

Illustrations and Descriptions of Fungi Injurious to the Culture of Siitake Mushroom. I.

By

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[Received on July 1, 1942.]

The technique of Siitake mushroom culture has made a notable advancement in recent years, and as its result, commercial production has increased enormously; but there is still a great deal of loss accompanying, owing to the secondary invasion of various injurious fungi, on the logs on which the mushroom is cultured.

A thorough knowledge of the fungi causing the damage is an important prerequisite to successful control measures. The present paper is a first step towards this direction and description and identification of these fungi are dealt primarily. An accurate description with illustrations in color is highly desirable in the field of mycology, but more so to those who are not especially trained in identifying fungi as the ones who are actually engaged in the production of Siitake mushroom. This is the first of the reports on studies carried out in the past few years.

The writers wish to acknowledge their indebtedness to several members of the Osaka Forestry Bureau for the cooperation. They are also obliged to Dr. ROKUYA IMAZEKI in connection with the identification of the fungi.

I. *Stereum umbrinum* BERK. et CURTIS.

Japan name: *Kami-uroko-take*.

Plate V, Figs. 1-3; Plate VII, Figs. 19-20; Plate IX, Figs. 29-31.

BERKELEY & CURTIS, Grevillea, I: 164, 1873; WAKEFIELD, Kew Bull., 1915: 369, 1915; BURT, Mo. Bot. Gard. Ann., 7: 91, 1920; IMAZEKI, Nippon Ikka-Syokubutu-Zusetu Dukan, p. 389, pl. 185, f. 3-4, 1939.

Thelephora crassa LEVEILLE in GAUDICHAUD, Voyage Bonite Bot., I: 190, pl. 139, f. 1, 1846. Not *Stereum crassum* FRIES, R. Soc. Sci. Upsal. Actis, III, I: 111, 1851.

Hymenochaete crassa (LEV.) BERKELEY in COOKE, Grevillea, 8: 148, 1880; SACC., Syll. Fung., 6: 597, 1888; MASSEE, Linn. Soc. Bot. Jour., 27: 114, 1890.

H. umbrina BERK. & CURTIS in COOKE, Grevillea, 8: 148, 1880; MORGAN, Cincinnati Soc. Nat. Hist. Jour., 10: 198, 1888; SACC., Syll. Fung., 6: 598, 1888; MASSEE, Linn. Soc. Bot. Jour., 27: 113, 1890.

H. vinosa (BERK.) COOKE, Grevillea, 8: 149, 1880; SACC., Syll. Fung., 6: 600, 1888.

H. multispinulosa PECK, Bot. Gaz., 7: 54, 1882; SACC., Syll. Fung., 6: 600, 1888; MASSEE, Linn. Soc. Bot. Jour., 27: 108, 1890.

H. scabriseta COOKE in RAVENEL, Fungi Am., 717, 1882; MASSEE, Linn. Soc. Bot. Jour., 27: 113, pl. 5, f. 7, 1890.

Lloydella scabriseta (COOKE) v. HÖHN. & LITSCH. K., Akad. Wiss. Wien Sitzungsber., 115: 1580, 1906.

Hymenochaete purpurea COOKE & MORGAN in COOKE, Grevillea, II: 106, 1883; MORGAN, Cincinnati Soc. Nat. Hist. Jour., 10: 198, 1888; SACC., Syll. Fung., 6: 597, 1888; MASSEE, Linn. Soc. Bot. Jour., 27: 115, 1890.

Knieffia purpurea (COOKE & MORG.) BRESADOLA, Ann. Myc., I: 100, 1903.

Peniophora intermedia MASSEE, Linn. Soc. Bot. Jour., 25: 143, 1889; SACC., Syll. Fung., 9: 238, 1891.

Hymenochaete Kalchbrenneri MASSEE, Linn. Soc. Bot. Jour., 27: 116, 1890; SACC., Syll. Fung., 9: 230, 1891.

Stereum umbranaceum FRIES, YASUDA, Tokyo Bot. Mag., 27: 503, 1913; MATSUURA, Ooyō Kinzigaku, p. 968, 1934.

Fructifications soft, coriaceous-spongy, resupinate, effused, circular to oval, 3×5 cm. across when young, becoming mostly 4.5×9 cm. or larger at maturity; margin often becoming reflexed; upper surface deep olive buff*, zonate, 0.5–3 cm. thick; surface of the hymenium even, vinaceous lavender to raisin black, pale vinaceous lilac, taupe brown when fresh, fading to cinnamon drab to deep olive buff, chamois by drying; cystidia conspicuous, yellowish in color, arising from the subhymenium, projecting from the surface of the hymenium 30–40 μ , fusiform, setae-like, 50–140×6–10 μ , incrusting toward the tip; hymenial layer yellowish; subhymenium of a layer below hymenium 250–380 μ thick, pale mouse gray to mouse gray, the color disappearing by the addition of KOH solution; succeeding layer 500–700 μ thick, colorless or slightly yellowish; the entire structure consisting of loosely interwoven hyphae 3.7–6.3 μ in diameter, slightly incrusting, septate, with clamp connections; basidium 3.2–3.5 μ in diameter with 4 sterigmata; spores ovoid, smooth, apiculate, 5.7–8.3×2.9–3.7 μ , hyaline.

Habitat: On the logs of *Quercus serrata* THUNB. used in culturing *Cortinellus Berkeleyanus* ITO et IAM. Bittu Kurasiki, collected July 1940; and Bizen Kozima-Gun, Fuzito, collected December, 1941. On the fallen branches of a deciduous in the Kamo National Forest, Mitu-Gun, Bizen, collected November, 1941; similarly at Gagyu-Zan, Takahasi, Bittu.

Distribution: North America, Cuba, Porto Rico, South America, Guatemala, Australia, Cochin China and Japan (Bizen and Bittu).

