

# THE GENERA *SCUTELLINIA* AND *GENEOSPERMA* (DISCOMYCETES, PEZIZALES) IN TAIWAN

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**ABSTRACT**—Nine species of *Scutellinia* and one species of *Geneosperma* collected from Taiwan are described. Among these, *Scutellinia cejpitii*, *S. jungneri*, *S. nigrohirtula*, *S. pennsylvanica*, *S. phymatodeus*, *S. subhirtella*, *S. umbrorum*, and *Geneosperma geneosporum* are reported for the first time from Taiwan. A key to these species is also provided.

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**KEY WORDS:** Discomycetes, Pezizales, *Scutellinia*, *Geneosperma*

The genus *Scutellinia* is characterized by orange-red apothecia surrounded with dark brown hairs. Many regional works have been done on this genus, i.e., Denison (1959) from North America, Kullman (1982) from the Soviet Union, Kaushal *et al.* (1983) from India, Otani (1989) from Japan, and Zhuang (1993) from China. Recently, a world monographic study by Schumacher (1990) includes 45 species in this genus. *Geneosperma* was proposed by Rifai (1968) for a single species, *G. geneosporum*, due to its peculiar ascospore morphology. Later, Korf and Zhuang (1986) added another species, *G. laevisporum* from New Zealand. However, Schumacher (1990) and Moravec (1996) do not recognize this genus and retain *G. geneosporum* in *Scutellinia*. Two species of *Scutellinia*, *S. scutellata* and *S. colensoi* have been reported in Taiwan by Chen (1975) and by Liou and Chen (1977). In the present study, nine species of *Scutellinia* and one species of *Geneosperma* are described and a key to these

species is also provided. Fresh collections were found from substrate as rotten wood, humus, and damp soil, within 300 to 3900 m elevation. Measurements are made from materials mounted in distilled water. Ascospore ornamentation was examined either in cotton blue or distilled water. All specimens are deposited at the Herbarium of the National Museum of Natural Science (TNM).

**General features:** Apothecia orange red, receptacle and margin clothed with dark brown, bristle-like hairs, base furcate. Ectal excipulum composed of polygonal cells, medullary excipulum with an intricate hyphal layer. Asci 8-spored, operculate, cylindrical, ascus walls do not turn blue in Melzer's reagent. Ascospores ellipsoid, ornamented with warts or ridges, hyaline, guttulate. Paraphyses filiform, tips enlarged, containing many orange granules.

**Key to *Scutellinia* and *Geneosperma* found in Taiwan:**

- 1a. Ascospores enclosed within a folliculate sheath, ornamented with tubercles.....  
..... *G. geneosporum*
- 1b. Ascospores not enclosed within a folliculate sheath ..... 2
- 2a. Marginal hairs exceeding 1000  $\mu$  m ..... 3
- 2b. Marginal hairs less than 1000  $\mu$  m ..... 6
- 3a. Ascospores irregularly reticulate .....  
..... *S. pennsylvanica*
- 3b. Ascospores not reticulate ..... 4
- 4a. Ascospores with warts and irregular ridges 1-2  $\mu$  m wide, 0.5-1  $\mu$  m high .....  
..... *S. colensoi*
- 4b. Ascospores with warts and ridges 0.4-1.5  $\mu$  m wide ..... 5
- 5a. Hymenium bright red, ascospores with warts and ridges 0.4-1.5  $\mu$  m wide, 0.6-1  $\mu$  m high ..... *S. scutellata*
- 5b. Hymenium yellowish orange, ascospores with warts and ridges 0.5-1.2  $\mu$  m wide, 0.5 - 0.8  $\mu$  m high ..... *S. jungneri*
- 6a. Ascospores with irregular warts and ridges ..... 7
- 6b. Ascospores with tubercles or warts .....  
..... 8
- 7a. Ascospores slender, 18-20 x 10-12  $\mu$  m, with irregular warts and ridges .....  
..... *S. cejpaii*
- 7b. Ascospores broadly ellipsoid, 22-25 x 15-16  $\mu$  m, with small warts and ridges, 0.4-1.2  $\mu$  m wide, 0.3-0.5  $\mu$  m high .....  
..... *S. nigrohirtula*
- 8a. Ascospores slender, 17-18 x 10-11  $\mu$  m, tuberculate, tubercles 2-4  $\mu$  m wide and high ..... *S. phymatodeus*
- 8b. Ascospores with warts less than 4  $\mu$  m wide and high ..... 9
- 9a. Ascospores with warts 0.5-1.5  $\mu$  m, 0.5-1  $\mu$  m high ..... *S. subhirtella*
- 9b. Ascospores with warts 1-2  $\mu$  m wide, 1-1.5  $\mu$  m high ..... *S. umbrorum*

