NOTES ON NEW FORMOSAN FOREST FUNGI(2)
IV. Research on the Wood-Destroying *Poria* from Taiwan

ZUEI-CHING CHEN(1)

Abstract: The flora of the genus *Poria* Pers. *ex* Gray fron Taiwan has been studied through the wide-range field survey since 1973. The following six species of the resupinate growth habit of poroid fungi are reported first time from this Island: *Poria reticulata* (Pers. *ex* Fries) Cooke, *P. nigrescens* Bres., *P. carneolutea* Rodway & Cleland, *P. versipora* (Pers.) Rom., *P. cinerascens* (Bres.) Sacc., and *P. nigra* (Berk.) Cooke. *P. nigra* causes a brown rot of wood and others are the white rotters.

INTRODUCTION

In treating Formosan Polyporaceae, the genus *Poria* was recognized as an important economic fungal group which has not been seriousely studied previousely in Taiwan. This group of fungi was assigned generic rank in 1794 by Persoon with a simple characteristics of the resupinate growth habit coupled with a poroid surface. The concept of the genus *Poria* since then has not changed very much and has been adopted by many mycologists such as S. F. Gray (1821), M. C. Cooke (1886), Saccardo (1888), Engler and Prantl (1900), and recently, J. L. Lowe (1966). Many polypores have resupinate sporophores at their early development or persistantly so at certain circumstance. Therefore, the genus *Poria sensu lato* or in the sense of Persoon and Gray, contains heterogenous groups of polypores. Currently many attempts have been made to break up this genus into more natural genera which have homogeneous characteristics in each group. Lowe (1966) listed 23 genera considered to be synonyms or divergent groups of the genus *Poria sensu lato*.

Most of species of *Poria* are saprophytic and grow on wood. Some are pathogenic to woody plants of highly commercial value. However, its economic importance is more recognized on its expensive damage to wood in service. The distribution of the genus *Poria* in Taiwan was reported first by Yasuda (1917) on *Poria xylina* Yasuda. Since then, no other species of *Poria* has been recorded from Taiwan. The present paper reports the result of our current survey of Formosan *Poria*. All species of *Poria* listed in this report are new to Taiwan.

METHODS AND MATERIALS

The field collection trips have been made several times since 1973. In total, about 80 specimens of resupinate poroid fungi were collected. All specimens were examined for both macroscopic and microscopic characteristics of each sporophores. For the latter, observations were made from thin freehand sections, mounted first in ninety-five percent ethyl alcohol to remove air and to wet the material, then, in the two percent potassium hydroxide solution to swell it to normal size. The characteristic of the context tissue were obtained from sections

(1) 陳瑞青, Associate Professor, Department of Botany, National Taiwan University, Taipei, Taiwan, Republic of China.

(2) This work was supported by a grant from the National Science Council, in Taipei, Taiwan, Republic of China.

cut parallel to the course of the hyphae, or from tissue teased apart with tiny needles. Tubes were usually cut longitudinally to obtain tramal and hymenial details. Macroscopic examination were made with the aid of a stereomicroscope (10-20×).

RESULTS

As the result of the survey and examination of the collected specimens, it was found that the half of specimens examined were sterile or lacking convincing hymenium structures. All of those phenomena are the nature of the tropical distribution and the accurate identification of those specimens were difficult. In addition, several species are considered to be new to the world record and will be published in future. Nomenclature and taxonomy of Formosan *Poria* are based mainly on those treatment of Lowe (1966) and Cuningham (1965).

DESCRIPTIONS AND KEYS TO FORMOSAN *PORIA*

PORIA Persoon *ex* S. F. Gray, adopted from Lowe (1966)...Sporophores resupinate, annual or perennial, consisting of context attached to the substratum that supports the tubes, or in perennial forms the new tube layers formed below the old ones; tubes opening by pores that vary from more than 1 mm wide to 10 per mm or rarely even smaller, lined with a hymenium that in most species does not continue around the end of the dissepiments, and consisting of sterile elements such as hyphal pegs, cystidia and setae, and nonseptate basidia bearing smooth or echinulate, hyaline to brown basidiospores.

Type species: *Poria medulla-panis* Pers.

