

THE BOLETES OF TAIWAN⁽¹⁾ (II)KAI-WUN YEH⁽²⁾ and ZUEI-CHING CHEN⁽³⁾

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Abstract: The following 13 species of Boletes fungi collected from Yu-Shan (Mt. Morrison, Alt. 3,980 m) region in the central highland of Taiwan are described: *Boletinus spectabilis* (Pk.) Murr. *Boletus calopus* Fr., *B. edulis* Fr., *B. erythropus* (Fr.) Krombh. *B. reticulatus* Schaeff. ex Boud., *B. subvelutipes* Peck, *Leccinum griseum* (Quél.) Singer, *L. insigne* Smith, Thiers & Watling, *Suillus americanus* (Pk.) Snell ex Slipp & Snell, *S. granulatus* (Fr.) Kuntze, *S. luteus* (L. ex Fr.) S.F. Gray, *Tylopilus felus* (Fr.) Karsten and *Xerocomus badius* (Fr.) Kühner ex Gilbert. *Leccinum rugosiceps* (Pk.) Singer previously reported from the central part of Taiwan was also collected from this area.

INTRODUCTION

As a part of expedition project of Formosan boletes, several field trips were taken around the mountain range of Yu-Shan (Mt. Morrison), the highest peak of Taiwan island with an altitude of near 4,000 m, located in the central part of the island, during 1979-1980. In this region, Kida (1937) collected *Boletus calopus* (as *B. pachypus* Fr.), *B. edulis*, *B. pulverulentus* Opatowski (as *B. badius* sense Kawamura), *Suillus bovinus* (Fr.) Kuntze, *Xerocomus subtomentosus* (Fr.) Quélet, and three unidentified species of *Boletus* (Sawada, 1959). During early 1979 expedition, *Gastroboletus scabrosus* Mazzer & Smith was added to the fungal flora of this area (Yeh & Chen, 1980). In this paper, 14 species of boletes are reported including 11 species of new records⁽⁴⁾ from Taiwan. All specimens are deposited in the Mycological Herbarium of Department of Botany, National Taiwan University, Taipei, R. O. C. (TAI).

*1. *Boletinus spectabilis* (Pk.) Murr. N. Amer. Fl. 9: 160, 1910.

Fig. 1 & Plate 1

Boletus spectabilis Peck, Ann. Rept. N. Y. State Cab. Nat. Hist. 23: 128, 1873.

Fuscoboletinus spectabilis (Peck) Pomerleau & Smith, Brittonia 14: 161, 1962.

Pileus 4-6 cm dia., convex to flattened, obtuse, subumbonate, surface dry, viscid when moist, covered with brightly red tomentum when young, in age becoming rather grayish brown and separate into coarse patches, scales, streaks, exposing the subfibrillose pellicle. Veil remnants also fade to yellowish or brownish. Context yellow, becoming deeper yellow in age, slowly turning pinkish when exposed. Tube adnate, yellow, at first enveloped by a reddish, glutinous membrane, becoming dull yellow, yellowish brown in age, turning pinkish when bruised. Pores angular, large, compound, slightly radiate, concolorous with tube, often with glandular dots at mouth when old. Stipe 2-4 x 0.7-1 cm, solid, subequal, surface color pale yellow all over when young, in age the apex above annulus yellow, the mid-portion to base ochraceous olive; Stipe sheathed with remnants of the veil, and leaving a gelatinous annulus, concolorous with pileus.

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(4) In front of number with an asterisk (*) sign. means a new record in Taiwan.

stipe often decorated with some scales. Spore print purplish brown, spores ellipsoid to subfusoid, $10-16 \times 4-5.5 \mu\text{m}$. Basidia 4-spored, $30-35 \times 9-11 \mu\text{m}$. Taste slightly acid. Odor slightly disagreeable.

Habitat: Solitary under mixed forest.

Distribution: Taiwan, North America.

Specimen Examined: NANTOU: Yu-Shan (Mt. Morrison), alt. 2800 m, August, 1980. TAI-YB-130.