Stereum umbrinum is one of the most common of fungi infesting on the logs used in culturing Shiitake mushroom — *Cortinellus Berkeleyanus* — and is highly destructive. In almost all cases it does not form the characteristic dimidiate to narrow shelf-like pileus, but it is effused resupinate when occurring on the logs. In the material collected at Fujito, pileus was present and it measured 1.7–2×

* Colors are of RIDGWAY'S "Color Standards and Color Nomenclature". 1912.

10 cm. On some small branches collected at Gagyū-Zan, Takahasi, Bittu, the fructifications were thin in texture, 0.5–0.7 mm. in thickness, non-pilate, and resembled species of *Hymenochaete* or *Peniophora*. The variation was quite marked in those formed on the logs in our Institute at Kurasiki, having a very uneven surface, often of sunken spots.

We have noted a grayish hyphal layer between the hymenium and the hyaline hyphal layer when observed under a microscope, although Burt does not recognize the presence of this particular layer. Important characteristic of this fungus is the change of color of the fructification from a beautiful purple to pale tobacco color upon drying. The fungus is destructive on account of covering the whole surface of log with the fructification, extending even over on to the fructifications of other species of fungi, such as *Irpex lacteus* Fr. in the log collected at Fujito.

II. *Stereum roseo-carneum* (Schw.) Fries.

Japan name: *Sumire-uroko-take*.

Plate V, Fig. 4; Plate VIII, Fig. 25; Plate IX, Fig. 32–35.

Fries, R. Soc. Sci. Upsal. Actis III, 1: 112, 1851; Burt, Mo. Bot. Gard. Ann., 7: 229, pl. 6, f. 77.

Thelephora roseo-carnea Schweinitz, Naturforsch. Ges. Leipzig Schrift, 1: 107, 1822 (under *C. Corticia*).

T. anthochroa Schweinitz, Am. Phil. Soc. Trans. N. S., IV: 168, 1832, (but not *T. anthochroa* of European authors).

Corticium lilacino-fuscum Berkeley et Curtis, Grevillea, I: 180, 1873; Sacc., Syll. Fung., VI: 621, 1888; Massee, Linn. Soc. Bot. Jour., XXVII: 143, 1890.

Stereum lilacino-fuscum (Berke. et Curt.) Lloyd, Myc. Writ. V, Letter, LXVIII: 3, 1919.

S. sendaiense Yasuda, Tokyo Bot. Mag., XXXI: 221, 1917; Lloyd, Myc. Writ. V, Myc. Notes, XLVIII: 680, text fig. 1015, 1917; Matsumura, Appl. Myc., 972, 1934.

Corticium subrepandum Berkeley et Cooke, Grevillea, VI: 81, 1878; Sacc., Syll. Fung., VI: 608, 1888; Massee, Linn. Soc. Bot. Jour., XXVI: 1119, 1890.

Fructifications soft coriaceous, effuso-reflexed; lower margin slightly reflexed; pileus sub-tomentose, zonate, very finely wrinkled, light buff to pinkish buff, context white; hymenial surface deep livid purple to dark livid purple changing appreciably to jauque brown to dull indian purple; in structure 300–350 μ thick, hymenium consisting of numerous yellowish dendroid paraphyses 2.5–5 μ wide and heavily incrustated, few hyaline, sub-torulose paraphyses 5–7.5 μ wide with little or no incrustation; hymenium and hyphal layer grayish, the hyphae of the latter bottle-brush-like, heavily incrustated, yellowish in color, 3.75–5 μ wide; hyaline layer below the grayish layer 70–100 μ in thickness, the hyphae non-incrustated, hyaline, 3.75 μ wide; entire layer loosely interwoven with hyphae provided with clamp connections; basidia few in number, 32–37.5 $\times$ 12.5–13.75 μ ; spores not observed.

Habitat: On the logs of *Quercus serrata* Thunb. used in culturing *Cortinellus Berkeleyanus* Ito et Imai, Ohara Institute for Agricultural Research, Kurasiki,

Bittu, collected July, 1940. On the dried fallen branches of a deciduous collected at Gagyū-Zan, Takahasi, Bittu, October 1941.

Distribution: North America, South America and Japan (Sendai and Bittu).

Our description agrees closely with that of YASUDA, who described the fungus under the name of *Stereum sendaiense*.

III. *Stereum gausapatum* FRIES.

Japan name: *Ti-uroko-lake*.

Plate V, Figs. 5-7; Plate VII, Figs. 23-24; Plate X, Figs. 39-41.

FRIES, Hym. Eur., 638, 1874; SACC., Syll. Fung., 6:560, 1888; MASSEE, Linn. Soc. Bot. Jour., 27:180, 1890; BURT, Mo. Bot. Gard. Ann., 7:136, pl. 4, f. 36, 1920.

Telephora guasapata FRIES, Elenchus Fung., 1:171, 1828; Epicr., 538, 1838.

T. spadicea FRIES, Elenchus Fung., 1:176, 1828 (not *T. spadicea* PERSOON, Syn. Fung., 568, 1801).

Stereum spadiceum FRIES, Epicr., 549, 1838; Hym. Eur., 640, 1874; BERKELEY, Outlines Brit. Fung., 270, 1860; YASUDA, Tokyo Bot. Mag., 27:562, 1913; REA, Brit. Basid., p. 663, 1922; MATSUURA, Ooyōkinzingaku-kenkyū, p. 972, 1934; IMAZEKI, Nippon-Inka-syokubutuzukan, p. 381, pl. 186, f. 3-4, 1939.

S. spadiceum var. *plicatum* PECK, N. Y. State Mus. Rept., 50, p. 132, 1897.

S. cristulatum QUELET, Champ. Jura et Voges, 3:15, pl. 1, f. 15, 1875.

S. occidentale LLOYD, Myc. Writ., 5 Letter, 69, p. 12, 1919.

S. quercinum POTTER.

Fructifications coriaceous, effuso-reflexed, 10 cm. or larger; pileus shell-like, dimidiate, cespitose, imbricate, tawny brown, clay color, buckton brown, hirsute with hairs of same color, zonata, 3-4×1-2.5 cm., margin acute, slightly to deeply split in places; context pinkish buff; hymenial surface light ochraceous salmon, light ochraceous buff, cinnamon buff, and when aged drab, producing reddish fluid upon injuring; conducting organ abundant in hymenium; hyphal layer 70-120×5-13 μ; spores hyaline, smooth, 6.2-9.5×2.6-4.2 μ; cystidia none.