KEY TO THE FORMOSAN SPECIES OF *PORIA*

1a Pore surface and tissue white or bright colored
  2a Hyphal system monomitic
    3a Spore allantoid.....1. *P. reticulata*
    3b Spore ellipsoid to globose.....2. *P. nigrescens*
  2b Hyphal system dimitic or trimitic
    3a Dimitic, with nodose-septate generative hyphae
      4a Spore globose or subglobose.....3. *P. carneolutea*
      4b Spore elliptical to oval.....4. *P. versipora*
    3b Trimitic.....5. *P. cinerascens*
1b Pore surface and tissue pale to dark brown.....6. *P. nigra*

DESCRIPTION

1. Poria reticulata (Pers. *ex* Fries) Cooke, Grevillea **14**: 114, 1886.

Polyporus reticulatus Pers. *ex* Fries, Syst. Myc. **1**: 385, 1821.
Boletus reticulatus Pers., Synop. Meth. Fung., p. 548, 1801.
Polyporus farinellus Fries, Syst. Myc. **1**: 384, 1821.
Caloporus expallescens var. *flavidulus* Karst., Soc. Fauna Flora Fenn. Meddel. **9**: 110, 1883.

Annual, effused up to 1 mm thick, separable, without distinct odor or taste; margin white, arachnoid, narrow about 1-2 mm wide, sterile, separable and curled on drying; pore surface white, on drying becoming cream, dull, tubes arising as shallow isolated cupules and coalescing to form the dissepiments, soft, fragile, up to 1 mm long, pore round to irregular, about 3-4 per mm (some have 5-7 per mm), edge thin, entire; context white, soft-fibrous, thin up to 1 mm thick. Tissue not changing color in KOH; hyphal system monomitic, generative hyphae branched

almost in the right angle, thin-walled, simple-septate, 3–5 μ in diameter, thick-walled with less branched, simple-septate hyphae, 2–4 μ in diameter; tramal tissue continuous with the context and of similar hyphae; hymenium 13–15 μ thick; cystidia none; basidia clavate, 10–13 × 5–6 μ; spores smooth, hyaline, IKI-, allantoid, 5–6 × 2–3 μ.

On the imported hardwoods from the south east Asia, associated with the white rot.

Distribution: Temperate North America, Brazil, Europe, Tunisia, Taiwan.

ILAN: Lo-tong, Z. C. Chen 1905 (NTU), April 7, 1974.

2. Poria nigrescens Bres., Accad. Rover. Agiati Atti 3, **3**: 83, 1897.

Poria bicolor Ellis & Langl., *nom nud.* in Sacc., Syll. Fung. **23**: 431, 1925 (non *P. bicolor* Bres., 1911)

Perennial, effused, up to 3 mm thick, separable, without distinctive odor or taste; margin pale, narrow 0.5–1 mm wide, membraneous; pore surface buff to buff-pink, darkening on drying, the tubes leathery, becoming rigid on drying, pores round to angular, 5–8 per mm, edge thin, entire; context tan, fibrous to corky, thin, continning without change into trama. Tissue not changing color in KOH; hyphal system monomitic, generative hyphae, rarely branched, 1.5–5.5 μ in diameter, thin- to thick-walled, simple-septate, sometimes up to 8 μ in diameter after treatment in KOH, tramal tissue same to context; hymenium 8–14 μ thick; cystidioles occasional, 5–6 μ in diameter; basidia not seen; spores hyaline, smooth, IKI–, subglobose, 4–5 × 3–4 μ.

On angiosperms and occasionally on gymnosperms, associated with a white fibrous rot.

Distribution: Alaska, Canada, U. S. A., Cuba, Puerto Rico, Guadeloupe, Brazil, West Java, Taiwan.

ILAN: Lo-tong, Z. C. Chen 1909 (NTU), April 7, 1974. On imported hardwood from the South East Asia.

