

# MUSHROOM FLORA OF LAN-YU ISLAND (1)

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**Abstract:** The following ten species of mushroom collected from Lan-Yu island are reported in this paper: *Anellaria sepulchralis* (Berk.) Sing., *Chlorophyllum molybdites* (Meyer: Fr.) Mass., *Copelandia cyanescens* (Berk. & Br.) Sing., *Gymnopilus aeruginosus* (Peck.) Sing., *Lepiota helveola* Bres., *Panaeolus campanulatus* (Fr.) Quél., *P. castaneifolius* (Murr.) Ota'h, *P. fimicola* Fr., *P. sphinctrinus* (Fr.) Quél., *Rhodophyllum aeruginosus* (Hiroe) Hongo. Among them nine species are new to Taiwan, except *C. molybdites*.

## INTRODUCTION

Lan-Yu island (Botel Tobago), a 45.7 square miles small tropical island, is located at pacific ocean, about 62 miles far from the coast of the south eastern part of Taiwan. The flora of this island is unique from the rest of Formosan island owing to its tropical climate. Consequently, fungal flora in this island is quite rich and attractive from the academic point of view. As for its mushroom flora, only Tu, C.C. *et al.*,<sup>(6)</sup> collected and reported nine species in 1977. However more extensive survey is needed. With this motivation, we began to survey the mushroom flora of this island from 1981, the first part of the result is presented here. All the specimens reported are deposited at the mycological herbarium, Dept. of Botany, National Taiwan University, R.O.C.. The color nomenclature we described the specimens is according to Kornerup & Wanscher<sup>(2)</sup>.

### 1. *Anellaria sepulchralis* (Berk.) Singer, Lloydia 22: 475, 1949, Fig. 1.

Pileus 4-7 cm in diam., semiglobose to convex, surface hygrophaneous of slightly viscid, rugous, radiately fibrillose, brownish tinged white, always more ochraceous hue on the disc, unchanging when touched. Margin serrate, context 2-3 cm thick, white flesh, unchanging when cut or bruised. Gill subfree to stipe, serrate, white to pale when young, turning fuscous when mature, then becoming purplish black when old. Stipe 12-20 cm long, 0.8-1.5 cm thick with fibrous texture, hollow, equal or slightly taper upward and always bulbous at the base, surface white, hygrophaneous and smooth, covered with white and minute hairs over, without trace of veil, unchanging when bruised; base with white mycelium. spore print carbonaceous black; spore 13-21×8.5-13 μm, ellipsoid, lemonshaped, opaque, smooth with complicated wall and a broad apical germination pore, appearing deep purplish fuscous to black under microscope, no color change in H<sub>2</sub>SO<sub>4</sub> soln., pleurocystidia 40-50×16-24 μm, very voluminous, with brownish refringent inclosure; cheilocystidia absent.

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Habitat: Solitary, gregarious on cow dung.

Specimens examined: Taitung, Lan-Yu island, LI-017, LI-018, Sep. 7-9, 1981.

Notes: *Anellaria sepulchralis* is a large tropical mushroom. Owing to the absent of cheilocystidia, Singer<sup>(4)</sup> transferred it to the genus *Anellaria* from genus *Panaeolus*.

2. ***Chlorophyllum molybdites*** (Meyer: Fr.) Mass. Flore Iconographique. 1936.

*Lepiota molybdites* (Meyer: Fr.) Sacc. Des Champignons du Congo Fasc. 16: 323, 1967.

Pileus 7-25 cm in dia., ovoid to subglobose when young, becoming convex to umbonate or nearly plane in age, surface dry and whitish, covered with numerous cinnamon scales more brownish hue on the disc center. Flesh white to yellowish, firm smelling fragrant. Margin regular and decorated with debris, Gills free, close and broad, snow white becoming greenish in age. Stipe 10-22 cm long, 1-2 cm thick, fibrillous and hollow, surface glabrous with superior ring, color white when young, becoming brownish at maturity. Spore print greenish; spore  $8-12.5 \times 6.5 \mu\text{m}$ , ellipsoid, thick walled, smooth, with small pore at apex.