*Scutellinia cejpaii* (Vel.) Svr., Česká Myk. 25:

83. 1971.

(Text-figs. 1A, 2A, 3A.)

*Diagnostic features:* apothecia orange red, 4-7 mm, hairs yellowish brown; 175-225  $\mu$  m long, asci cylindrical, 225-275 x 11-14  $\mu$  m; ascospores ellipsoid, 18-20 x 10-12  $\mu$  m, with irregular warts and ridges, prominent at poles; warts 0.6-1  $\mu$  m wide, 1-2  $\mu$  m high; paraphyses filiform, tips enlarged to 6-9  $\mu$  m.

*Specimen examined:* Taiwan. Nantou: Meifeng, alt. 2250 m, on damp soil with *Aleuria aurantia*, 19-XII-1996, Y. Z. Wang, WAN 376 (TNM F5399).

*Notes:* This collection is characterized by short apothecial hairs and slender ascospores with irregular spore ornamentation. The spore size and shape is close to *S. verrucipolaris* Denison (1959) which is considered as a synonym of *S. cejpaii* by Schumacher (1990). He also substituted this name for *S. hirta* (Schumacher: Fr.) Kuntze and this designation was not confirmed by Yao and Spooner (1996). I tentatively put this collection under *S. cejpaii*.

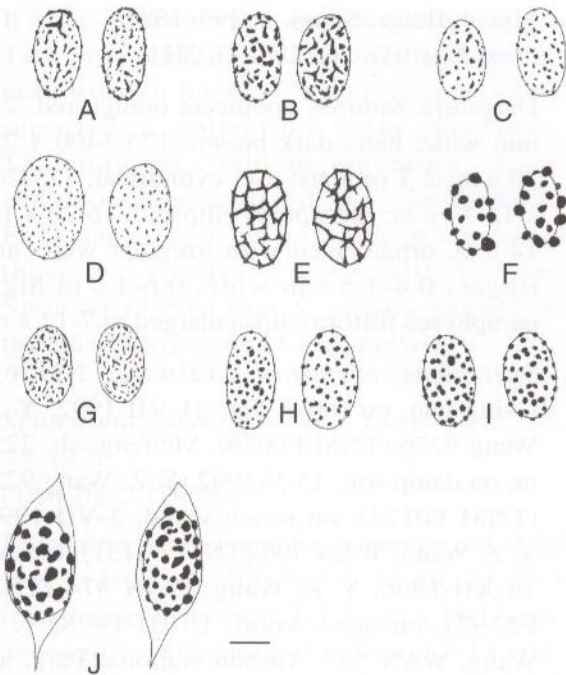
*Scutellinia colensoi* (Massée) Le Gal, Bull. Soc. Mycol. Fr. 83: 336, 1967.

(Text-figs. 1B, 2B, 3B.)

*Diagnostic features:* apothecia orange red, 2-10 mm; hair dark brown, 1500-2000 x 10-25  $\mu$  m; asci cylindrical, 237.5-275 x 15-20  $\mu$  m; ascospores ellipsoid, 16-20 (23) x 11-13  $\mu$  m, many small guttules inside, ornamented with irregular ridges, 1-2  $\mu$  m wide, 0.5-1  $\mu$  m high; paraphyses enlarged at tips, 5-7.5  $\mu$  m.

