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Two Pezizales from Taiwan

Mei-Lee Wu[1]

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ABSTRACT: Two discomycetes with operculate asci and growing from soil and Junipers, respectively, are reported in this study. The causal agent of Juniper's twig wilting disease was reported without fungal description by Sawada as *Pitya cupressi*. Its scientific name was further cited in "List of The Fungi in Taiwan" . This pathogen was rediscovered from Yangmingshan National Park and the campus of Taipei Municipal Teachers' College. The correct scientific name for this fungus cited in "List of the Fungi in Taiwan" should be corrected from *Pitya cupressi* to *Pithya cupressi*. Besides the rediscovery of *Pithya cupressi*, *Cheilymenia theleboloides* was reported for the first time from Chang-Hwa County, Taiwan. In this study the macroscopic and microscopic morphologies of both Pezizales from Taiwan will be described in detail.

KEY WORDS: ***Cheilymenia theleboloides*, Pezizales, *Pitya cupressi*, *Pithya cupressi*, Discomycetes, Junipers, Operculate asci.**

INTRODUCTION

In 1931, Sadawa had reported that the causal agent of Juniper's twig wilting disease was *Pitya cupressi* (an ascomycetes) but provided no description of this fungus. The above pathogen was rediscovered recently and collected from Yangmingshan National Park (YNP) and the campus of Taipei Municipal Teachers' College (TMTC). During identification, it was found that the correct scientific name for this weak Juniper parasite reported by Sawada should be *Pithya cupressi* instead of *Pitya cupressi*. The correct scientific name of this fungus was cited in " List of Plant Diseases in Taiwan" (Tsai, 1991). The pathogen had been briefly described in Chinese without microscopic illustrations in "Common Tree Diseases in Taiwan" (Chang, *et al.*, 1999). However, the wrong scientific name published by Sawada for the above pathogen was recently cited in the book of "List of the Fungi in Taiwan" (Wang, *et al.* 1999).

Besides the above discomycetes, a fungus with a yellow disc was discovered from spent soil of a flowerpot, in which had been previously cultivated with deciduous woody plants and spoilt soybean milk had been dumped. Through detailed examination, this fungus is *Cheilymenia theleboloides*, which is one kind of Pezizales and belongs to Humariaceae.

The detailed macroscopic and microscopic morphologies, habitat, and distribution of *Pithya cupressi* will be described. Furthermore, *C. theleboloides*, which is newly reported from Taiwan, will also be described in detail.

1. Department of Science Education, Taipei Municipal Teachers' College No. 1, Ai-Kuo West Rd., Taipei, Taiwan, R. O. C.

MATERIALS AND METHODS

This study was conducted from February 1998 to May 2000. The twigs, stems or leaves of the conifers were examined for mycofloral studies in the campus of TMTC and near the Jin-Ching Center of YNP. The spent soil with yellow discomycetes was collected from a downtown house of Chang-Hwa County. The habitats of the fruiting bodies of discomycetes were photographed and the morphologies of samples were examined, while still fresh, within 2-3 days of collections. Taxonomic observations were made both on fresh and dried materials.

For microscopic examination of the ascomycetes, thin sections, 8-10 μm in thickness, of hymenium was made with a Yamato Kohki "Electro Freeze" Model MC-802A microtome. Then the sections were mounted in distilled water and stained with lactic acid with cotton blue (Moravec, 1990), Mealzer's reagent or Phloxine B (Wu, 1995). All the above sections were then examined by a BX-50 Olympus microscope with Normaski. Identification was based on Dennis (1981), Moravec (1990), Denison (1964), Teng (1996), Tai (1979) and Seaver (1928).

RESULTS

Pithya cupressi was found on Junipers either in Yangmingshan National Park or in the campus of Taipei Municipal Teachers' College. Also the fungus from soil of the flowerpot was identified as *Cheilymenia theleboloides*. The characteristics and habitats of these two operculate discomycete will be described as follows.

Pithya cupressi (Batsch.) Rehm. in Rab. Krypt. Fl. 1: 926, 1896. Figs. 1 and 4-7

Pithya thujina Peck. In Saccardo, P. A. Syll. Fung. 8: 210. 1889.
Pitya cupressi (Batsch.) Rehm. In Sawada, Descriptive Cat. Taiwan Fungi. Part V. 51: 31, 1931.