Habitat: Scattered, gregarious on lawn, grassland and farm straw compost.

Specimens examined: Lan-Yu island. LI-181. Aug. 15-20, 1985.

3. ***Copelandia cyanescens*** (Berk. & Br.) Singer, Lloydia 22: 473, 1949. Fig. 5, & plates 3 & 5

*Agaricus cyanescens* Berk. & Br., Journ. Linn. Soc. 11: 557, 1871.

Pileus 2-5 cm in diam. conic convex, plano-convex, subumbonate, surface smooth and white to pallid when young, but ochraceous yellow at disc, becoming ochraceous yellow at disc, becoming ochraceous and olivaceous in age, turning blue when bruised. Margin thin, fissure, context white, thin, fragile, turning blue when cut. Gill subfree to stipe, white when young, turning purplish to grey black in age and bruised. Stipe 10-20 cm long, 0.3-0.6 cm thick, hygrophaneous, covered with white fine hairs, fibrous texture, hollow surface white to pallid when young, becoming ochraceous to brownish when mature, slowly turning blue when touches; base with white mycelium. Spore print gray black; spore  $13-15 \times 8-11.5 \mu\text{m}$ , lemon-shaped, ellipsoid, smooth, complex wall, truncate type, with a large germination pore, brown to black under microscope. Cystidia metuloid type,  $45-62 \times 11-20 \mu\text{m}$ , thick wall and golden brown.

Habitat: Gregarious, caespitous on cow dung.

Specimens examined: Taitung, Lan-Yu island, LI-009, LI-001, LI-013, Sep. 7-9, 1981.

Notes: *Copelandia cyanescens* can be easily distinguished by metuloid type cystidia under microscope. The old fruiting body turned blue at field and all cultures isolated successfully on PDA media tinged blue<sup>(7)</sup>. It is a hallucinogenic mushroom according to Singer's view point.<sup>(4)</sup>

4. ***Gymnopilus aeruginosus*** (Peck) Singer, Agaricales, 560, 1949. Fig. 2.

*Phloiota aeruginosa* Peck, Ann. Rep. N. Y. State Mus. 43: 8, 1890.

Pileus 3-6 cm in diam., plano-convex to plane, surface color rusty, orange brown, with small, violet reddish to yellowish red scales. Margin sometimes with fine remains. Gill adnate, almost concolorous with cap surface. Stipe 3-6 cm long, 3-8



cm thick, always flexuous, with fibrous texture, nearly equal, hollow, surface slightly violet, pink, yellowish brown, with membranous annulus at middle to upper region. Spore print rusty, light brown, spore  $7-9 \times 5-6 \mu\text{m}$ , ovoid, warty.

Habitat: Lignicolous on rotten woods, gregarious or caespitous.

Specimens examined: Taitung, Lan-Yu island, LI-027, Sep. 7-9, 1981.

5. *Lepiota helveola* Bres. senus Josserand, Fungi Trid. 1: 15, 1882. Fig. 3, & plate 1.

Pileus 3-7 cm in diam., umbonate, cap covered with brownish patch-like scales, ground tissue whitish and glabrous. Margin thin, striate of fissure. Context about 0.5 cm thick, soft, turning rosy iridescence when bruises, then become reddish ocher. Gill white, free, alternating with short lamella. Stipe 6-8 cm long, about 0.5 cm thick, almost equal, white glabrous of fibrillose, hollow, context concolorous upper region. Spore print creamy. Spore  $8-11 \times 6-8 \mu\text{m}$ , ovoid, smooth, nodulose, hyaline under microscope. Taste sweet.

Habitat: Gregarious on lawn

Specimens examined: Taitung, Lan-Yu island, LI-021, Sep. 7-9, 1981.

6. *Panaeolus campanulatus* (Fr.) Quél., Icones Selec. Fung., 1930. Fig. 6, & plate 2.

*Agaricus campanulatus* L. AP. plant., Ed. I, P. 1175, 1753.