*Specimens examined:* Taiwan. Nantou: Pilu, alt. 2000 m, on rotten log with mosses, 29-VII-1992, Y. Z. Wang 9275 (TNM F0666); 21-X-1992, Y. Z. Wang 92123 (TNM F0687); Y. Z. Wang 92124 (TNM F0685). Tatachia, on rotten wood, 25-XI-1993, W. N. Chou, Wang 93112412 (TNM F1425). Meifeng, alt. 2250 m, on rotten wood, 19-XII-1996, W. N. Chou,





Text-figure 1

Ascospores of A. *Scutellinia cejpilii* (TNM F5399). B. *S. colensoi* (TNM F0666). C. *S. jungeri* (TNM F7679). D. *S. nigrohirtula* (TNM F5385). E. *S. pennsylvanica* (TNM F0992). F. *S. phymatodeus* (TNM F5398). G. *S. scutellata* (TNM F5131). H. *S. subhirtella* (TNM F2599). I. *S. umbrorum* (TNM F5127). J. *Geneosperma geneosporum* (TNM F5149). Bars = 10  $\mu$  m.

WAN 370 (TNM F5393), on rotten wood, 24-XII-1997, W. N. Chou, WAN 540 (TNM F7722). Taipei: Sanbalin-Fushan; alt. 1500 m, on rotten wood, 21-I-1994, W. N. Chou, (TNM F1665). Miaoli: Mapihaohsi, alt. 1725 m, on rotten wood, 30-VIII-1995, S. Y. Tseng, Sy 13 (TNM F3696).

*Notes:* This species is characterized by long apothecial hairs and prominent spore markings. Ascospores of Taiwanese collections are slightly wider than are the type materials (Rifai, 1968; Schumacher, 1990). Liou and Chen (1977) previously reported a collection of this species from Meifeng, Nantou.

*Scutellinia jungeri* (P. Henn.) Clem., Bull. Torr. Bot. Club 30: 90, 1903. (Text-figs. 1C, 3C.)

*Diagnostic features:* apothecia yellowish orange, 2-5 mm; hair 800-1100  $\mu$  m long, 1-3 rootlets; asci cylindrical, 180-205 x 14-15  $\mu$  m; ascospores ellipsoid, 17-19 x 11-12  $\mu$  m, verrucose; warts 0.5-1.2  $\mu$  m wide, 0.5-0.8  $\mu$  m high; paraphyses filiform, tips enlarged to 4-6  $\mu$  m.

*Specimen examined:* Taiwan. Pingtung: Nanjenshan, alt. 300 m, on rotten wood, 19-IX-1997, C. C. Wen, WAN 494 (TNM F7679).

*Notes:* This species is recognized by yellowish apothecia, lignicolous habitat, and narrowly ellipsoid ascospores. It is considered a tropical equatorial species (Schumacher, 1990).

*Scutellinia nigrohirtula* (Svr.) Le Gal, Bull. Soc. Mycol. Fr. 80: 123, 1964. (Text-figs. 1D, 3D.)

*Diagnostic features:* apothecia orange red, 1.5-5 mm; hair 165-375 x 15-20  $\mu$  m, 1-3 rootlets; asci cylindrical, 250-325 x 15-18  $\mu$  m; ascospores ellipsoid, 22-25 x (12.5-)15-16  $\mu$  m, with low irregular warts and crests; 0.4-1.2  $\mu$  m wide, 0.3-0.5  $\mu$  m high; paraphyses filiform, tips enlarged to 5-10  $\mu$  m.

*Specimens examined:* Taiwan. Nantou: Syuan, alt. 2280 m, on soil, 11-V-1993, S. T. Chiu 01941 (TNM F0747). Hoshe, alt. 750 m, on soil, 18-XII-1996, C. C. Wen, WAN 361 (TNM F5385).

*Notes:* This species is characterized by medium long hairs, and large ascospores with low irregular warts and ridges.

