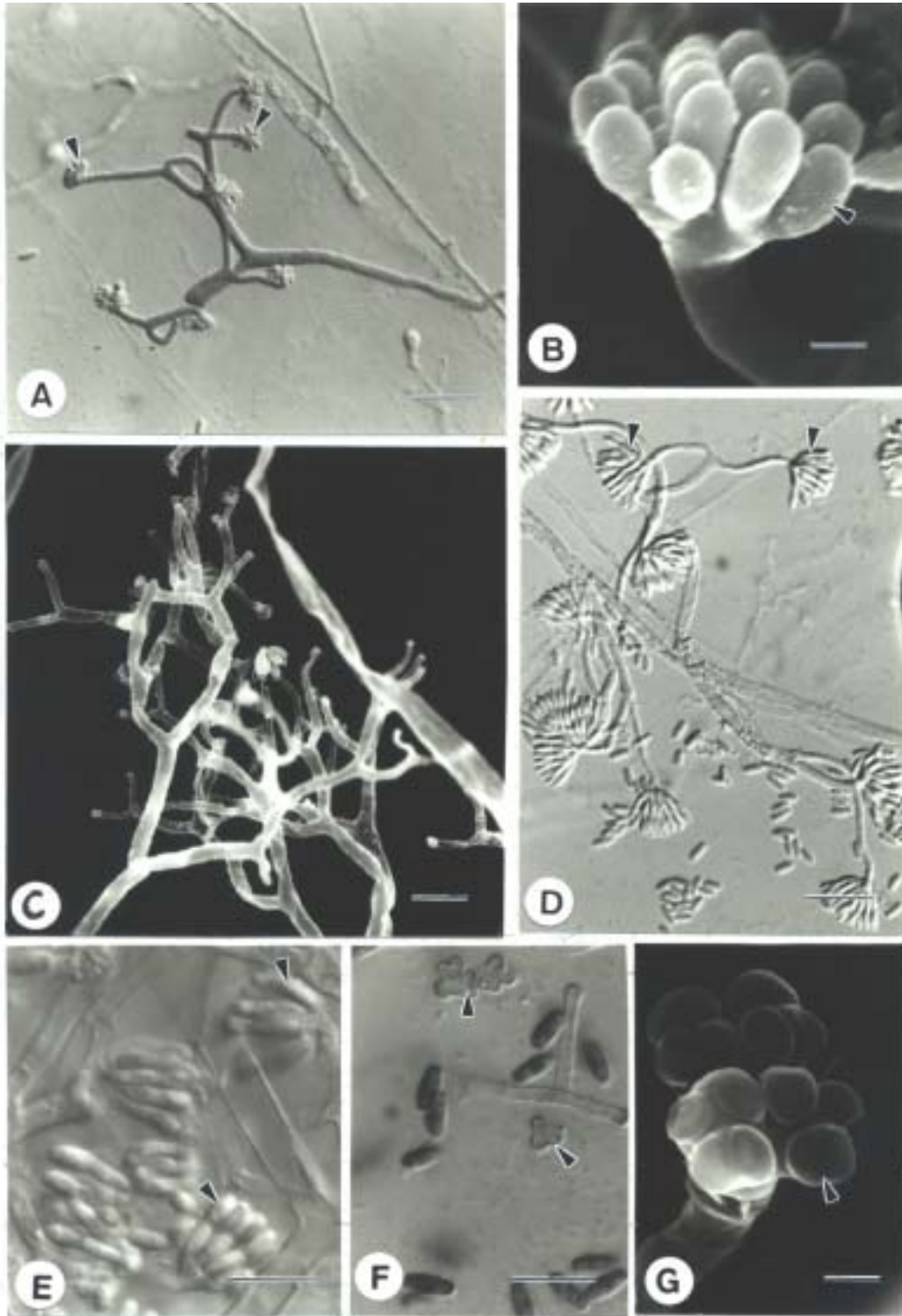


Fig. 1. *Piptocephalis curvata*, A, C, E, F, LM; B, D, G, SEM. A: Young sporophore showing developing merosporangia (arrow heads) on tip, bar = 20  $\mu\text{m}$ . B: Ultimate branch with young merosporangia (arrow head) on head cell, bar = 1  $\mu\text{m}$ . C: Terminal portion of sporophores after most of the head cells detached, bar = 10  $\mu\text{m}$ . D: Ultimate curvature sporophore with merosporangia (arrow heads) on head cells, bar = 20  $\mu\text{m}$ . E: Nearly mature merosporangia (arrow heads) on head cells, bar = 10  $\mu\text{m}$ . F: Detached head cells (arrow heads) and spores, bar = 10  $\mu\text{m}$ . G: Projections (arrow head) on head cell, bar = 1.0  $\mu\text{m}$ .