Pileus 2-4.5 cm in diam., obtuse conic when young, becoming campanulate or hemispherical to convex in age, often with an obtuse umbo at the center. Greyish cinnamon buff to brownish, more tawny at the disc. Surface smooth when young, glabrous in age. Margin thinner, serrate and with whitish remnants of the partial veil. Gills adnexed, greyish at fist, becoming mottled dark greyish in age. Stipe 5-15 cm long, 1.5-4 mm thick, brownish under a greyish pruinose surface, equal and tubular. Spores  $14-17 \times 8-10 \mu\text{m}$ , smooth, ovoid of lemon shape, with apical germination pore. Spore print greyish black.

Habitat: Growing scattered to gregariously on cow dung or compost in the late spring to fall at southern Taiwan.

Specimens examined: Taitung Hsien, Lan-Yu island, LI-042, LI-043.

Note: *P. campanulatus* and *P. sphinctrinus* are two very closely related species. Both have quite similar appearance in age. The spores of *P. sphinctrinus* posses punctate surface unders EM.

7. *Panaeolus castaneifolius* (Murr.) Ola'h, Le Genre Panaeolus p. 249. 2960. Fig. 9, & plate 4.

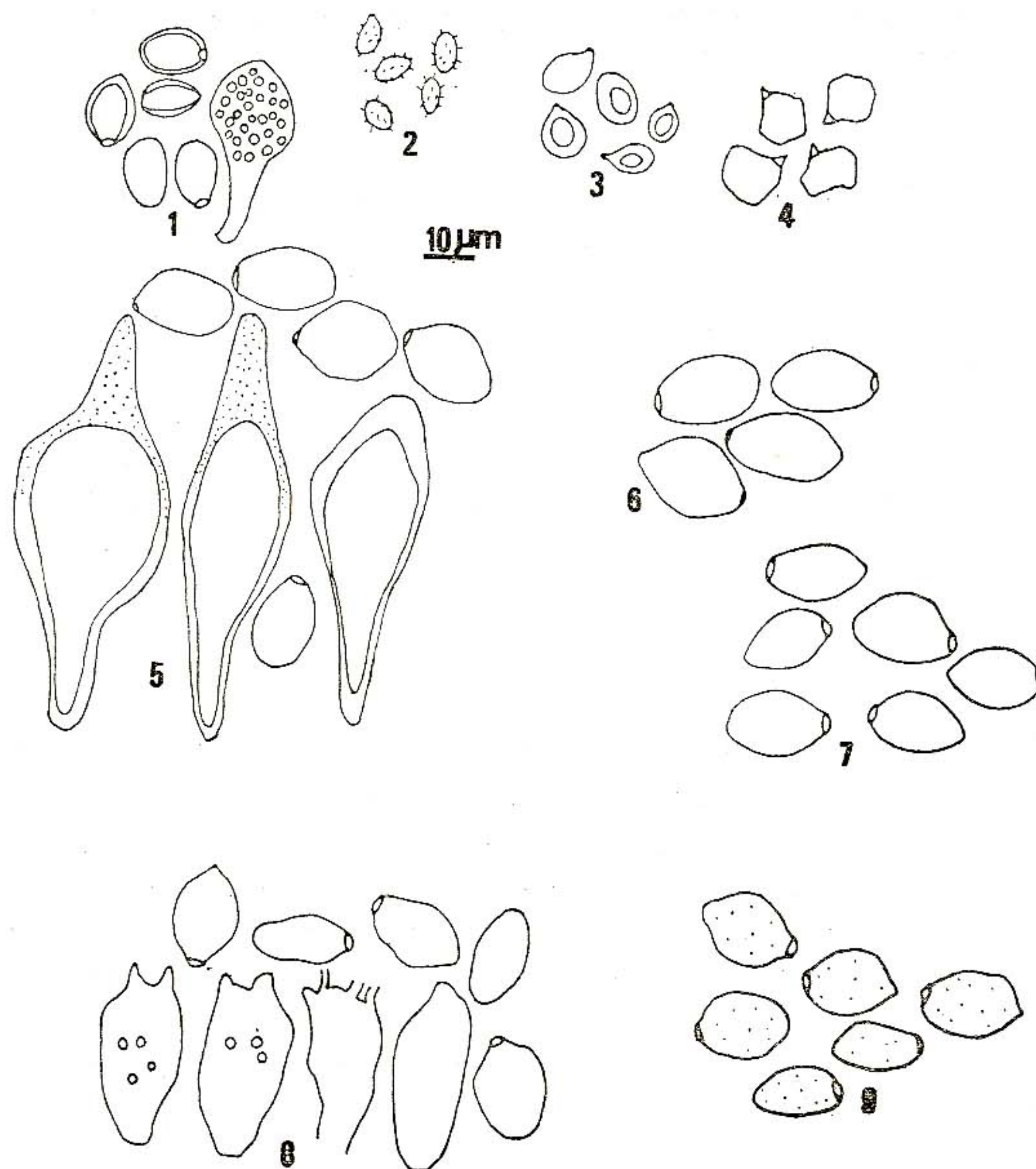
*Psilocybe castaneifolia* Murr. Mycologia 15: 27, 1923.