Making white rot on deciduous logs.

Habitat: On the logs of *Quercus acutissima* CARR. and rarely *Quercus serrata* THUNB. both of which are used in culturing *Corticium Berkeleyanus* ITO et IMAI. Collected at Ohara Institute for Agricultural Research, Kurasaki, Bittu, September, 1941.

Distribution: Europe (Sweden, England, Holland, France, and Italy), North America (Canada, U. S. A., Mexico), Australia, China and Japan (Hokkaido, Honshu and Kyushu).

Stereum gausapatum begins to appear from late in autumn with the fructifications 0.5-1 cm. in size, warm buff in color but the margin white. In May and June it makes its greatest appearance and becomes 5-15×1.5 cm. in size. The fructifications attain their maximum development in September. During the rainy

season of May and June, the pileus shows a reddish color, and the water droplets that adhere to it are often tinged with a similar color. The fructification can be stripped off from the substratum readily in winter.

Cortinellus Berkeleyanus develops its fruiting bodies on the logs that are later infected with *Stereum gausapatum*, the presence of which may give a unfavorable sight to the logs. Because of the superficial nature of the fungus, the logs can be cleared of the fructifications by stripping off.

The fungus was found to occur most abundantly on the logs of *Quercus* spp.

Hairs of the dried specimens are readily eaten by herbarium insects, and this fact has already been noted by BURT.

IV. *Stereum hirsutum* (WILLD.) FR.

Japan name: *Ki-uroko-take*.

Plate VI, Figs. 11-14; Plate VIII, Fig. 26; Plate X, Fig. 42-43.

FRIES, Epicr., 549, 1838; Hym. Eur., 639, 1874; PERSOON, Romer Neues Mag. Bot., 1: 110, 1794; Obs. Myc., 2: 90, 1799; BERKELEY, Outlines Brit. Fung., 270, pl. 17, f. 7, 1860; KICKX, p. 261; WINTER, Pilze, I: 345, 1884; SACC., Syll. Fung., 6: 563, 1888; BURT, Mo. Bot. Gard. Ann., 7: 150, pl. 5, f. 2, 1920; REA, Basid. Brit., 664, 1922; IMAZEKI, Nippon-Inka-syokubutu-Zukan, p. 391, pl. 186, f. 2, 1939; YASUDA, Tokyo Bot. Mag., 28: 91, 1914; MATSUURA, Ooyôkinzingaku-kenkyu, p. 967, 1934.

Thelephora hirsuta WILLDENOW, El. Berol. Prodrum., 397, 1787; FRIES, Syst. Myc., 1: 439, 1821; PERSOON, Syn. Fung., 570, 1801; Mycol. Eur., 1: 116, 1822.

Auricularia reflexa BULLIARD, Herb. de la France, 1: 281, pl. 274, 1785.

Auricularia aurantiaca SCHUM., Ennmer, II, p. 398.

Thelephora ochracea SCHWEINTZ, Naturforsch. Ges. Leipzig Schrift, I: 106, 1822, (but not of FRIES).

Thelephora subzonata FRIES, Elenchus Fung., 1: 181, 1828; SCHWEINTZ, Am. Phil. Soc. Trans. N. S., 4: 167, 1832.

Corticium subzonatum FRIES, Epicr., 557, 1838; SACC., Syll. Fung., VI, 608, 1888.

Stereum Variicolor LLOYD, Myc. Writ., 4, Letter 53: 10, 1914.

Fructifications coriaceous, rigid, effuso-reflexed; pileus often dimidiate, strigose-hirsute, cream buff, yellow ochre to tilleul-buff on aging, lightly zonate; hymenial surface light cadmium, lemon chrome to pinkish buff, vinaceous buff, tilleul-buff when old but leaving yellowish margin; in structure 500-800 μ thick, with narrow golden zone next to the hairy covering; hyphae hyaline, 3-6 μ wide, some yellowish in subhymenium but not of conducting organs; cystidia none; spores hyaline, flattened on one side, 5-7 $\times$ 5-3 μ .

Habitat: On the logs of *Castanea crenata* SIEB. et ZUCC., *Quercus serrata* THUNB. and *Quercus acuta* THUNB. used in culturing *Cortinellus Berkeleyanus* ITO et IMAI, Kamo National Forest, Mitu-Gun, Bizen, collected November 1941, and Ohara Institute for Agricultural Research, Kurasiki, Bittu, collected October, 1941.

Distribution: Europe (Sweden, England, France, Germany and Italy), North America (Canada, U. S. A., Mexico), Japan (Central and Southern Honsyu).

The pileus of *Stereum hirsutum* resembles very closely that of *Stereum fasciatum* but the former does not become large as the latter. The damage to the logs is great; the effused fructifications often become as large as 12×30 cm. in size. *Quercus* logs at Kamo were found to be almost entirely affected by this fungus. Once affected by this fungus, it is almost impossible to remove the fructifications completely by simple scraping. *Quercus* logs are usually quite resistant to the attack of fungi, but are apparently much invaded by *S. hirsutum* and a few species of *Hymenochaetes*. Fructifications on the logs of *Castanea crenata* SIEB. et Zucc. and *Quercus serrata* THUNB. are as a rule small.

V. *Stereum fasciatum* SCHWEINITZ.

Japan name: *Tya-uroko-take*.

Plate VI, Figs. 15–16; Plate VII, Figs. 21–22.