Apothecia (Fig. 1) up to 1.2 mm in diameter, sessile, gregarious on the foliage of Junipers, subglobose when young then expanded to disc. Hymenium (Figs. 1 and 4) plane or slightly concave, smooth, deep-orange, darker than the receptacle of the apothecium. Ectal excipulum (Fig. 6) subhyaline, composed of elongated prismatic cells with slender apex in the outermost layer. Asci (Fig. 5) hyaline, operculate, cylindrical above, becoming slender at the lower portion and forming a stalk-like base, (163-) 183-208 (-230) × 10-13.8 (-15) μm, 8 ascospores located in the upper half portion of the ascus. Ascospores (Fig. 7) uniseriate, global, hyaline, containing a large oil-drop, non-septate, (10-) 11.3-12.5 × (10.3) 11.3-12.5 μm in diameter. Paraphyses (Fig. 4) filiform, (2.5-) 3.75-5 μm in diameter at the widest part, blunt at the top, septate, branched at the base, exceeding the asci by up to (5-) 7.5-17.5 (-27.5) μm.

Habitat: Gregarious on the foliage of *Juniperus chinensis* L. cv. *Kaizuka* Hort. ex Endl.

Specimen examined: Taipei, in the campus of TMTC near the Science Building, 01-V-1999, MLWu 990501G1; 25-V-1999, MLWu 990525G1; 27-V-1999, MLWu 990527G1; and 02-V-2000, MLWu 000502 G1, and in the front of the Department of Reservation office in Jin-Ching Center of Yangmingshan National Park, 21-VII-1999, MLWu 990721G1.

Distribution: Europe, North America, Bermuda Islands, Mainland China, Japan and Taiwan.