Pileus 1-3 cm in diam. subhemispheric when young, then becoming convex to broadly convex in age. Surface smooth to slightly silky, color smoky grey becoming straw-yellow of pale ochraceous when drying, always with a more reddish brown at the apex and more smoky brownish along the margin. Margin thinner and pallid, striate and wrinkle. Gills adnate to adnexed, thin, pallid when young, becoming gray-black to dark purplish mottles in age. Stipe 4-8 cm long, 0.3-0.6 cm thick, equal and hollow, surface glabrous, greyish, ochraceous to brownish. Spores  $12-14.5 \times 7-10 \mu\text{m}$ , finely roughened, with apical germination pore. Spore print grey black.

Habitat: Scattered to gregarious on cow dung and straw compost.

Specimens examined: P-002, P-003, 1983.





- Fig. 1. *Anellaria sepuchralis* (Berk.) Singer  
 Fig. 2. *Gymnopilus aeruginosus* (Peck) Singer  
 Fig. 3. *Lepiota helveola* Bres. sensus Josserand  
 Fig. 4. *Rhodophyllum aeruginosus* (Hiroe) Hongo  
 Fig. 5. *Copelandia cyanescens* (Berk. & Br.) Singer  
 Fig. 6. *Panaeolus campanulatus* (Fr.) Quél.  
 Fig. 7. *Panaeolus fimicola* Fr.  
 Fig. 8. *Panaeolus sphinctrinus* (Fr.) Quél.  
 Fig. 9. *Panaeolus castaneifolius* (Murr.) Ota'h

8. *Panaeolus fimicola* Fr. Epicris. Syst. Myc. P. 237, 1838. Fig. 7, & plate 6.

Pileus 1.5-3 cm in diam., conic-campanulate, convex, surface smooth, ochraceous to gray when young, dingy gray to light greyish black in age, often with reddish hues at disc; becoming paler when dry, but always leaving a brownish encircling zone along the margin. Margin thinner and paler than other portion, rounded when young, striate in age, not appendiculate. Flesh slightly thick, fragile and pale. Gills adnate to adnexed, grayish and mottled. Spore 6-12 cm long, 2 mm thick, surface striate and slightly hairy, fairly fragile and soft, dingy pale to brownish, equal and hollow. Spore print greyblack. Spores  $9.5-13 \times 7.5-9 \mu\text{m}$ , lemon shape with germination pore.



Habitat: Scattered and gregarious on cow dung or straw compost. Growing from the late spring to early fall at Lan-Yu island of southernmost Taiwan.

Specimens examined: Taitung, Lan-Yu island. P-004, P-007.

Notes: The organism, containing psilocybin, is recognized hallucinogenic. The reddish hue at the disc is its prominent characteristic which distinguish it from *P. castaneifolius*.

9. **Panaeolus sphinctrinus** (Fr.) Quél., Champ. Jura et Vosges, I: P. 151, 1872. Fig. 8.

*Agaricus sphinctrinus* Fr., Epicr. 235, 1936.

