

*Material cited.*—CALIFORNIA: Smith 56294, 56602; Thiers 23953 (SFSC); COLORADO: Denver Bot. Garden 5043, 5147 (all MICH); Kauffman September 5, 1920 (MICH); Smith 52334, 52517, 52975, 84919, 84969, 85208, 85271, 85945; IDAHO: Smith 46030, 46322, 46407, 46668, 46739, 46774, 46913, 53499, 58725, 59139, 59290, 59820, 65661, 65904, 66050, 66263, 69752, 76724; OREGON: Smith 23646; UTAH: McKnight F1053 (MICH); Thiers 23758 (SFSC); WASHINGTON: Smith 30632, 30909, 30956, 40688, 40799, 40912, 48534; WYOMING: Kauffman, September 5, 1923 (MICH); McKnight 11034 (BPI); Smith 34917 (type, MICH), 35354, 35634, 35640, 35720, 35762.

125. ***Lactarius kauffmanii* sp. nov.**

var. ***kauffmanii***

Illus. Pl. 54; figs. 117, 119, 232.

Pileus 5-15(20) cm latus, fuscus vel atrobrunneus, viscidus, glaber. Latex albus, constans, gustu acer. Lamellae pallide griseo-vinacae demum incarnato-cinnamomeae, confertae, latae subdecurrentes. Stipes 5-10 cm longus, 1-3 crassus, saepe cavus, glaber, concolor cum lamellis, viscosus. Sporae 7-10 × 6.5-8  $\mu$ . Specimen typicum in Herbarium University of Michigan conservatum; legit prope Nordman, Idaho, 12 Oct 1956, Smith 54534.

Pileus 5-15(20) cm broad, broadly convex, disc depressed, margin inrolled and minutely tomentose at first, in age the margin elevated, surface colors blackish brown (“hair-brown,” “bone-brown,” “benzo-brown,” “clove-brown” or at times “seal-brown”) becoming drab to grayish or grayish vinaceous on aging, slimy-viscid, azonate, more rarely obscurely zonate, often virgate under the slime, glabrous, margin pubescent when very young, even. Context violaceous-brown near the cuticle, “pale vinaceous-fawn” near the lamellae; odor none; taste mild becoming acrid (test the lamellae). Latex white, unchanging, slowly staining the lamellae olivaceous to grayish brown, taste acrid.

Lamellae adnate to short-decurrent, close, narrow at first, broad at maturity, forking near the stipe, pallid becoming flushed pale dull vinaceous to “pale ochraceous-salmon,” in age flushed “pale pinkish cinnamon” or darker and often with brown stains as well as those from latex which may eventually become brown.

Stipe 5-10 cm long, 1-3 cm thick, often thicker in midportion, soon hollow, slimy-viscid, appearing varnished in dry weather, surface glabrous, pallid to vinaceous-cinnamon or tan, often uneven but characteristically scrobiculate.

Spore deposit white to off-white (in at least some instances if it is weakly yellowish at first, it becomes whitish on drying out). Spores  $7-10 \times 6.5-8 \mu$ , broadly ellipsoid; plage distinct and hyaline in Melzer's; ornamentation in the form of a distinct partial reticulum with the netting quite irregular as to the shape of the meshes, many elongated ridges present, isolated warts generally rare; prominences  $0.2-0.7(1.0) \mu$  high.

Basidia  $40-50 \times 9-12 \mu$ , 4-spored. Pleurocystidia: macrocystidia  $60-100 \times 9-12 \mu$ , fusoid-ventricose with acute apex to subaciculate, content granular; pseudocystidia not observed. Cheilocystidia present but remaining collapsed (about as for the macrocystidia but smaller). Gill trama lacking conspicuous lactifers. Pileus trama heteromerous, lactifers inconspicuous; some incrustations and/or debris in and near the cuticle. Pileus cuticle an ixotrichoderm arising from a basal zone about  $75 \mu$  deep of narrow repent hyphae, the slime KOH-stable. Stipe cortex with rosettes. Cuticle of stipe a distinct ixolattice collapsing to an "ixocutis," slime KOH-stable.

*Habit, habitat, and distribution.*—On soil, in coniferous woods, Washington, Oregon, California, Idaho, Alaska, British Columbia, and Michigan, July to November. Common in the Pacific Northwest.