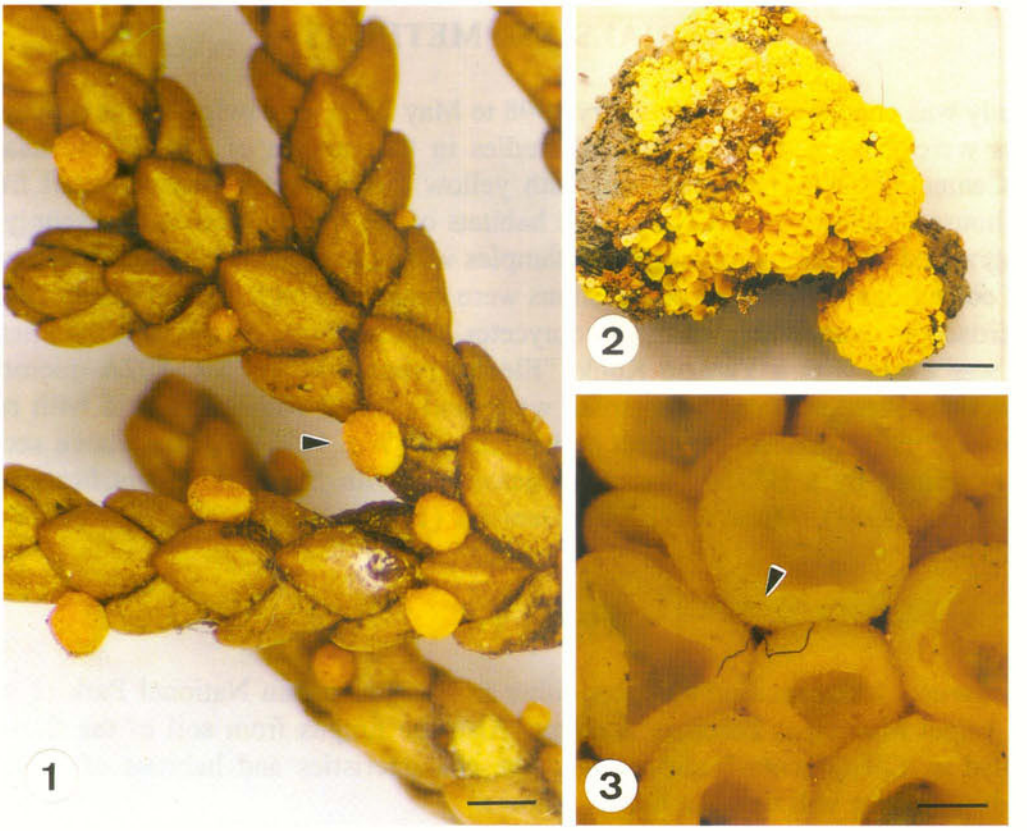


Fig. 1-3. 1: Apothecia (arrowhead) of *Pithya cupressi* on leaves of *Juniperus chinensis*. Bar=1.2 mm. 2: Apothecia of *Cheilymenia theleboloides* on soil of a flowerpot. Bar=13 mm. 3: Apothecia of *C. theleboloides* with brown hairs (arrowhead). Bar=1.7 mm.

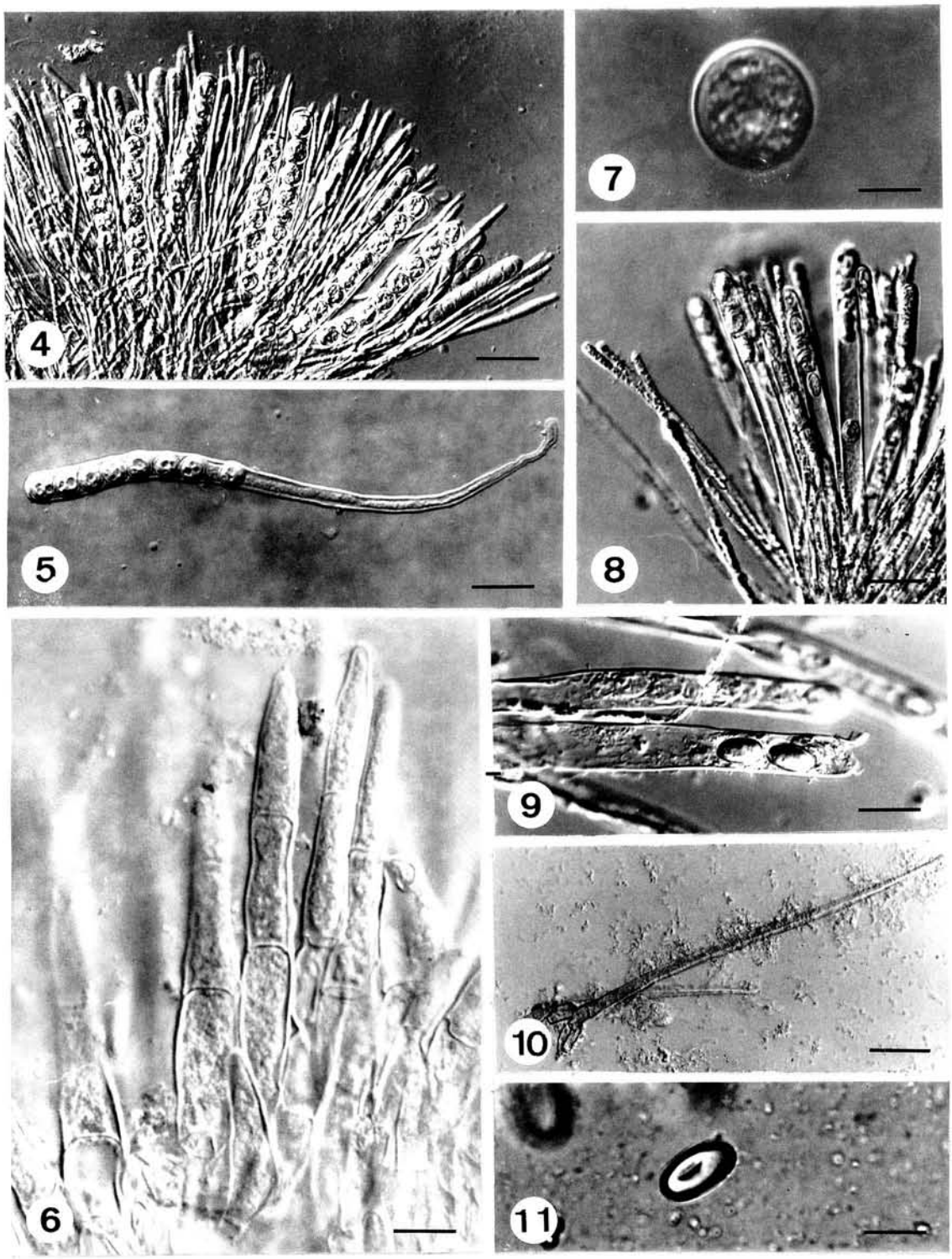
Cheilymenia theleboloides (Albertini & Schweinitz ex Fries) Boudier, Hist. Class. discom. d'Eur. 62, 1907. Figs. 2, 3 and 8-12