Note: This species can be easily distinguished by its scabrous pileus surface and big spores. In North America, it was usually collected under larch forest (Smith & Thiers, 1971), but occasionally in Balsam fir or tamarack wood (Snell & Dick, 1970). In Taiwan, so far as we know, only *Suillus grevillei* (Klotzsch) Singer was collected under larch trees (Yeh & Chen, 1980).

2. *Boletus calopus* Fr, Syst. Mycol. 1: 390. 1821.

Fig. 2 & Plate 2

Boletus olivaceus Schaff, Icon. Fung. Ind. p. 77, 1764.

Pileus 5-9 cm dia., hemispherical and with involuted margin when young, becoming convex to pulvinate in age, dry, finely tomentose or velutinous, slightly chamoise-like, buff-gray, milk-coffee with olivaceous tinges. Context thick, compact, pale cream yellow to brightly yellow, becoming slightly blue when cut, but soon fading, above tube appearing a bright blue band. Tube sinuate, bright lemon yellow, immediately becoming bluish-greenish, soon fading as context. Pores minute, circular, lemon yellow, turning bluish when bruised. Stipe stout, firm, about 3.5 cm long, 2 cm thick, ventricose at base and attenuate at apex, pink tomentose below, but bright yellow upper, with finely but prominently reticulate all over. Spores fusiform, $12-16 \times 4-6 \mu\text{m}$, deep melleous. Basidia 4-spored, $30-45 \times 10-12 \mu\text{m}$, clavate. Cystidia fusoid-ventricose, $35-50 \times 8-10 \mu\text{m}$. Taste at first sweetish, then feel bitter. Odor fungoid.

Habitat: Gregarious under conifer forest.

Distribution: Taiwan, North America, Europe.

Specimen Examined: NANTOU: Yu-Shan (Mt. Morrison), alt. 2700-2800 m, July, 1980, TAI-YB-096.

Note: Skirgiello (1960) treated *B. pachypus* Fr. as a synonym of *B. calopus* Fr., and the former had been reported from Taiwan by Kida (1937) and Sawada (1959) from the area where *B. calopus* Fr. was collected.

3. *Boletus edulis* Bull. ex Fr. Syst. Mycol. 1: 392. 1821.

Fig. 3 & Plate 3

Leccinum edule (Fr.) S.F. Gray, Nat. Arr. Brit. Pls. 1: 647, 1821.

Tubiporus edulis (Fr.) Karsten, Rev. Mycol. 3: 16, 1831.

Dictyopus edulis (Fr.) Quélet, Enchir. Fung. p. 159, 1886.

Pileus 10-20 cm dia., surface moist, viscid at times, slimy when wet, glabrous to subglabrous, surface color complex, chestnut, amber brown, russet, brownish-reddish, tawny-brown, pale-tan, paler at margin. Context thick, white to yellowish, slightly pink under cuticle. Tube free or indented, 1-2 cm long, white to yellowish. Pores small, rotund, white when young, yellowish-green to olive in age. Stipe bulbous or subequal, about 6 cm long, 3-4 cm thick, surface whitish-pallid, covered with a distinct light flesh-colored network. Spore print deep ochraceous, spores fusiform, ellipsoid, pale olivaceous, $12-17 \times 4-6 \mu\text{m}$. Basidia 4-spored, clavate, $25-40 \times 10-11 \mu\text{m}$. Pleurocystidia rare, clavate, ventricose, fusoid, $45-52 \times 10-12 \mu\text{m}$. Cutis with tangled layer of more or less appressed gelatinous hyphae, always nonseparable from context. Taste mild or sweet. Odor fragrant.

Habitat: Solitary, or scattered under conifer forest and mixed forest.

Distribution: Taiwan, America, Europe.

Specimen Examined: NANTOU: Yu-Shan (Mt. Morrison), alt. 2800 m, Tsuga and pine forest, July, 1980. TAI-YB-092.

Note: Kida (1933) collected this species from Kuan-Kao in Yu-Shan area in early August.

*4. *Boletus erythropus* (Fr.) Krombholz, *Consp. Fung. Esc.* p. 24. 1821. Fig. 4 & Plate 4

Dictyopus erythropus (Fr.) Quélet, *Enchir. Fung.* p. 160, 1886.