SCHWEINITZ, Naturforsch. Ges. Leipzig Schrift., 1: 106, 1832; SACC., Syll. Fung. 6: 560, 1888; BURT, Mo. Bot. Gard. Ann., 7: 155, pl. 5, f. 43–45, text f. 23, 1920; YASUDA, Tokyo Bot. Mag., 16: 19, 1912; UMEMURA, Tokyo Bot. Mag., 28: 358, 1914; KANEHIRA, Trans. Taiwan Nat. Hist., No. 36: 88, 1918; SAWADA, Taiwan Kinrui Tyosahokoku, 5: 67; MATSURA, Ooyokinzingaku-kenkyu, p. 965, 1934 (cites YASUDA and UMEMURA).

Stereum fasciatum (SCHW.) FR., Epicr., 546, 1838; MASSEE, Linn. Soc. Bot. Jour., 27: 180, 1890; IMAZEKI, Inkwa-Syokubutu Zukan, p. 391, pl. 186, f. 1, 1939.

Thelephora versicolor β *fasciata* (SCHW.) FRIES, Elanchnus Fung., 1: 175, 1828; SCHWEINITZ, Am. Phil. Soc. Trans. N. S., 4: 167, 1832.

T. ostrea BLUME & NEES, Acad. Leop.-Carol. Nov. Acta., 13: 13, pl. 2, 1826.

Stereum ostrea (BLUME et NEES) FRIES, Epicr., 547, 1838; SACC., Syll. Fung., 6: 571, 1888; BRESADOLA, Hedwigia, 51: 321, 1912.

Thelephora (Stereum) mollis LEVEILLE, Ann. Sci. Nat. Bot., III, 5: 147, 1846.

Stereum molle LEVEILLE, Champ. Mus., p. 147; SACC., Syll. Fung., 6: 577, 1888; MASSEE, Linn. Soc. Bot. Jour., 27: 175, 1890.

S. arcticum FRIES, Hym. Eur., 639, 1874.

Fructifications coriaceous; pileus dimidiate to fan shaped, densely tomentose, warm buff to tawny olive, pale gull gray to pale smoke gray to neutral gray on weathering, highly zonate, chestnut brown to russet, slightly rugulose, with margin more or less undulate, thin, acute; hymenial surface even, warm buff to light pinkish cinnamon and avellaneous; context white; in structure 400–800 μ thick; hymenium, intermediate hyphal layer, and dark cuticular layer simple in arrangement; spores according to IMAZEKI hyaline, 6×2.5–3 μ .

Habitat: On the logs of *Quercus acuta* THUNB. used in culturing *Cortinellus Berkeleyanus* ITO et IMAI, Kamo National Forest, Mitu-Gun, Bizen, collected November, 1941.

Distribution: Europe (Norway, Sweden), North America (Canada, U. S. A., Mexico), Central America, South America (Brazil), Philippine Islands, Java, and Japan (Honsyu, Taiwan).

Stereum fasciatum develops on the logs of *Quercus acuta* and the size of the fructification is 4-5×2-3 cm., rarely as long as 7 cm. under special conditions. The fungus resembles *Stereum hirsutum* but can be differentiated by the character of the pileus.

VI. *Stereum vibrans* BERK. et CURTIS.

Japan name: *Sabi-uroko-take*.

Plate VI, Figs. 17-18; Plate VIII, Fig. 28; Plate IX, Fig. 36.

BERKELEY & CURTIS, Linn. Soc. Bot. Jour., 10:332, 1868; SACC., Syll. Fung., 6:577, 1888; BURT, Mo. Bot. Gard. Ann., 7:179, pl. 5, f. 52, 1920; IMAZEKI, Nippon-Inkwasyokubutu-Zukan, p. 389, pl. 185, f. 5, 6, 1939.

Stereum cupulatum PATOUILLARD, in DUSA, Fl. Crypt. Antilles Fr., 233, 1904.

Hymenochaete vibrans BERK. in YASUDA, Tokyo Bot. Mag., 28:521, 1914; MATSUURA, Ooyôkinzingaku-kenkyu, p. 974, 1934.

Hymeno-chaete vibrans MASSEE, Linn. Soc. Bot. Jour., 27:117, 1891.

H. veluticipi B. et C. in SACC., Syll. Fung., 6:577, 1888.

Fructifications coriaceous, firm, effuso-reflexed; pileus dimidiate, imbricate, 2-7 cm. wide, upper surface sudan brown, amber brown to SACCARDO's umber, velvety hirsute, zonate, undulate, slightly split radially; hymenium sudan brown, antique brown to wood brown, drab, powdery; in structure 600-800 μ thick; hymenial and hyphal layers yellowish brown; intermediate layer, brownish, blackish in KOH; hyphae yellowish brown, 3.75-5 μ ; paraphyses blunt or acute apex like setae, 4-5 μ wide, occasionally incrustated; spores according to BURT hyaline, even, 4-5×2.5-3 μ .

Habitat: On the logs of *Quercus serrata* THUNB. used in culturing *Cortinellus Berkeleyanus* ITO et IMAI, Kamo National Forest, Mitu-Gun, Bizen, collected November, 1941; and similarly, Gagyû-Zan, Takahasi, Bittu, October, 1941.

Distribution: Cuba, Jamaica, China, Japan (Honsyu, Sikoku, Kyusyu).

Stereum vibrans develops on the logs of *Quercus serrata*, but not very abundantly. The fructifications are effused, reflexed and are usually 7×6 cm. in size.

VII. *Stereum roseum* YASUDA.

Japan name: *Usubeni-uroko-take*.

Plate VI, Figs. 8-10; Plate VIII, Fig. 27; Plate X, Fig. 37-38.

YASUDA, A., Tokyo Bot. Mag., 36:41, 1922; MATSUURA, Ooyôkinzingaku-kenkyu, p. 970, 1934; IMAZEKI, Nippon Inka-syokubutu-Zukan, p. 395, pl. 188, f. 4-5, 1939.