Apothecia (Figs. 2, 3 and 12A) 3.5-5.5 mm in diameter, saucer-shaped, gregarious on waste soil, concave when young then expanded to disc. Hymenium (Figs. 2 and 12D) sulfur-yellow, outer surface concolorous, clothed with short, scattered, hyaline to yellowish-brown hairs (Fig. 3) on the magin. Hairs (Figs. 10 and 12B) 1-3 septa, forked from the base, tapering to a blunt or subacuminate tip, (204-) 250-286 (-418)× (7.7-) 15.3-20.4 (-25.5) μm; smooth and thin-walled, (1.5-) 2.0 (-2.5) μm thick. Ectal excipulum (Fig. 12C) one layered and composed of globular to angular cells. Asci (Figs. 8, 9 and 12E) cylindrical with typical terminal operculum, (175-) 200-205 (-225) × (11.3-) 12.5 (-15) μm, not bluing in Mealzer's reagent. Ascospores (Figs. 11 and 12F) 8, elliptical, hyaline, uniseriate located in the top area of asci, (15-) 16.3-17.5 (-20.0) × (7.5-) 10 (-12.5) μm, smooth, without oil-drops, wall of ascospores showing inconspicuous striation by staining with cotton blue in lactic acid. Paraphyses (Figs. 8 and 12E) filiform, slightly enlarged at the tip, with yellowish pigments in its cytoplasm.

Habitat: Gregarious on the spent soil of a flowerpot dumped with spoilt soybean milk.

Specimen examined: Chang-Hua County, in a flowerpot of downtown house, 15-II-1998, Wu980215S_1, collected by Miss Yu-Jen Chiu.

Distribution: England, Germany, North America, South America, Mainland China, Japan and Taiwan.



Figs. 4-7. *Pithya cupressi.* Figs. 8-11. *Cheilymenia theleboloides*. Photographs of 4-9 from Normaski. 4: Hymeniun with asci, mature ascospores and paraphyses. Bar=25 μm. 5: Cylindrical ascus with 8 ascospores. Note the slender base. Bar=5.9 μm. 6: Elongated prismatic cells on outer surface of ectal excipulum. Bar=30 μm. 7: An ascospore with oil-drops. Bar=5.5 μm. 8: Hymeniun with asci, mature ascospores and paraphyses. Bar=37 μm. 9: Asci with ascospores and typical operculum. Bar=21 μm. 10: A subacuminate hair with bifurcate base. Bar=59 μm. 11: A mature ascospore with depression in center. Bar=14 μm.