Tubiporus erythropus (Fr.) Ricken, *Vadem. fur Pilzfreunde* p. 205, 1918.

Pileus about 5 cm dia., convex, flattened in age, mat tomentose, dry, even, surface color red, dark brown but with yellow brown or orange shade when young. Context yellow, turning dark blue quickly when exposed. Tube sinuate to depressed, about 1-2 cm long, yellow to olive, becoming intensive dark blue when cut. Pores boletoid, small, brick-red tinged orange, circular to angular, when touch becoming blue. Stipe up to 10 cm long, 3-4 cm wide, cylindrical, equal or slightly taper upward, brick-red tinged orange, in the lowest part light yellow, surface covered with minute red dots (minute grains) all over, veil none, becoming intensive blue when touch, base with white to yellowish mycelia. Spore print sordid olive, spores ellipsoid-fusiform, $12-15 \times 5-6 \mu\text{m}$, subacute, fusoid ventricose. Caulocystidia at apex surface, campanulate, $40-65 \times 6-15 \mu\text{m}$. Cutis composed of trichodermium, but very like hymenium, cuticle nonseparable from the pileus. Taste mild.

Habitat: Gregarious under conifer forest.

Distribution: Taiwan, Europe, North America.

Specimen Examined: NANTOU: Yu-Shan (Mt. Morrison), alt. 2700-3000 m, tsuga forest, July, 1980. TAI-YB-095.

*5. *Boletus reticulatus* Schaeff. ex Boud. *Bull. Mycol. Fr.* 23: 321. 1876. Fig. 5 & Plate 5

Boletus edulis Bull. ex Fr. var. *reticulatus* (Schaeff. ex Boud.) Bat. *Boletes* p. 14, 1908.

Boletus edulis Bull. ex Fr. var. *quercicola* Vassilkov, *Sedobn. yad. griby* p. 40, 1948.

Pileus about 8-10 cm dia., convex, in age flat or slightly umbilicate, surface color buff, pale brownish, ochraceous-gray, finely tomentose to granulose when dry, never glabrous, but rimose-areolate when dry. Context soft, white, slightly cream color under the cuticle. Tube adnate, sinuate to almost free, white when young, becoming yellow-green in age, about 1-2 cm long. Pores small, circular, boletoid, concolorous with tube. Stipe about 6 cm long, 2 cm thick, ovoid-ventricose, bulbous, often wrinkled below, pallid-reticulate at least to lower half and often to the base, with the network raised and meshes elongated, pale gray to brownish, the base whitish. Spores ellipsoid-fusiform, olive-yellow, $14.5-17 \times 4.5-5.5 \mu\text{m}$. Basidia 4-spored, $25-40 \times 7-13 \mu\text{m}$, clavate. Cystidia not found. Taste and odor pleasant.

Habitat: Solitary under mixture of conifer and deciduous forest.

Distribution: Taiwan, North America, Europe.

Specimen Examined: NANTOU: Pa-Ton-Kuang, alt. 2500 m, July, 1980. TAI-YB-090.

*6. *Boletus subvelutipes* Pk., *Rept. N. Y. State Mus.* 2(8): 142. 1898. Fig. 6 & Plate 6

Suillus subvelutipes Kuntze, *Rev. Gen. Pl.* 3(2): 536, 1898.

Pileus 4-8 cm dia., convex when young, slightly flattened in age, soft, subglabrous to minutely tomentose, subvelutinous, surface color yellowish brown to reddish brown, varying in brightness of color. Context whitish to yellow, change to blue where bruised. Tube adnexed to sub-decurrent, yellowish to ochraceous, turning blue when cut. Pores small, rotund, yellow or brown red, becoming blue when bruised. Stipe firm, subequal or slightly taper upward, 4-6 x 1-2 cm, surface color pale yellow tinged reddish, either uniform so or in various mixture, conspicuously furfuraceous to tomentose-punctate, or velvety with hairy tomentum, slightly scurf, or with strigosity at the apex. Spore print deep olivaceous, spores ellipsoid to oblong-ellipsoid, fusiform, $13-18 \times 4-6 \mu\text{m}$. Basidia 4-spored, $30-40 \times 8-12 \mu\text{m}$. Pleurocystidia rare, mucronate,

fusoid, about $30 \times 10 \mu\text{m}$. Cutis composed of long narrow tubular hyphae. Taste and odor not noteworthy.