Fructifications effuso-respinate, sub-fleshy when wet, coriaceous-membranous, very slightly reflexed on drying, back surface carob brown, even; hymenial surface flesh-pink, coral pink, fading to light vinaceous fawn, vinaceous buff, avel-laneous on drying, even; in structure 200–500 μ thick; cystidia hyaline, thick walled, elliptic-fusiform, incrusting, 35–70 $\times$ 8–20 μ , projecting 15–30 μ ; yellowish brown cuticular layer in back surface; hyphal layer slightly colored; hyphae hyaline, thin walled, with clamp-connections, branched, slightly incrusting, undulating, 2.5–3.75 μ wide; basidia hyaline, 12–48 $\times$ 3–4.6 μ , with 4 sterigmata; spores hyaline, 6–7.5 $\times$ 2–2.5 μ , ellipsoid and curved on one side.

Habitat: On the logs of *Quercus serrata* THUNB. used on culturing *Cortinellus Berkeleyanus* ITO et IMAI, and on branches of *Prunus serrata*, Ohara Institute for Agricultural Research, Kurasiki, Bittu, collected July, 1940.

Distribution: Japan (Honsyu, Sikoku, Kyusyu).

Stereum roseum develops on deciduous logs abundantly during the rainy period of June and July, making the fructifications of 4–7 cm. in diameter, coalescing to 15 cm.; but in most cases they cease growth at 0.5–1 cm. in diameter. Margin is free and upon drying the whole structure becomes reflexed like a saucer. The central portion is raised. The growth on cherry is more vigorous than on *Quercus serrata*.

The general character of this organism is typical of species of *Peniophora* and as a member of *Stereum* it is quite imperfect. The authors are of the opinion that *S. roseum* best belongs in the genus *Peniophora*.

Key to the Species of *Stereum* described in this Paper.

1. Hymenial surface purplish.
 - A. The color fading to pale tobacco color on aging, cystidia colored, conspicuous, fusiform *S. umbrinum*.
 - B. The color fast, paraphyses numerous, dendroid *S. roseo-carneum*.
2. Hymenium producing red milk on injuring, conducting organs present . . .
. *S. gausapatum*.
3. Hymenium surface yellowish.
 - A. Fructifications effuso-reflexed at first, pileus with conspicuous zones, colored hyphae often interspersed in subhymenium *S. fasciatum*.
 - B. Pileus not conspicuously zonate *S. hirsutum*.
4. Hymenial surface sudan brown to drab, paraphyses present . . . *S. vibrans*.
5. Hymenial surface fresh pink, fading on aging, cystidia present . . *S. roseum*.

Explanation of Plates.

Plate V.

All figures of colored Plate I and II have been drawn natural size from fresh specimens unless otherwise noted.

- Figs. 1 - 3.** *Stereum umbrinum*. Fig. 1. Upper side of a pileus. Fig. 2. Under side of the same. Fig. 3. Dried and faded specimen.
- Fig. 4.** *Stereum roseo-carneum*, showing resupinate and effused-reflexed fructification.
- Figs. 5 - 7.** *Stereum gausapatum*. Fig. 5. Upper side of pilei. Fig. 6. Under side of pilei. Fig. 7. Dried and faded specimen.

Plate VI.

- Figs. 8 - 10.** *Stereum roseum*. Fig. 8. Widely effused fructifications. Figs. 9 - 10. Small young fructifications.
- Figs. 11 - 14.** *Stereum hirsutum*. Figs. 11 - 12. Resupinate fructifications. Figs. 13 - 14. Upper side of pilei.
- Figs. 15 - 16.** *Stereum fasciatum*. Fig. 15. Under side of a pileus. Fig. 16. Upper side of a pileus.
- Figs. 17 - 18.** *Stereum vibrans*. Fig. 17. Under side of a pileus. Fig. 18. Upper side of a pileus.

Plate VII.

All figures of Plates III and IV have been reproduced natural size from photographs of dried herbarium specimens or fresh ones unless otherwise noted.

- Figs. 19 - 20.** *Stereum umbrinum*. Fig. 19. Resupinate fructifications. Fig. 20. Upper side of a pileate form of the fructification.
- Figs. 21 - 22.** *Stereum fasciatum*. Fig. 21. Upper side of two pilei. Fig. 22. Under or hymenium side of two pilei.
- Figs. 23 - 24.** *Stereum gausapatum*. Fig. 23. Upper as well as under side of fructifications from dried herbarium specimens. Fig. 24. Young resupinate fructifications from fresh materials.

Plate VIII.

- Fig. 25.** *Stereum roseo-carneum*. (A) and (B) Resupinate reflexed fructifications. (C) Resupinate fructification.
- Fig. 26.** *Stereum hirsutum*. (A) Under side of a pileus. (B), (C) and (D) Upper side of three pilei.
- Fig. 27.** *Stereum roseum*. Surface view of the fructifications.
- Fig. 28.** *Stereum vibrans*. (A) Resupinate and slightly reflexed fructification. (B - D) Upper side of pilei.

Plate IX.

All figures in Plates V - VI, have been drawn from paraffin sections or water mount preparations with the aid of an Abbe's camera lucida under a Zeiss microscope.

- Figs. 29 - 31.** *Stereum umbrinum*. Fig. 29. Cystidia $\times 750$. Fig. 30. Paraffin section of hymenial region $\times 1650$. Fig. 31. Basidiospores from fresh material $\times 1650$.

Figs. 32-35. *Stereum roseo-carneum*. Fig. 32. Portion of a hypha with clamp-connections $\times 750$. Fig. 33. Hypha with small branches $\times 750$. Fig. 34. Dendroid paraphyses $\times 750$. Fig. 35. (A) Strangulated paraphyses $\times 750$. (B) Basidium $\times 750$.

Fig. 36. *Stereum vibrans* showing cylindrical paraphyses capitated with crystals, and aculeated $\times 750$.

Plate X.

Figs. 37-38. *Stereum roseum*. Fig. 37. Basidiospores $\times 1650$. Fig. 38. Cystidia incrustated with crystals $\times 750$.

Figs. 39-41. *Stereum gausapatum*. Fig. 39. Basidiospores $\times 1650$. Fig. 40. Conducting organs $\times 750$. Fig. 41. Section of a fructification showing distribution of conducting organs $\times 80$.

Figs. 42-43. *Stereum hirsutum*. Fig. 42. Section of a fructification $\times 80$. Fig. 43. Basidiospores $\times 1650$.