Pileus 2-4 cm in diam, conic, convex, rarely campanulate, smooth, glabrous, hygrophanous, color pallid, slightly ochraceous, brown, gray. Margin thin, with delicate veil remains, flesh thin, not blue, gill subfree to stipe, grey, becoming black in age. Stipe 10-20×0.3-0.6 cm, almost equal, tubular, fibrous, reddish brown to tan color, not blue when touched, cover with delicate white hairs, base with white mycelium or not. Spore print black; spore 11.5~15×8-15 μm, smooth, lemon-shaped or ovoid, with an apical germination pore and complex wall, brown to dark brown under microscope. Metuloid cystidia absent.

Habitat: Solitary or gregarious on cow dung at irrigated lawn.

Specimens examined: Taitung, Lan-Yu island, LI-015, LI-17, Sep. 7-9, 1981.

Notes: Ola'h<sup>(3)</sup> and Guzman *et al.*<sup>(1)</sup> thought that is a latent hallucinogenic mushroom. It always grows together with *Copelandia cyanescens* on dung in Lan-Yu island. It can be distinguished easily from *C. cyanescens* by presence of marginal veil remains.

10. **Rhodophyllum aeruginosus** (Hiroe) Hongo, Jap. Bot., 29: 92, 1954. Fig. 4, & plate 7.

Pileus 2-3 cm in diam, conic when young, becoming umbonate or scarcely campanulate, surface dry, fibrillose, color blue, turning ochraceous when touched. Flesh thin, pink. Gill subfree to stipe, distant. Stipe 3-6 cm×3-4 mm, hollow, texture fibrillose, surface angular, about 10 μm in diam.

Habitat: Solitary, Scattered on forest humus.

Specimens examined: Lan-Yu island, LI-182. Aug. 15-20, 1985.

### ACKNOWLEDGEMENT

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### LITERATURE CITED

- GUZMAN, G., J.L. OTT and S.H. POLLOCK, 1976. Psychotropic Mycoflora of Washington, Idaho, Oregon, California and Columbia. *Mycologia* 68: 1267-1272.
- KORNERUP, A. and J.H. WANSCHER, 1976. Methuen Handbook of Colour. Eyre Methuen, London.
- OLA'H, G.H., 1969. Le Genre panaeolus, Herbar Louis Maire, University Larval, Quebec (canada), 273 pp.
- SINGER, R., 1987. The Agaricales of Modern Taxonomy. J. Cramer,
- STAMETS, P., 1987. Psilocybe Mushrooms and Their Allies. Homestead Book, 160 pp.





Plate 1. *Lepiota helveola* Bres. sensu josserand.

Plate 2. *Panaeolus campanulatus* (Fr.) Quél.

Plate 3. *Copelandia cyanescens* (Berk & Br.) Singer.

Plate 4. *Panaeolus castaneifolius* (Murr.) Ola'h.

Plate 5. Metuloid cystidia of *C. cyanescens* under electron microscope, 3,000x.

Plate 6. *Panaeolus fimicola* Fr.

Plate 7. *Rhodophyllus aeruginosus* (Hiroe) Hongo.



- TU, C. C., S. CHENG, Y. H. HAN and T. C. DOUGH, 1977. Some Agaricus on the Southern Part of Orchid Island, Taiwan. Taiwan Mushroom 1(2): 45-55.
- YEH, K. W., 1984. The Hallucinogenic Mushroom of Taiwan. Newsletters of Mycological Society of ROC 1: p. 11.

## 臺灣蘭嶼島上的蕈類誌 (I)

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### 摘 要

蘭嶼島位於臺灣東南方 62 公里的太平洋海域上面積僅 45.7 平方公里，由於屬典型的熱帶海島，其菌蕈種類迥異於臺灣本島，本篇報告描述十種菇蕈。分別是：*Anellaria sepuchralis* (Berk.) Sing., *Chlorophyllum molybdites* (Meyer: Fr.) Mass., *Copelandia cyanescens* (Berk. & Br.) Sing., *Gymnopilus aeruginosus* (Peck.) Sing., *Lepiota helveola* Bres., *Panaeolus campanulatus* (Fr.) Quél., *P. castaneifolius* (Murr.) Ota'h, *P. fimicloa* Fr., *P. sphinctrinus* (Fr.) Quél., *Rhodophyllum aeruginosus* (Hiroe) Hongo，其中，除了 *C. molybdites* 之外皆屬臺灣新記錄種。