Habitat: Solitary to gregarious under mixed forest.

Distribution: Taiwan, North America, Europe.

Specimen Examined: NANTOU: Yu-Shan (Mt. Morrison) alt. 2600–3000 m, July, 1980, TAI-YB-1000; August, 1980, TAI-YB-121.

*7. *Leccinum griseum* (Quélet) Singer, *The agaricales in Modern Taxonomy* p. 744. 1962.

Fig. 7 & Plate 7

Gyroporus griseus Quélet, *Assoc. Fr. Avanc. Sci.* (1901): 496, 1902.

Pileus 3–7 cm dia., convex when young, in age broadly convex or with a broad umbo, margin obtuse, distorted, surface often uneven, wrinkled, glabrous at first, becoming rimose-areolate, exposing the pallid context, gray-brown, dull brown, in age darker brown. Context soft, very thick, pallid, whitish, somewhat brownish beneath the cuticle, gradually avellaneous when cut. Tubes depressed or nearly free, at first whitish then grayish, olivaceous, becoming brownish when bruised. Pores minute, angular, concolorous with tube, becoming brownish or blackish when bruised. Stipe long, slender. Solid, 5–11 cm long, 2–4 cm thick, taper upward, and attenuate at base, pallid, whitish, ornamented with densely floccules to scabrous, raised fibroses, ribs, the base with white mycelia. Spores $13\text{--}18(20) \times 4\text{--}6 \mu\text{m}$, elongate-fusiform. Basidia 4-spored, about $25 \times 8 \mu\text{m}$. Cystidia about $30 \times 8 \mu\text{m}$. Cuticular hyphae with some inflated, ellipsoid to subglobose cells. Taste mild, but slightly sour. Odor somewhat fragrant.

Habitat: Solitary, terrestrial, under mixed forest (sasa bamboo and pine forest).

Distribution: Taiwan, North America, Europe.

Specimen Examined: NANTOU: Wan-Shiang, alt. 2400 m, July, 1980, TAI-YB-094.

*8. *Leccinum insigne* Smith, Thiers & Watling, *Mich. Bot.* 5: 160.

Fig. 8 & Plate 8

Pileus 5–10 cm dia., hemispherical when young, in age broad convex, margin incurved when young, in age some part break into segments, dry, tomentose, to velutinous, surface smooth or wrinkle, in age subviscid, surface color dull orange-brown, golden blackish brown. Context thick, firm, yellowish to brownish, becoming fuscous, particularly near the cutis and tube when exposed. Tube short, slightly depressed, olivaceous gray or somewhat yellow green, becoming fuscous when cut. Pores minute, pale yellowish. Stipe 6–12 cm long, 1–2.5 cm thick, subequal or slightly taper upward, sometimes attenuate at the base, surface covered with snuff-brown furfuraceous ornamentation, becoming blackish, ground color tan, brown. Spores smooth, slender, pseudoamyloid in Melzer's reagent, $10\text{--}15 \times 3\text{--}6 \mu\text{m}$, elongate—fusiform, ellipsoid. Basidia about $35 \times 12 \mu\text{m}$. Caulobasidia 2-, 3-, 4-spored. Caulobasidiospores having various types, ovoid, elongate-fusiform, oblong, ellipsoid, somewhat lemon shape, $7\text{--}20 \times 3\text{--}10 \mu\text{m}$. Caulocystidia clavate, ventricose, cylindrical, some with brown vacuolar contents. Cutis hymeniform, composed of compact, long, slender hyphae, end cell tubular. Taste mild. Odor mild.

Habitat: Scattered on ground of conifer forest.

Distribution: Taiwan, North America.