*Scutellinia pennsylvanica* (Seav.) Denison, Mycologia 51: 619, 1959. (Text-figs. 1E, 3E.)

*Diagnostic features:* apothecia orange red, 2-6 mm wide; hairs 375-1500 x 20-35  $\mu$  m, 1-3



rootlets; asci cylindrical, 250-325 x 20-25  $\mu$  m; ascospores ellipsoid, 18-22 x 12-13.5  $\mu$  m, incompletely reticulate; ridges 0.5-3  $\mu$  m wide, 1-3  $\mu$  m high; paraphyses filiform, tips enlarged to 5-10  $\mu$  m.

*Specimens examined*: Taiwan. Hsinchu: Yuanyanghu, alt. 1760 m, on soil with plant debris, 10-VIII-1993, S. L. Shin and Y. Z. Wang 93081009 (TNM F0992). Taipei: Sanbalin-Fushan; alt. 1500 m, on rotten wood, 2-XII-1997, W. N. Chou, WAN 524 (TNM F7707).

*Notes*: This species is characterized by ellipsoid tuberculo-reticulate ascospores and large prominent hairs (Schumacher, 1990). The Yuanyanghu collection has shorter apothecia hair and more regular reticulation on spore surface. Collection WAN 524 has irregular reticulation, but the spore size, lignicolous habitat, and hair characteristics fit the description of *S. pennsylvanica*.

*Scutellinia phymatodeus* S. C. Kaushal & R. Kaushal, *Bibl. Mycol.* 91: 594. 1983. (Text-figs. 1F, 3F.)

*Diagnostic features*: apothecia orange red, 1-2 mm wide; hairs dark brown, 160-280 x 8-10  $\mu$  m base not forked; asci cylindrical, 265-280 x 14-15  $\mu$  m; ascospores ellipsoid, 17-18 x 10-11  $\mu$  m, tuberculate; warts 2-4  $\mu$  m wide, 2-4  $\mu$  m high; paraphyses tips enlarged to 7-8  $\mu$  m.

*Specimen examined*: Taiwan. Nantou: Meifeng, alt. 2250 m, on damp soil, 19-XII-1996, Y. Z. Wang, WAN 375 (TNM F5398).

*Notes*: This collection is characterized by short apothecial hairs and slender tuberculate ascospores. The type material has shorter hairs and asci (Kaushal and Kaushal, 1983; Cao and Moravec, 1988). Schumacher (1988; 1990) did not examine the type specimen and doubted whether it is a species of *Scutellinia*.

*Scutellinia scutellata* (L.: Fr.) Lamb., *Fl.*

*Mycol. Belge, Suppl.* 1: 299, 1887. (Text-figs. 1G, 2C, 2D, 3G, 3H.)

*Diagnostic features*: apothecia orange red, 2-4 mm wide; hairs dark brown, 175-1400 x 22-30  $\mu$  m, 2-3 rootlets; asci cylindrical, 175-240 x 12-17  $\mu$  m; ascospores ellipsoid, 16-22 x 11-14  $\mu$  m, ornamented with irregular warts and ridges; 0.4-1.5  $\mu$  m wide, 0.6-1  $\mu$  m high; paraphyses filiform, tips enlarged to 7-12  $\mu$  m.