PLATE V.



Fig. 7.

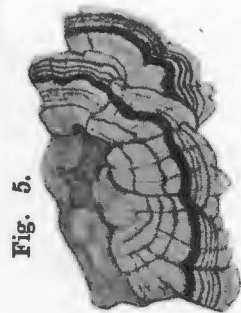


Fig. 5.

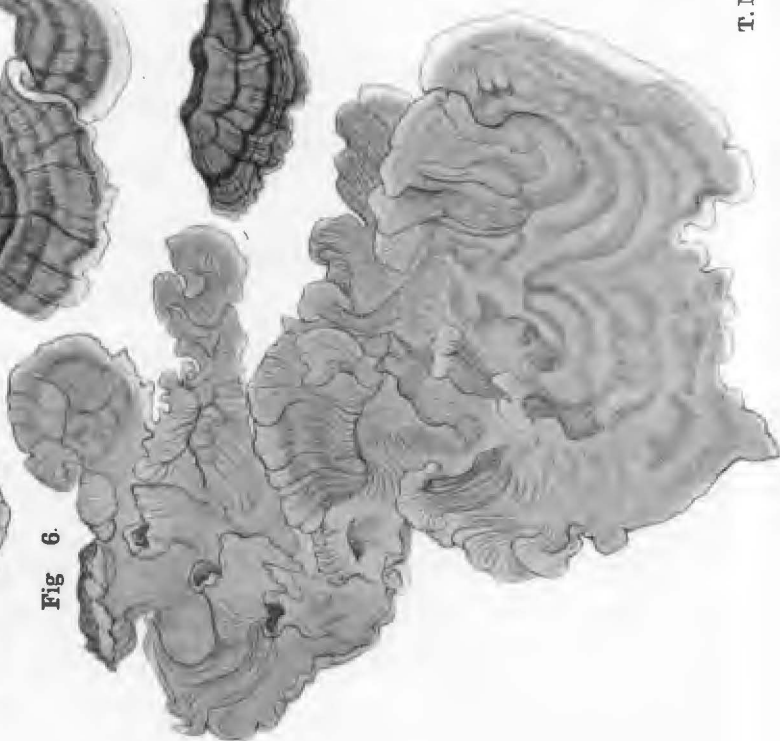


Fig. 6.

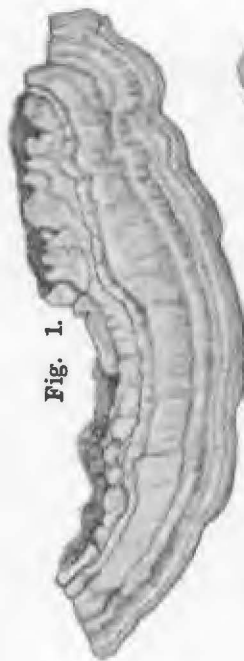


Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.

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PLATE VI.

Fig. 8.

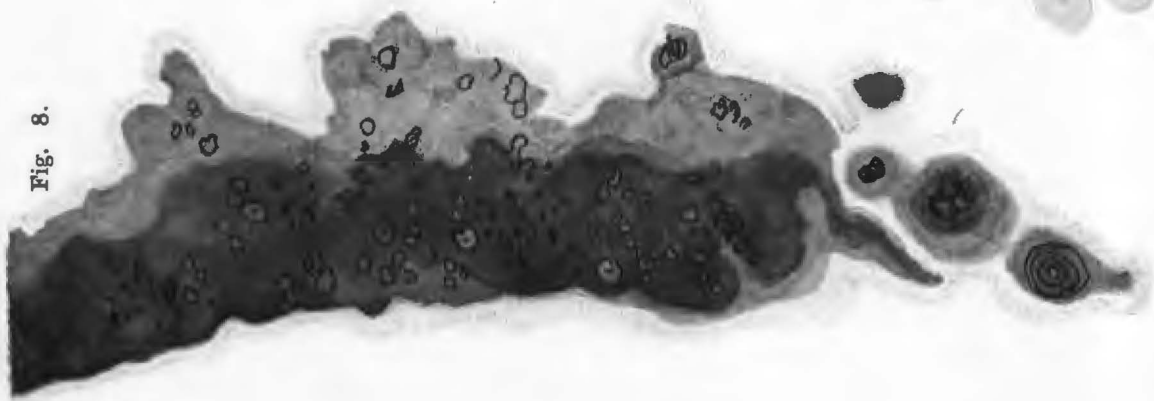


Fig. 9.



Fig. 10.

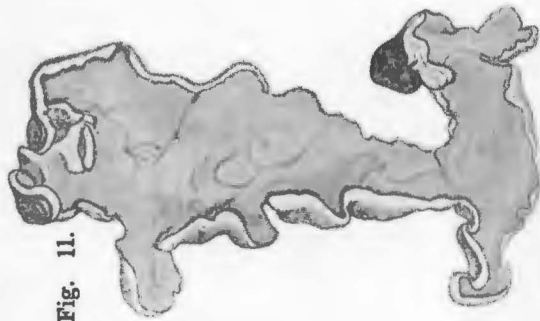
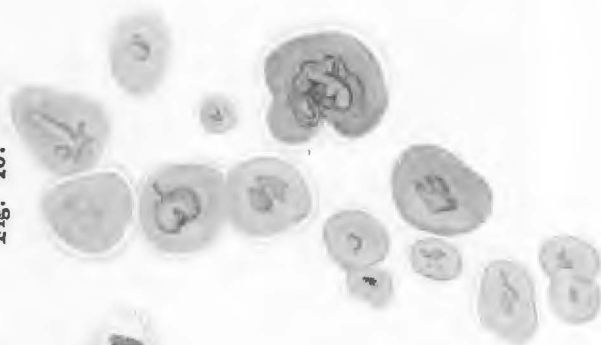


Fig. 11.

Fig. 12.



Fig. 13.



Fig. 14.



Fig. 15.