Specimen Examined: NANTOU: Yu-Shan (Mt. Morrison), alt. 2800 m, July, 1980, TAI-YB-067.

*9. *Suillus americanus* (Peck) Snell ex Slipp & Snell, *Lloydia* 7: 39, 1944.

Fig. 9

Boletus americanus Peck, *Bull. N. Y. State Mus.* 1: 62, 1887.

Pileus 2–4 cm dia., broadly convex, surface bright yellow, viscid, with scattered appressed patches, some streaked with brown fibrill, patch color buff to dingy cinnamon. Context yellow, when cut ochraceous. Tube about 3 mm long, adnate to decurrent, dull yellow, becoming brownish when bruised. Pores large, about 1.5 mm, circular to angular, slightly boletinoid, mustard-yellow, yellow-green, yellow-brown. Stipe about 3 cm long, 5 mm thick, equal, hollow,

surface lemon-yellow, covered with dark brown glandular dots, a little veil remains. Spore print dull cinnamon, spores $8-11 \times 3.5-4.5 \mu\text{m}$, smooth, fusiform, ellipsoid, pale cinnamon (false dextrinoid) in Melzer's reagent. Basidia 4-spored, $22-25 \times 5-7 \mu\text{m}$, clavate, smooth. Cystidia in fascicle, $32-65 \times 5-8 \mu\text{m}$, some hyaline some golden-yellow in KOH solution, obventricose, subclavate to clavate. Taste mild.

Habitat: Solitary to gregarious under conifer forest.

Distribution: Taiwan, North America.

Specimen Examined: NANTOU: Pa-Ton-Kuang, alt. 2400 m, white pine and tsuga forest, July, 1980, TAI-YB-093.

10. *Suillus granulatus* (Fr.) Kuntze, Rev. Gen. Pl. 32: 535. 1898.

Fig. 10 & Plate 9

Boletus granulatus Fr., Syst. Myc. 1: 358, 1821.

Rostkovites granulatus (Fr.) Karsten, Rev. Mycol. 3: 16, 1881.

Viscipellis granulatus (Fr.) Quélet, Enchir. Fung. p. 156, 1886.

Xocomus granulatus (Fr.) Quélet, Fl. Myc. Fr. p. 412, 1888.

Pileus 4-9 cm dia., convex when young, becoming broad convex, when wet viscid to glutinous, glabrous or streak, light yellow, sometimes tinged with cinnamon, in age more or less cinnamon over all, or orange-cinnamon, but in young stage pileus is whitish to yellowish. Context whitish, pale yellow, not changing when injured, above the tube appearing a slightly yellow green line. Tube adnate, but some subdecurent to stipe, 6 mm long, pallid, yellow green. Pores yellowish, yellow green, about 1 mm dia., slightly boletinoid, in age always with color spots. Stipe 2.5-5 cm long, about 0.7 cm thick, equal or slightly narrowed downward, solid, when young whitish, in age light lemon and somewhat brown at base, flesh whitish to pale yellow, at the apical position covered with pinkish tan to brown colored glandular dots (very rare over all). Veil none. Spore print dingy cinnamon, spores ellipsoid-fusiform, $7-10 \times 2.5-3.5 \mu\text{m}$, smooth. Basidia 4-spored, about $20 \mu\text{m}$ long, $5-6 \mu\text{m}$ wide, clavate. Pleurocystidia in cluster, clavata, $50-60 \times 10-13 \mu\text{m}$. Caulocystidia $45-70 \times 7-11 \mu\text{m}$, clavate, subfusiform to cylindrical, some hyaline and some golden-yellow (with brown contents). Taste mild.

Habitat: Scattered, gregarious under pine forest, on road side. It occurs from late summer to early autumn at alt. 1500-3000 m.

Distribution: Taiwan, Japan, North America, Europe.

Specimen Examined: NANTOU: Wan-Shiang, alt. 2100-2300 m, July, 1980, TAI-YB-087; Pa-Ton-Kuang, alt. 2500 m, July, 1980, TAI-YB-088; Yu-Shan (Mt. Morrison), alt. 3000 m, August, 1980, TAI-YB-153.