3. Poria carneolutea Rodway & Cleland, Roy. Soc. Tasm. Pap. & Proc. 1929, p. 18, 1929.

Annual, adherent, membranous, effused, creviced in old, hymenial surface cartridge-buff to cinnamon-buff and even in young; margin thinning out, 1–2.5 mm wide, fibrillose, white to light buff, loosely attached; pores 5–6 (–8) per mm, round to angular, surface pale orange yellow to warm-buff at maturity, edge thick when young, thin when old, fibrillose with encrusted hyphae; context up to 300 μ thick, with densely interwined hyphae, tissue dimitic, skeletal hyphae 2–5 μ in diameter, thick-walled, scantily branched, generative hyphae, 2–3 μ in diameter, thin- to slightly thick-walled, nodose-septate, associate with numerous pyriform vesicles 5–8 μ in diameter, which sometimes appear in the hymenial layer as capitate hyphae; hymenial layer 15–20 μ thick; (basidia subclavate, 10–12 × 3.5–5 μ), a close palisade of basidia, cystidiole or paraphyses, and capitate cystidia; cystidia cylindrical, fusiform or subclavate or frequently capitate and projecting to 15 μ from hymenium, 3–5 μ in diameter; spores oval or subglobose, 3.5–4.5 × 2.5–3.5 μ, smooth, hyaline, IKI-,.

On angiosperm, associated with white rot, an important antagonistic fungi of the artificial cultivation of *Cortinellus edodes* on the bed-logs.

Distribution: Australia, and Taiwan.

TAICHUNG: Pu-li, Z. C. Chen 2750 & 2943 (NTU), on fallen logs of hardwood and bed-logs of *C. edodes*, February 26, 1975.

4. Poria versipora (Pers.) Rom., Svensk Bot. Tidskr. **20**: 15, 1926.

Polyporus versiporus Pers., Myc. Europe **2**: 105, 1825.
Poria platensis Speg., Buenos Aires Mus. Argen. Cien. Nat. Anal. **8**: 53, 1902.
P. mucida var. *tripicoides* Jaap, Fungi Sel. Exs. 233, 1907.
P. lignicola Murr., Mycologia **12**: 307, 1920.
P. jalapensis Murr., Mycologia **13**: 177, 1921.
P. ochracea Murr., Mycologia **13**: 174, 1921.

Annual, effused by coalescing the small isolated areas, up to 3 mm thick, adnate, without distinct teste; margin white or rarely concolorous with the tubes, narrow about 0.1–0.3 mm wide; pore surface warm-buff to cinnamon-buff, dull, the tubes leathery, drying fragile, up to 3 mm long, pore round or angular at first, soon coalescing and forming daedaloid or lamellate conditions, 4–6 per mm, edges, becoming rather thin, entire to eroded or lacerate, even irpiciform; context concolorous with the tubes, soft-fibrous, thin, continuing without change into the trama; tissue not changing color in KOH; hyphal system monomitic, generative hyphae 2–4 μ in diameter, with abundant small clamp connection, incrusted on the surface, sometimes or rarely, terminating in bulbous swellings up to 5 μ in diameter; subiculum about 80–120 μ thick; subhymenium layer 15 μ and hymenium layer about 15 μ thick; cystidioles inconspicuous and immersed, rarely capitate-incrusted, terminally inflated hyphae sometimes protruded from hymenium or immersed on subhymenium layer; basidia cylindrical-clavate, 8–15 × 3.5–5 μ; spores hyaline, smooth, IKI-, oblong-ellipsoid, 4–5 × 3–3.5 (–4) μ.

On angiosperms or rarely on gymnosperms, associated with a white rot.

Distribution: World wide,; Europe, North America, Australia, Tasmania, New Zealand, Japan, Taiwan.

NANTOU: Shih-Tii to Mt. A-Li, Z. C. Chen 2527 (NTU), on fallen log of *Quercus*, December 23, 1974.

5. Poria cinerascens (Bees.) Sacc. & Syd., Syll. Fung. **16**: 161, 1902.

Polyporus cinerascens Bres., in Strasser, Zool-Bot. Ges. Vienna Verh. **50**: 361, 1900.
Poria subavellanea Murr., Mycologia **12**: 88, 1920.
P. subfuscoflavida (Rostk.) Cooke of most North American and European determinations.