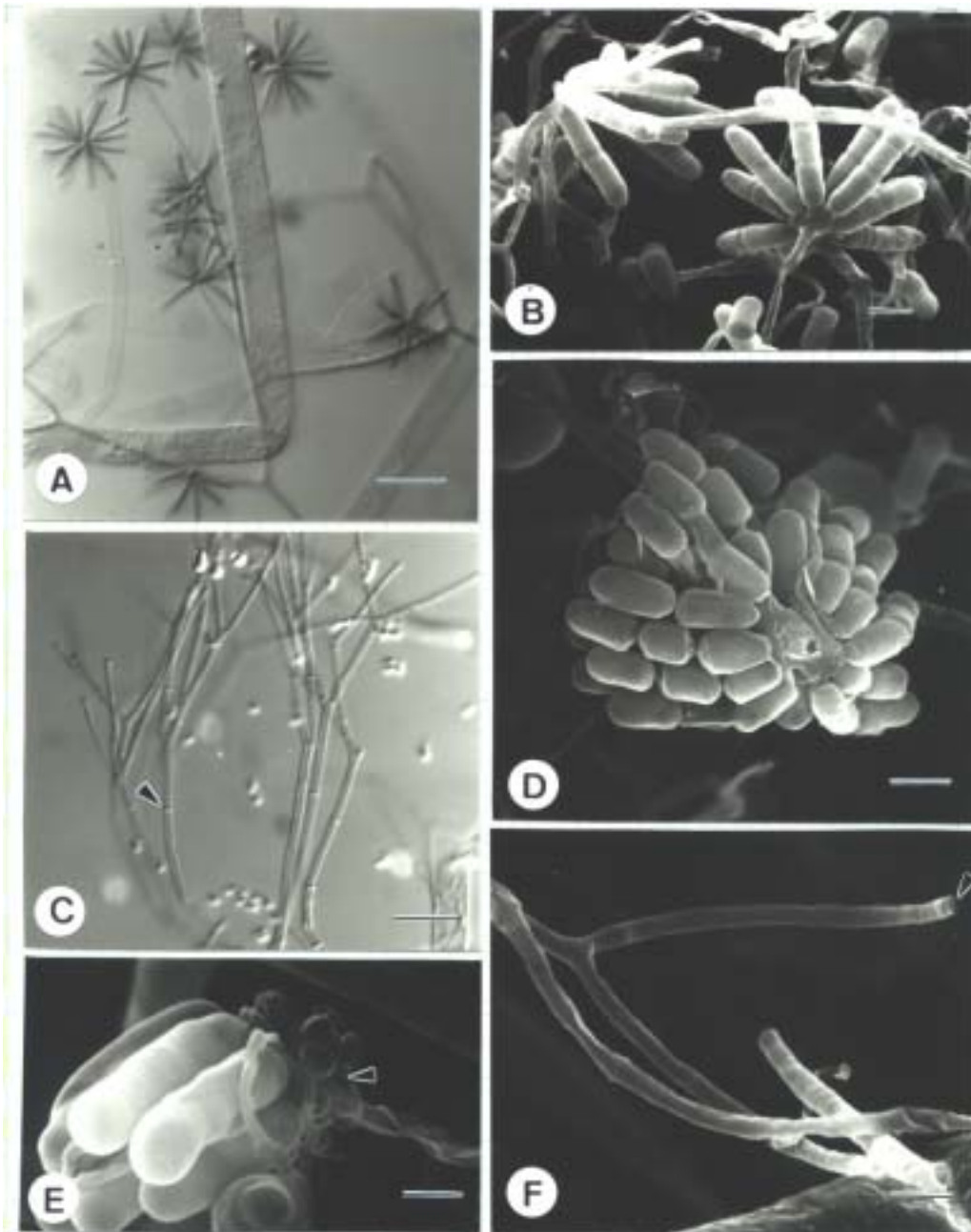


Fig. 2. *Piptocephalis fimbriata*, A, C, LM (DIC); B, D-F, SEM. A: Upper portion of a sporophore showing the branching pattern and the merosporangia on tips, bar = 20  $\mu$ m. B: Nearly mature merosporangia on the tip of sporophore, bar = 2.5  $\mu$ m. C: Portion of aged sporophores with septa (arrow head) formed, bar = 20  $\mu$ m. D: Ellipsoidal, cylindrical merosporangiospores, bar = 2  $\mu$ m. E: Young merosporangia born on a head cell (arrow head), bar = 3.0  $\mu$ m. F: Terminal portion of ultimate branch showing fringe on tip (Arrow head), bar = 2.5  $\mu$ m.

Notes: This fungus bears the distinguished characteristics of *P. fimbriata* in having fertile, dichotomously branching sporophores; head cells smaller than 7  $\mu$ m in diam. which are lysing at maturity, leaving small fringe at the tip of sporophores, and the ultimate branches usually longer than the penultimate branches (Kirk, 1978; Grafenhan, 1998). However, the long main sporophores of this isolate which is up to 1.5 cm is reported for the first time in this paper.

Host: *Mucor* sp.

Specimen examined: *Sts0101*, from soil, Dahuishan, Taichung County.

Distribution: Japan; Taiwan; UK; USA.

### ACKNOWLEDGEMENTS

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## 台灣管狀孢子囊接合菌之研究 (IV)：兩種頭珠黴屬新紀錄種

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### 摘 要

本文報告兩種具管狀孢子囊的頭珠黴屬接合菌 *Piptocephalis curvata* 及 *P. fimbriata*，兩者均為台灣的新紀錄種，文中並提供描述、照相與對形態變異之簡短討論。

關鍵詞：管狀孢子囊真菌、頭珠黴屬、台灣、接合菌綱。

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