Notes: Sawada (1933) collected this fungus from pine plantation of Taipei area of Taiwan. We recognized that this as common as *S. bovinus* and *S. luteus*, widely distributed in forests of different pine species in Taiwan, and it is not uncommon to observe three fungal species growing together in the same pine plantation. It is suspected that those three boletes species may be sharing the same symbiont and ecology is very closely related.

*11. *Suillus luteus* (L. ex Fr.) S.F. Gray, Nat. Arr. Brit. Pl. 1: 646. 1821. Fig. 11 & Plate 10

Boletus luteus Fries, Syst. Mycol. 1: 385, 1821.

Cricanopus luteus (Fries) Karst. Rev. Mycol. 3: 16, 1881.

Viscipellis luteus (Fries) Quélet, Enchir. Fung. p. 155, 1886.

Xocomus luteus (Fries) Quélet, Fl. Mycol. Fr. p. 414, 1888.

Pileus 5-8 cm dia., hemispherical to obtuse when young, becoming convex to plane in age, surface glabrous and distinctly viscid, slightly streaked beneath slimes sometimes, color reddish-brown to chocolate-brown, often fading out more or less ochraceous in age, very readily separable. Context soft, whitish, lemon-yellowish in age, especially near the tube, when cut

becoming dull ochraceous. Tube about 4 mm deep, adnate or slightly decurrent, whitish to yellow when young, getting darker in age, unchanging when cut, readily separable from context. Pores small, about 0.5–1 mm, circular, in age angular, concolorous with tube, some with darker dots at pores. Stipe 4–7 cm long, about 0.6 cm thick, equal or attenuate at base, solid, yellowish to ochraceous, with minute glandular dots at upper portion, rarely over all, white when young, in age becoming buff, when disrupted forming an annulus on the stipe or hangs at margin. Spore print dull cinnamon, Spores $7-9 \times 2.8-3.3 \mu\text{m}$, smooth, ellipsoid. Basidia $15-20 \times 7-10 \mu\text{m}$. Pleurocystidia $30-40 \times 6-8 \mu\text{m}$, clavate, scattered or in cluster. Cheilocystidia similar, some embeded in amorphous brown material. Caulocystidia $32-70 \times 5-18 \mu\text{m}$, in large cluster, hyaline or brownish in KOH solution, campanulate. Epicutis composed of filamentous hyphae. Taste mild. Odor not distinct.

Habitat: Scattered or gregarious under conifer forest, very common from summer to autumn.

Distribution: Taiwan, Japan, North America, Europe.

Specimen Examined: NANTOU: Wan-Shiang, alt. 2000–2300 m, Taiwan red pine plantation, July, 1980, TAI-YB-086; Pa-Ton-Kuang, alt. 2500 m, mixed forest, July, 1980, TAI-YB-098; Yu-Shan (Mt. Morrison), alt. 3000 m, white pine forest, August, 1980, Tai-YB-131.

*12. *Tylophilus fellus* (Fr.) Karsten, Rev. Myc. 3: 16. 1881.

Fig. 12 & Plate 11

Boletus fellus Fr., Syst. Myc. 1: 394, 1821.

Dictyopus fellus (Fr.) Quélet, Enchir. Fung. p. 159, 1886.

Rhodoporus fellus (Fr.) Quélet, Fl. Myc. Fr. p. 421, 1888.

Boletus fellus var. *obesus* Peck, Bull. N. Y. State Mus. 2(8): 154, 1889.

Pileus 5–12 cm dia., convex when young, in age becoming plano-convex to plane, and margin always straight to recurved, surface dry but glutinous when wet, glabrous or pruinose when young, in age glabrous, surface color pinkish to reddish purple when young, in age becoming russet, cinnamon brown. Context thick, firm, white, becoming pinkish when cut. Tube adnate or nearly free, depressed, at first white or slightly olive yellow, in age turning to vinaceous. Pores about 1 mm large, rotund, angular, whitish to dingy pallid when young, in age becoming pinkish, changing to brownish when bruised. Stipe 4–6 cm long, 2–3 cm thick, solid, subequal, glabrous to minutely furfuraceous, usually reticulate above, at times reticulate all over the stipe. Spores ellipsoid to fusiform-ellipsoid, $10-14 \times 4.5-5.5 \mu\text{m}$. Basidia $18-22 \times 8-10 \mu\text{m}$, irregular, clavate. Cystidia abundant, projecting, $25-30 \times 7-10 \mu\text{m}$, submucronate, fusoid—ventricose. Taste bitter when young, but not so extensive in age. Odor not noteworthy.