Annual, becoming widely effused, up to 6 mm thick, separable, without any taste; margin white to light tan, fimbriate to velvet, appressed, narrow up to 4 mm wide, sterile; pore surface white to cream, drying cinnamon-buff, clay color, tawny-olive, light drabsmoke gray; the tubes fragile to tough when dry, up to 5 mm long, indistinctly zonate 2–3 mm thick in each layer, pore round to angular, 3–4 per mm, edge becoming thin, entire; context white, corky to spongy, thin, 1–2 mm thick, continuing without change into trama; tissue not change color in KOH; hyphal system trimitic; the context of generative hyphae, thin-walled, nodose-septate, 2–5 μ in diameter, skeletal hyphae rarely branched, thick-walled, non-septate, 3–5 μ in diameter, binding hyphae much branched, thick-walled, non-septate, 1.5–3 μ in diameter; hymenium 10–18 μ thick, cystidia none but cystidiole sometimes present, imbedded, 4.5–5.5 (–8) μ in diameter; basidia clavate, 4–5 μ in diameter; spores hyaline, smooth, IKI-, suballantoid to narrowly oblongellipsoid, 4–6 × 2 (–3) μ.

On the fallen gymnosperms, associated with a white rot.

Distribution: Canada, U. S. A., Mexico, South America, Europe, and Taiwan.

TAIPEI: Taipei city, Z. C. Chen 2166 (NTU), May 21, 1974, on the fallen logs of Taiwan red pine (*Pinus taiwanensis* Hayata) in the campus of the Forest Research Institution of Taiwan.

6. Poria nigra (Berk.) Cooke, Grevillea **14**: 111, 1886.

Polyporus niger Berk., London Jour. Bot. **4**: 304, 1845.

Perennial, becoming widely effused, 13–30 cm wide, up to 4 mm thick, without distinct taste or odor; margin paler than the pore surface, minutely pubescent, rather narrow, 1–2 mm wide; pore surface white with pinkish tint when young, becoming smoke gray to light drab, when older, turn to hair brown to fuscous -cocoa brown, dull, the tubes corky to woody, up to 2 mm long in each distinct layer, pore round to angular, 4–6(–9) per mm, edge entire or thin and incised; context 0.2–0.5 mm thick, dark purplish brown, soft-spongy, or soft-fibrous,

sometimes with a black hard line or layer at the juncture with the substratum, continuing without change into trama; hymenium much paler than the tramal tissue; tissue darkening and without stain in KOH; hyphal system dimitic, the context principally of skeletal hyphae which are rarely branched, mostly thick-walled, rarely simple-septate, 2–5 μ in diameter, generative hyphae rarely branched, nodose- and simple-septate, 1–4 μ in diameter; hymenium dissolved and difficult to measure; setae absent; spore hyaline, smooth, IKI-, ellipsoid, 3–5 (-6)× 2–3 μ.

On angiosperms, especially oak and chestnut, associated with a brown rot.

Distribution: U. S. A. and Taiwan.

TAIPEI: Taipei city, Z. C. Chen 2160 (NTU), May 21, 1974, on the decayed hardwood sleeper, in the campus of the Forest Research Institution of Taiwan.

OMITTED SPECIES

The specimens of *Poria xylina* Yasuda (1917) and later by Sawada (1919) has been lost since The world war II. The present author has, therefore, no means to prove its validity.

REFERENCES

Boyce, J. S. 1961. Forest Pathology, 3rd Ed. 572pp. McGraw Hill. New York.

Chen, Z. C. 1975. Notes on new Formosan forest fungi, II. some lignicolous fungi., Taiwania **20**(2): 201-212.

Cunningham, G. H. 1965. Polyporaceae of New Zealand, D. S. I. R. Bull. **164**: 44-68.

Ito, S. 1955. Mycological Flora of Japan, **II**(4), 450pp. Yokendo, Japan.

Lowe, J. L. 1966. Polyporaceae of North America: The genus Poria. SUNY, Coll. Forestry, Tech. Bull. No. **60**, 128pp.

Overholts, L. O. 1953. The Polyporaceae of the United States, Alaska, and Canada. 466pp. The Univ. Mich. Press., U. S. A.

Sawada, K. 1919. Descriptive Catalogue of Formosan Fungi, Part **I**, 503-504.