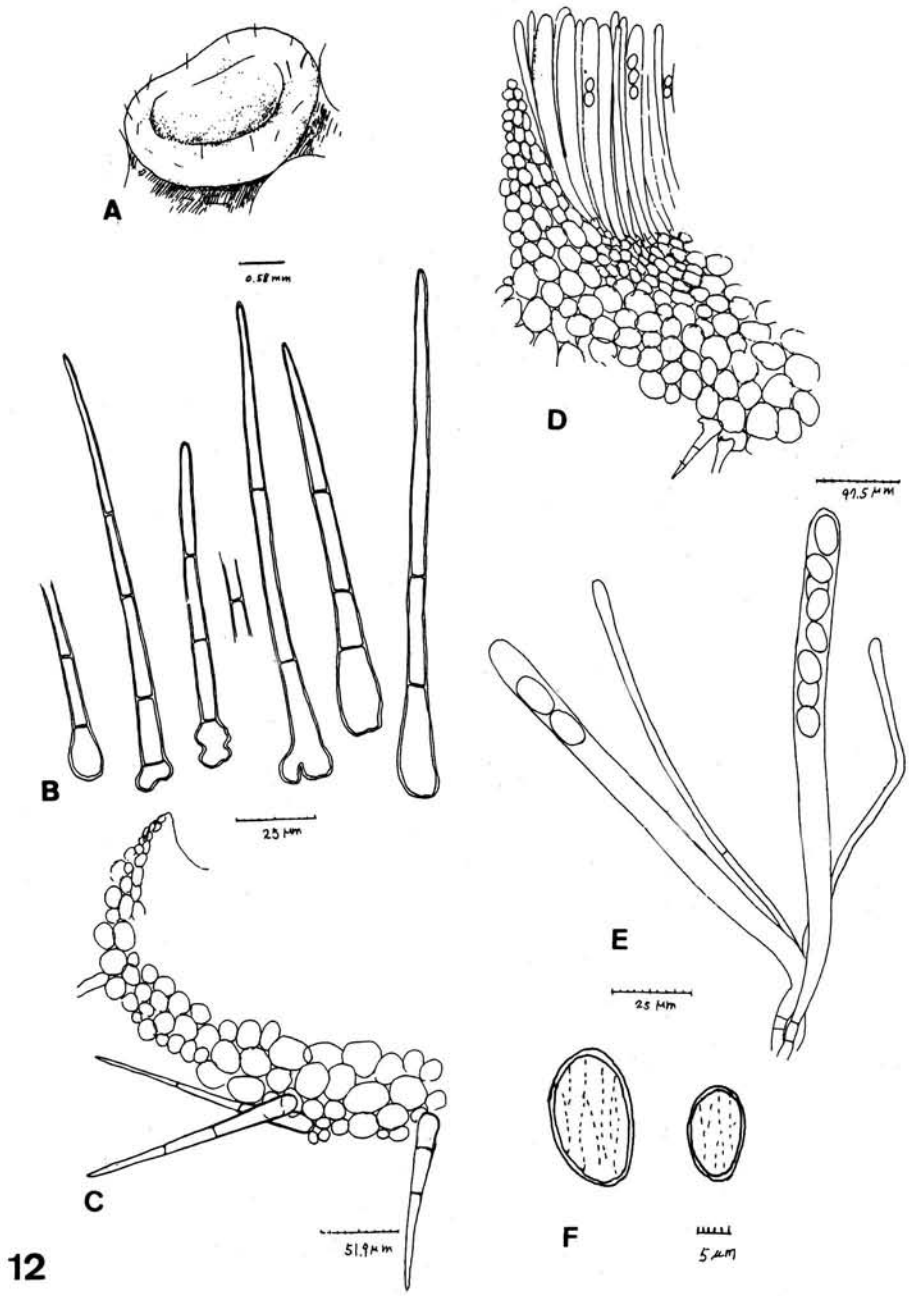


Fig. 12. *Cheilymenia theleboloides*. A: Apothecium. B: Hyphoid to subacuminate hairs with simple bulbous to bifurcate base. C: Ectal excipulum with superficial hairs. D: Section of the marginal part of an apothecium. E: Asci with ascospores and paraphyses. F: Ascospores stained with cotton blue under oil immersion.

DISCUSSIONS

Sawada (1931) had reported that the Juniper's twig wilting disease was caused by an ascomycetes—*Pitya cupressi*, but he didn't describe any of the pathogen's characteristics. He cited "Rehm, H.—Rabh. Krptog. Hora von Deutschl., Oesterr. und der Schw. II. Autl. Bd. I.

Abt. III. p. 926, 1896" and also cited "Seaver, F. J.—The North Amer. Cup. Fungi. (Operculate). p. 78. Pl. 4. Fig. 1., 1928." under the scientific name of *Pitya cupressi* for its references (Sawada, 1931). However, the original name published by Rehm and Seaver (1928) was *Pithya cupressi* instead of *Pitya cupressi*. Furthermore, there has been no documentation of the genus of *Pitya* in the world as verified by the Ainsworth & Bisby's Dictionary of the Fungi (Hawkwsworth *et al.* 1990). It was obviously a printing error in Sawada's publication. The correct scientific name of this common pathogen in Taiwan was revised in " List of Plant Disease in Taiwan" (Tsai, 1991). However, the wrong scientific name published by Sawada was recently cited in "List of the Fungi in Taiwan" (Wang, *et al.*, 1999). Therefore the scientific name for this pathogen cited in "List of the Fungi in Taiwan" should be corrected to *Pithya cupressi*.