Habitat: Solitary, caespitose under conifer forest.

Distribution: Taiwan, North America, Europe.

Specimen Examined: NANTOU: Pa-Ton-Kuang, alt. 2600 m, July, 1980, TAI-YB-099.

*13. *Xerocomus badius* (Fr.) Kuhn, ex Gilbert, Boletes p. 116. 1931.

Fig. 13 & Plate 12

Boletus castaneus var. *badius* Fr., Syst. Mycol. 1: 392, 1821.

Boletus badius (Fr.) Fr., Elench. Fung. 1: 126, 1828.

Boletus vaccinus Fr., Epicr. p. 420, 1838.

Pileus 4–6 cm dia., hemispherical when young, in age becoming broadly convex or nearly plane, surface tomentose, felted, even, in rainy weather viscid to viscous, but soon dry and unpolished, surface color yellowish brown to vinaceous red when young, in age becoming darker-brown. Context often soft, white or slightly cream, becoming bluish when exposed, particularly near the tube. Tube adnate or sinuate-depressed, whitish-yellow, changing to slightly blue when wounded. Pores small (0.5 mm), at first circular and whitish-yellow, in age becoming large and angular, darker color. Stipe 3–5 cm long, 8–12 mm thick, subequal or

taper upward, or slightly bulbous, often curved, covered with minutely furfuraceous, pruinose fibrillose, ornamentation, often somewhat rugulose, color brownish, but the apex and the base ochraceous, white myceloid. Spores subfusiform, ellipsoid, $11-17 \times 4-6 \mu\text{m}$. Basidia 4-spored, $25-35 \times 8-10 \mu\text{m}$. Pleurocystidia $50-60 \times 10-14 \mu\text{m}$, fusoid, ventricose, with yellow brown contents. Taste mild. Odor inconspicuous.

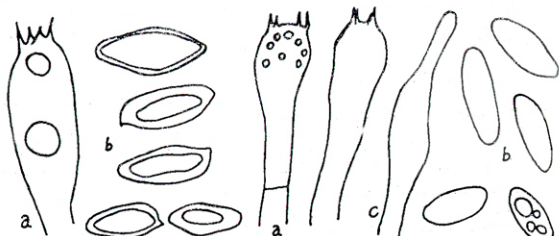


Fig. 1

Fig. 2

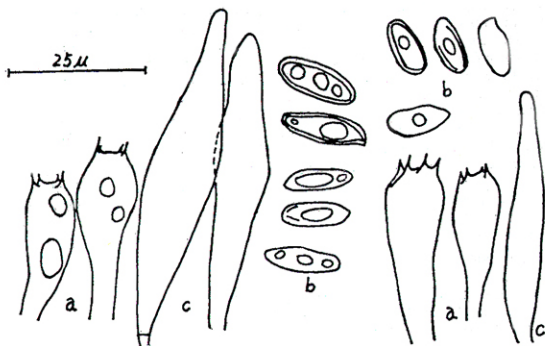


Fig. 3

Fig. 4

Fig. 1. *Boletinus spectabilis*, TAI-YB-130;

Fig. 2. *Boletus calopus*, TAI-YB-096;

Fig. 3. *Boletus edulis*, TAI-YB-092;

Fig. 4. *Boletus erythropus*, TAI-YB-095;

a. basidia; b. basidiospore; c. pleurocystidia.