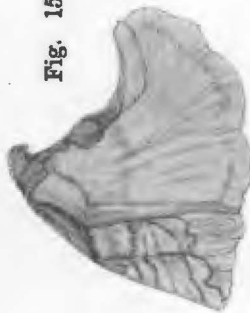


Fig. 16.

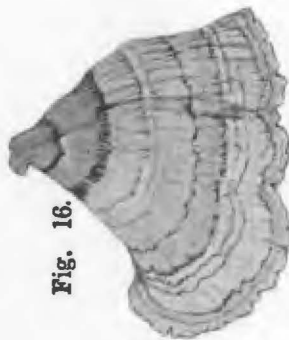


Fig. 17.

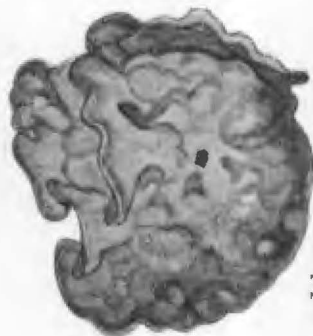


Fig. 18.



PLATE VII.

Fig. 19.



Fig. 23.



Fig. 20.



Fig. 21.

Fig. 24.



T. MIHASI photo.

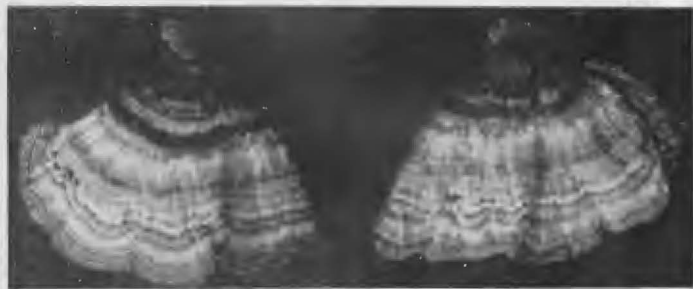


Fig. 22.



PLATE VIII.

Fig. 25.



Fig. 27.

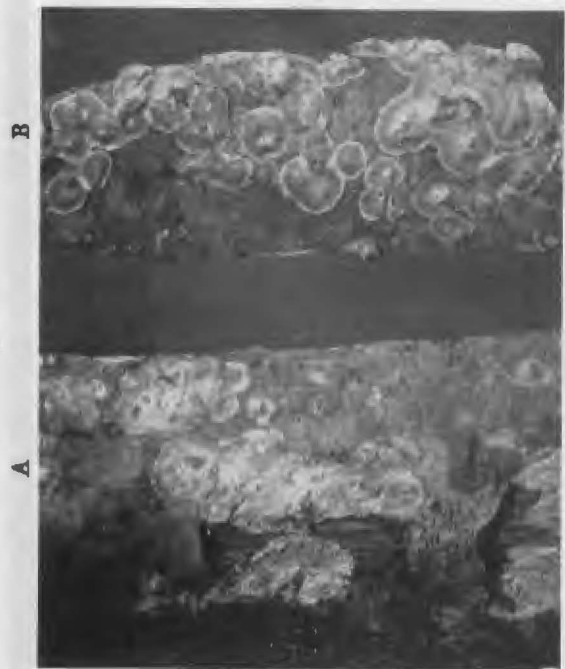


Fig. 26.

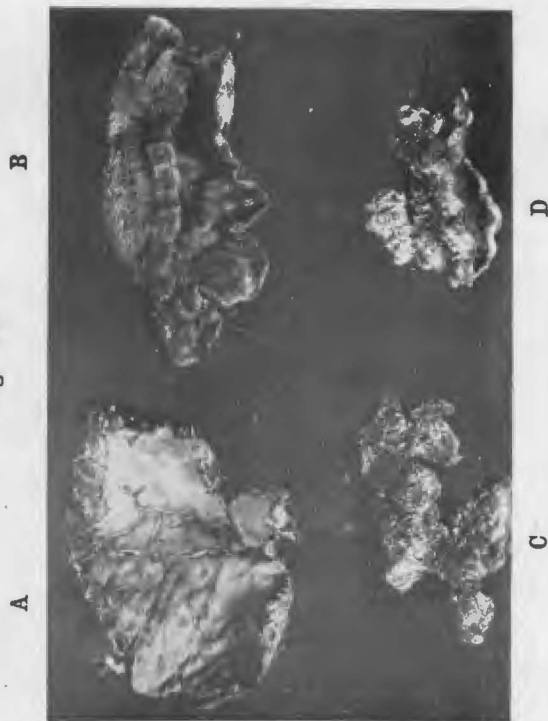


Fig. 28.

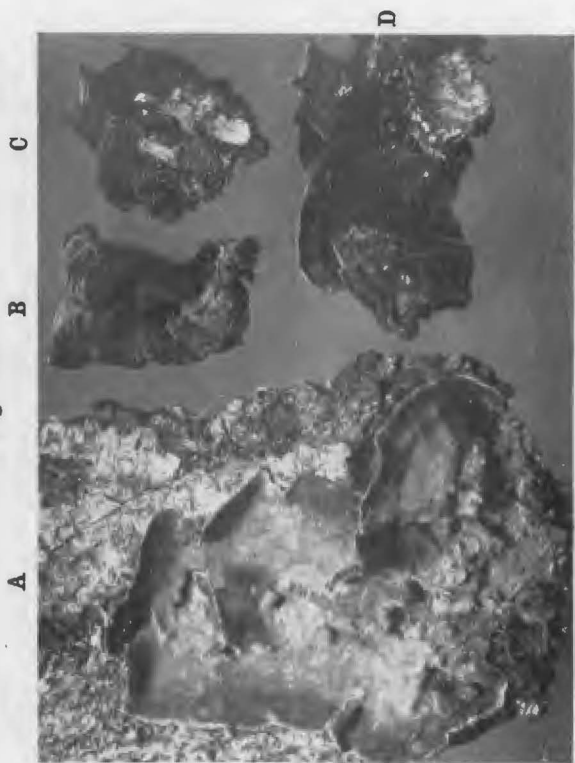


PLATE IX.