Pithya cupressi has been reported from fallen twigs or recently killed foliage of various species of *Juniperus*, *Cupressus*, *Thuja* and *Sequoia* in Mainland China, Japan, North America, Europe and Taiwan. A brief Chinese description of this fungus was reported in " Common Tree Diseases in Taiwan" by H.-J. Hsieh without any detailed microscopic illustrations (Chang, *et al.*, 1999). Therefore the detailed characteristics of the fungus recently collected from Taiwan is the first of its kind. The symptom described by Hsieh in Chinese was "dead twigs of Junipers forming pink globose spots, 1 mm in diameter, which was perithecium of the pathogen" (Chang, *et al.*, 1999). However, the fungus collected from YNP and TMTC only formed orange spots which was apothecia of this pathogen. So, there was also a printing error in Hseih's description and should be corrected.

Two species of genus *Cheilymenia* from animal dung had been reported from Taiwan (Wang, 1993 and 1994). However, *C. theleboloides* from Taiwan is first reported and described for the first time in this study. The habitat of *C. theleboloides* reported from Taiwan is different to the fungus reported from England. This fungus from Taiwan grew on soil dumped with spoilt soybean milk, while that of England grew either on leaf mold or on lime waste (Dennis, 1981). This fungus is also reported to have grown from the soil of flowerpots from Mainland China (Tai, 1979). The growing substrate of the Taiwan sample is also typical. as *Cheilymenia theleboloides* usually grows on waste spent debris such as husks in deer feeder, hops, vine grapes but also on dung (also human) etc. (personal communication with Dr. Moravec). It's not common in Taiwan but rather common in Europe.

The Taiwan sample of *C. theleboloides* is different from that of the England sample in several aspects, such as possessing concave discs instead of flat discs, outer surface of apothecium concolorous with the hymenium but not paler than the hymenium, and hairs tapered to blunt or subacuminate instead of pointed apex. However, the shape of apothecia, the characteristics of the sparse hairs in Taiwan sample are also typical characteristics for *C. theleboloides*. Furthermore, the size of apothecium, asci, spores, and the color and length of hairs of the sample confirm with *C. theleboloides*.

A new generic and infrageneric classification of the genus *Cheilymenia* Boud. emend. nov. was proposed into 9 sections and several series by Moravec (1990). *Cheilymenia thelelobiodes* was included in the *Striatisporae* sect. and also in ser. *Striatisporae*, which possessed cyanophilic longitudinal striation. The striation can be seen by staining the spore with cotton blue in lactic acid in the manner devised by Le Gal (1974). The spore of the Taiwan sample showed striation, although it was not conspicuous when stained with methylene blue in lactic acid.

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台灣兩種盤菌目真菌

吳美麗[1]

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摘　　要

本文發表兩種盤菌，其子囊均具有囊蓋而分別生長在土裡和龍柏樹上。日人澤田兼吉(Sawada)曾報導龍柏枝枯病菌的病原為柏小豔盤菌，並以 *Pitya cupress* 印出其學名，此學名被引用在"台灣真菌名錄"一書，但其引用名稱應訂正為 *Pithya cupressi*。本菌特徵雖曾在"台灣常見樹木病害"中以中文被簡要介紹，卻無人曾對本地所發現的該病原菌作詳細的特性描述並呈現其微觀特徵之圖片，上述病原菌在陽明山及台北市立師範學院的校園內再度被發現，該菌的微觀特徵與圖片，首次於本文中被詳細介紹。除此種真菌外，本文並發表台灣新紀錄有蓋盤菌菌種黃緣刺盤菌(*Cheilymenia theleboloides*)，其巨觀與微觀特徵亦於本文中被詳細描述。

關鍵詞：黃緣刺盤菌、盤菌目、柏小豔盤菌、盤菌、柏樹、有蓋子囊、。

1.台北市立師範學院自然科學教育學系，100 台北市愛國西路 1 號，台灣，中華民國。