Fig. 5

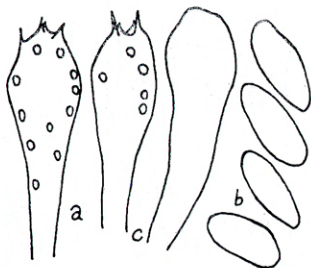


Fig. 6

25 μ

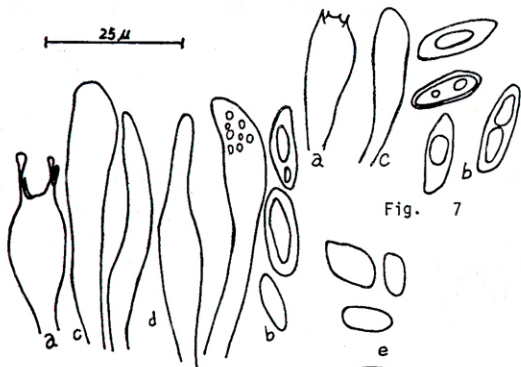


Fig. 7

Fig. 8

- Fig. 5. *Boletus reticulatus*, TAI-YB-090;
 Fig. 6. *Boletus subvelutipes*, TAI-YB-100;
 Fig. 7. *Leccinum griseum*, TAI-YB-094;
 Fig. 8. *Leccinum insigne*, TAI-YB-067;
 a. basidia; b. basidiospore; c. pleurocystidia;
 d. caulocystidia; e. caulobasidiospore.

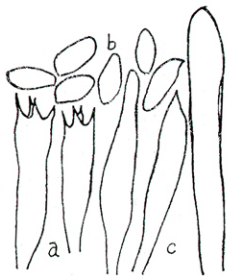


Fig. 9

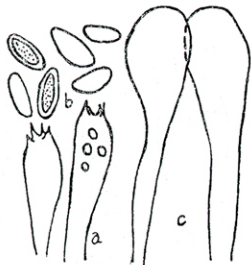


Fig. 10

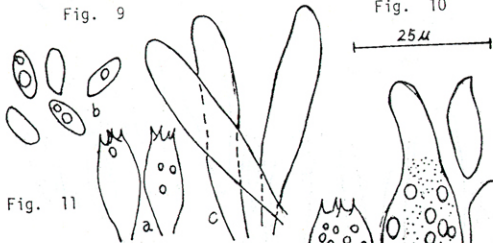


Fig. 11



Fig. 12



Fig. 13

- Fig. 9. *Suillus americanus*, TAI-YB-093;
 Fig. 10. *Suillus granulatus*, TAI-YB-087;
 Fig. 11. *Suillus luteus*, TAI-YB-131;
 Fig. 12. *Tylopilus fellus*, TAI-YB-099;
 Fig. 13. *Xeroconus badius*, TAI-YB-101;
 a. basidia; b. basidiospore; c. pleurocystidia.



Plate 1. *Boletinus spectabilis*



Plate 2. *Boletus calopus*



Plate 3. *Boletus edulis*



Plate 4. *Boletus erythropus*



Plate 5. *Boletus reticularus*



Plate 6. *Boletus subvelutipes*

Plate 7. *Leccinum griseum*Plate 8. *Leccinum insigne*



Plate 9. *Suillus granulatus*



Plate 10. *Suillus luteus*



Plate 11. *Tylophilus fellus*



Plate 12. *Xeroconus badius*

Habitat: Solitary, scattered under mixed forest, often growing on rotting tree root (in soil).

Distribution: Taiwan, North America, Europe.

Specimen Examined: NANTOU: Pa-Ton-Kuang, alt. 2500 m, July, 1980, TAI-YB-101.

14. *Leccinum rugosiceps* (Peck) Singer, Mycologia 37: 799. 1945.

Specimen Examined: NANTOU: Pa-Ton-Kuang, alt. 2500 m, mixed forest, July, 1980, TAI-YB-079; Yu-Shan (Mt. Morrison), alt. 3100 m, tsuga forest, August, 1980, TAI-YB-133.

Note: This species has been collected from the deciduous forest in Li-Shan area (Yeh & Chen, 1980). The present investigation revealed that it is also distributed on tsuga and mixed forest, around the Yu-Shan mountain range between 2300-3100 m altitude.

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