Fig. 29.

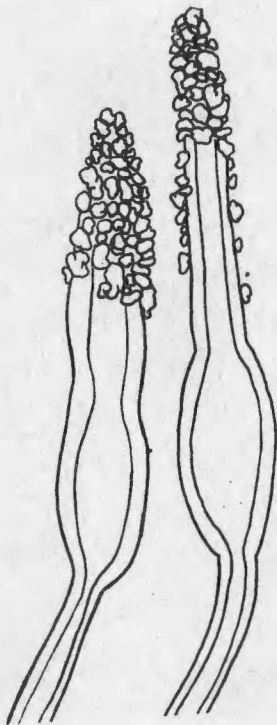


Fig. 30.

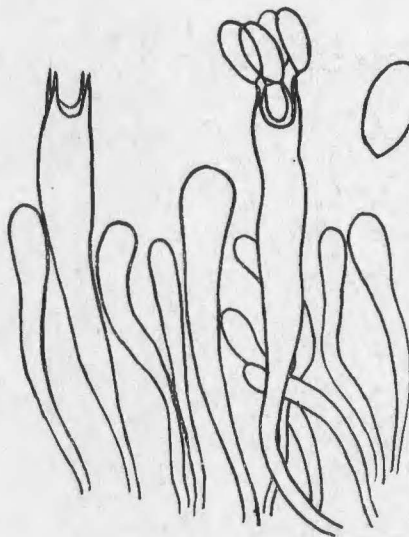


Fig. 31.

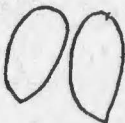


Fig. 33.

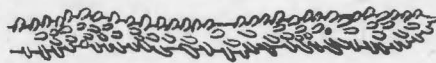


Fig. 34.

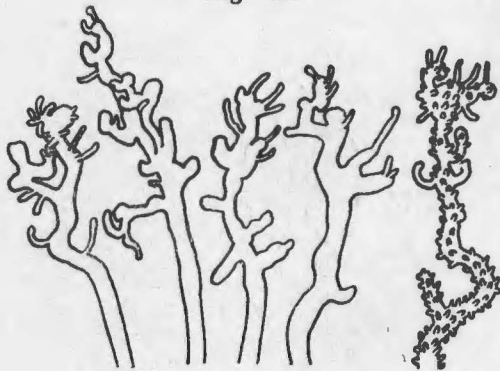


Fig. 32.



Fig. 35.

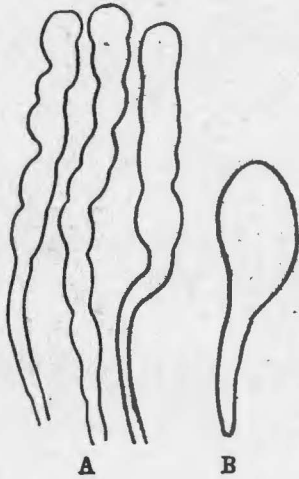


Fig. 36.

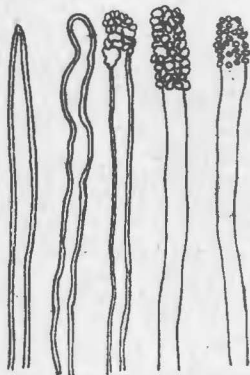


PLATE X.

Fig. 37.



Fig. 38.

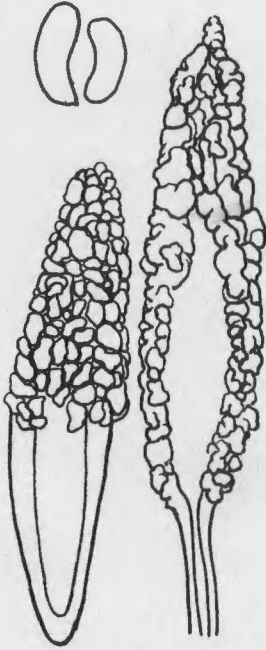


Fig. 39.

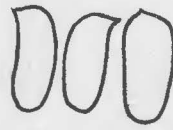


Fig. 40.

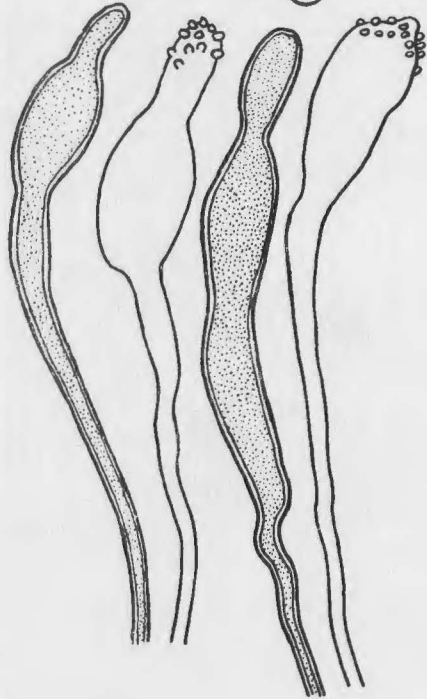


Fig. 43.



Fig. 41.

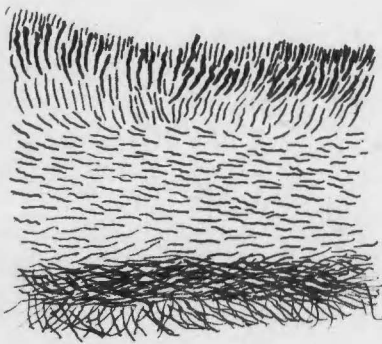
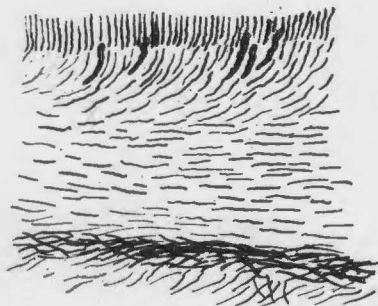


Fig. 42.



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