*Specimens examined*: Taiwan. Nantou: Chingshan, on rotten log, 31-VII-1992, Y. Z. Wang 9276 (TNM F0686). Meifeng, alt. 2250 m, on damp soil, 15-V-1992, Y. Z. Wang 9225 (TNM F0173); on rotten wood, 3-VII-1996, Y. Z. Wang, WAN 306 (TNM F5131); on soil, 19-XII-1996, Y. Z. Wang, WAN 374 (TNM F5397), on dead wood, 10-III-1998, Y. Z. Wang, WAN 557. Yushan National Park, alt. 1600 m, on rotten wood, 6-X-1992, S. H. Wu 92117 (TNM F0700). Lulin Villa, alt. 2650 m, on rotten wood, 25-XI-1993, Y. Z. Wang 93112407 (TNM F1420). Lulinshan, alt. 2700m, on soil, 13-X-1993, S. Z. Chen, Wang 93101330 (TNM F1313). Chiayi: Nanshi Forest Road, alt. 1850 m, on rotten wood, 13-X-1993, Y. Z. Wang 93101304 (TNM F1290); 93101306 (TNM F1292); 93101310 (TNM F1294); 93101312 (TNM F1296). Nanshi Forest Road, alt. 1800 m, on dead wood, 13-IV-1996, S. Z. Chen, WAN 292 (TNM F4710). Lulinshan, alt. 2640 m, on soil with plant materials, 4-V-1995, Y. Z. Wang, WAN 136 (TNM F3093). Ilan: Fushan Botanical Garden, alt. 600 m, on rotten wood, 9-III-1994, Y. Z. Wang WAN 004 (TNM F1779). Pingtung: Payuchih Hiking Trail, alt. 1950 m, on the ground, 18-I-1995, S. Z. Chen, WAN 109 (TNM F2924). Hualien: Tayuling, alt. 2600 m, on rotten paper soaked with urine, 23-VI-1994, W. N. Chou, WAN 057 (TNM F2136). Nantou: Tsuifeng, alt. 2300 m, 16-II-1993, on rotten wood, Y. Z. Wang 93020 (TNM F0499).

*Notes*: This is the type species of *Scutellinia*.



It is the most common species of this genus in Taiwan. Collections were usually found on dead wood in forests. Chen (1975) previously reported a collection from Hsueshan, Taichung, at 3000 m elevation. Some collections were assigned as *S. crinita* (Bull.: Fr.) Lamb. at first, but it is difficult to separate these two species. I agree with Yao and Spooner (1996) that *S. crinita* should be treated as a synonym of *S. scutellata*.

*Scutellinia subhirtella* Svr., Česká Myk. 25: 85, 1971.  
(Text-figs.: 1H, 2E, 3I.)

*Diagnostic features:* apothecia orange red, 2-10 mm wide; hairs 300-860 x 24-40  $\mu$  m, 2-3 rootlets; asci cylindrical, 127.5-240 x 13-17  $\mu$  m; ascospores ellipsoid, 18-24 x 12-15  $\mu$  m, ornamented with warts; 0.5-1.5  $\mu$  m wide, 0.5-1  $\mu$  m high; paraphyses filiform, tips enlarged to 6-10  $\mu$  m.

*Specimens examined:* Taiwan. Nantou: Yushan Peifeng, alt. 3900 m, on rotten wood, 2-VIII-1994, S. T. Chiu, WAN 072 (TNM F3114). Hualien: Tayuling, alt. 2800 m, on rotten paper bag, 26-X-1994, W. N. Chou, WAN 089 (TNM F2599). Hsinchu: Yuanyanghu, alt. 1760 m, on soil, 10-VIII-1993, S. L. Shin & Y. Z. Wang 93081010 (TNM F0986). Ilan: Taipingshan, alt. 1890 m, on soil, 9-IX-1997, M. L. Wu 970909 T2 (TNM F7734).

*Notes:* Taiwanese collections have longer hairs than that of the type material (see Schumacher, 1990). This species is characterized by medium long apothecial hairs and ascospores marked with small warts.

*Scutellinia umbrorum* (Fr.) Lamb., Fl. Mycol. Belge, Suppl. 1: 300, 1887.  
(Text-figs.: II, 3J.)

*Diagnostic features:* apothecia orange red, 2-4 mm; hairs 550-600 x 25-40  $\mu$  m, 1-3 rootlets; asci cylindrical, 196-240 x 13-16  $\mu$  m;

ascospores ellipsoid, 17-21 x 12-13.5  $\mu$  m, ornamented with large tubercles; 1-2  $\mu$  m wide, 1-1.5  $\mu$  m high; paraphyses filiform, base 3-4  $\mu$  m, tips enlarged to 7-9  $\mu$  m.

*Specimen examined:* Taiwan. Nantou: Meifeng, alt. 2250 m, on damp soil, 2-VII-1996, Y. Z. Wang, WAN 302 (TNM F5127).

*Notes:* This species is characterized by medium long hairs, and broad ellipsoid ascospores marked with tubercles. This collection has slightly narrower ascospores but is still within the range of the type material (16.8-25.2 x 12.7-17.2  $\mu$  m, Schumacher, 1990).

*Geneosperma geneosporum* (Berk.) Rifai, Verh. Kon. Nederl. Akad. Van Wetensch., 57(3): 103, 1968.  
(Text-figs.: 1J, 2F, 3K.)

*Diagnostic features:* apothecia dark orange red, 1-2.5 cm wide; hairs 500-740 x 15-35  $\mu$  m, 1-2 rootlets; asci cylindrical, 255-299 x 20-22  $\mu$  m; ascospores ellipsoid, 20-22 x 11-15  $\mu$  m, enclosed within a folliculate sheath, ornamented with large warts; 1-3  $\mu$  m wide, 1-2  $\mu$  m high; paraphyses septate, filiform, base 3-4  $\mu$  m, tips enlarged to 9-11  $\mu$  m.

*Specimens examined:* Taiwan. Taichung: Anmashan, alt. 2275 m, on humus, 14-VIII-1996, W. N. Chou, WAN 324 (TNM F5149); 15-VIII-1997, W. N. Chou, WAN 465 (TNM F7395). Nantou, Tatachia, alt. 2730 m, on rotten wood, 18-IX-1997, W. N. Chou, WAN 485 (TNM F7670). Hsinchu, Kuanwu, alt. 2000 m, on rotten wood, 20-XI-1997, S. Z. Chen, WAN 512 (TNM F7696). Taipei: Sanbalin-Fushan; alt. 1500 m, on rotten wood, 2-XII-1997, W. N. Chou, WAN 523 (TNM F7706).

*Notes:* This species is characterized by large apothecia and warted ascospores enclosed within a folliculate sheath. I retain it in *Geneosperma*, because there is another





Text-figure 2

Habitats of *Scutellinia* and *Genenosperma*. A. *S. cejpaii* (TNM F 5399). B. *S. colensoi* (TNM F1665). C. *S. scutellata* (TNM F3093). D. *S. scutellata* E. *S. subhirtella* (TNM F2599). F. *G. genesporum* (TNM F5149). Bars = 0.5 cm.





Text-figure 3

(SEM) Ascospores of A. *Scutellinia cejpai* (TNM F 5399). B. *S. colensoi* (TNM F 0687). C. *S. jungneri* (TNM F7679). D. *S. nigrohirtula* (TNM F5385). E. *S. pennsylvanica* (TNM F0992). F. *S. phymatodeus* (TNM F5398). G. *S. scutellata* (TNM F5131). H. *S. scutellata* (TNM F5397). I. *S. subhirtella* (TNM F2599). J. *S. umbrorum* (TNM F5127). K. *Geneosperma geneosporum* (TNM F5149). Bars = 5  $\mu$  m.





species found with this special character (Korf and Zhuang, 1986).

### ACKNOWLEDGEMENTS

The author thanks Drs. W.-Y. Zhuang at Academia Sinica, Beijing and Y.-J. Yao at Royal Botanical Gardens, Kew for reviewing the manuscript and all the people who collected specimens for use in this study.

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Manuscript received March 24, 1998

Revised manuscript accepted October 8, 1998



## 台灣的盾盤菌屬與須孢盤菌屬

王也珍

摘要

本文報告台灣產盾盤菌屬與須孢盤菌屬兩屬共十種盤菌。其中八種，*Scutellinia cejpai*, *S. jungneri*, *S. nigrohirtula*, *S. pennsylvanica*, *S. phymatodeus*, *S. subhirtella*, *S. umbrorum*, 與 *Geneosperma geneosporum* 是台灣新記錄種。並附各種的檢索表。

關鍵詞：盤菌，盾盤菌屬，須孢盤菌屬