*Observations.*—*L. kauffmanii* is one of the large *Lactarii* of the conifer forests of the Pacific Northwest, and, as for many common species, considerable variation in it has been noted. The color of the spore print varies from white to off-white to "pale pinkish buff" (almost white), and in some collections studied a cream-colored deposit became white after escape of moisture. In *L. mucidus* var. *fuscogriseus* and *L. kauffmanii* var. *sitchensis* the deposit is distinctly yellowish and this is maintained in drying. Spore size varies between  $8-11 \times 6.5-9 \mu$  for some collections, and  $7-10 \times 6-8 \mu$  for others. Deposited spores as a rule show less variation than those from revived gill tissue, and tend to measure smaller. Apparently the large spores are not always deposited. We have not, to our satisfaction, demonstrated that the larger spores are borne on 2-spored basidia. In Smith 77062, spores deposited on white paper were rehydrated in Melzer's and showed the wall as dull lemon-yellow with the reticulum violet. Spores from gill tissue of the same collection showed the spore wall as hyaline and the reticulum violet. In northern Idaho a variant occurs in which the spores measure  $7-9 \times 6-7 \mu$  from young pilei and  $8-10 \times 6.5-8 \mu$  from old pilei (both measurements from deposited spores), see Smith 82342. Some collections may stain slowly or fail to show olive or olive-gray stains, the change to brown developing slowly.

The cuticle of the pileus is an extremely well-developed ixotrichoderm as can be demonstrated readily from immature pilei. In fully expanded pilei it often appears, in sections, to be an ixolattice or a loosely interwoven ixocutis because of the extreme elongation (100-

150  $\mu$ ) of the hyphae. The ixotrichoderm simply collapses as moisture escapes from the layer and the hyphae become more or less cemented together and matted down. If sections are not properly revived, the hyphae never reassume their original arrangement. The slime on the pileus may be 2 mm deep in wet weather. The pleurocystidia (as macrocystidia) are much like those of *L. vinaceorufescens*—they tend to collapse in age in many collections. Section immature basidiocarps to gauge their frequency accurately.

The color of the pileus is blackish when fresh, but, on standing in the herbarium (in contact with naphthalene) for a few years, fades to drab or gray and often an ochraceous tone develops. Smith 79247 from Oregon had a strong and acrid taste followed by a bitter taste, and the latex in about 2 hours dried greenish. In Smith 56532 from California the latex was unchanging and the lamellae stained ochraceous along the edges. The lamellae were whitish becoming yellowish (lacking a pinkish gray flush). In Smith 56278, collected 5 days earlier at Trinidad, the gills stained brown where injured.

Because the color of the spore deposit, color changes of the latex, and the staining of injured tissues have been standard characters in the taxonomy of *Lactarius*, their variation in this species is of more than passing interest. As an aid to further study of this problem we have here grouped those of our collections upon which we have recorded the data, into groups as follows:

- Group 1. Spores white to off-white; latex changing to olive or staining tissues olive to olive-brown: Smith 40910, 54534 (type), 82337, 82342, 82382, 82413, 82416, 82420, 82448, 82579, 82831, 82833, 83015, 83017, 83063, 83064, 83066, 83729. Total 18 collections.
- Group 2. Spores white to pale cream; lamellae staining brown (no olive present). Smith 16897, 56278, 79247, 82624, 82752, 83016, 83065, 83769. 8 collections.
- Group 3. White spored; no stains. Smith 56532, 82082, 82627, 83062. 4 collections.
- Group 4. Spore deposit yellow (after air-drying); green stains (or olive) present. Smith 82414, 82447, 82451, 82745, 83728. 5 collections.

We recognize Group 1 as the type of *L. kauffmanii*. It is more common than the records indicate, and is unquestionably a widely distributed taxon in the Northwest. The remainder of the groups are not recognized as individual taxa at any level as we feel there are several possible discrepancies which may be involved in the groupings. Our data were accumulated over a 25-year period, but only recently have we taken care to check for long-delayed staining—and when this

does occur, the significance, taxonomically, may still be open to question. As far as olive and brown are concerned, the former may change to the latter and we cannot now be sure that both are not simply part of a  $\pm$  continuous reaction—one which may not always progress to completion depending on the condition of the basidiocarp. However, in some collections brown stains develop in a short time and are not preceded by olive tones. In summary, we have tried to bring the taxonomic problems involved in this group into focus so that they can be studied from the background we have established.

*L. kauffmanii*, as presently described, is distinguished by: (1) the dark to blackish brown slimy pileus; (2) slimy  $\pm$  vinaceous to tan stipe; (3) more or less pale vinaceous lamellae when young staining olive to gray and finally brown; (4) large size; and (5) the “in between” color of the spore deposit.

Dr. Calvin Henry Kauffman collected this species on his expedition to Lake Cushman, Washington, in 1915. We take pleasure in dedicating it to him.

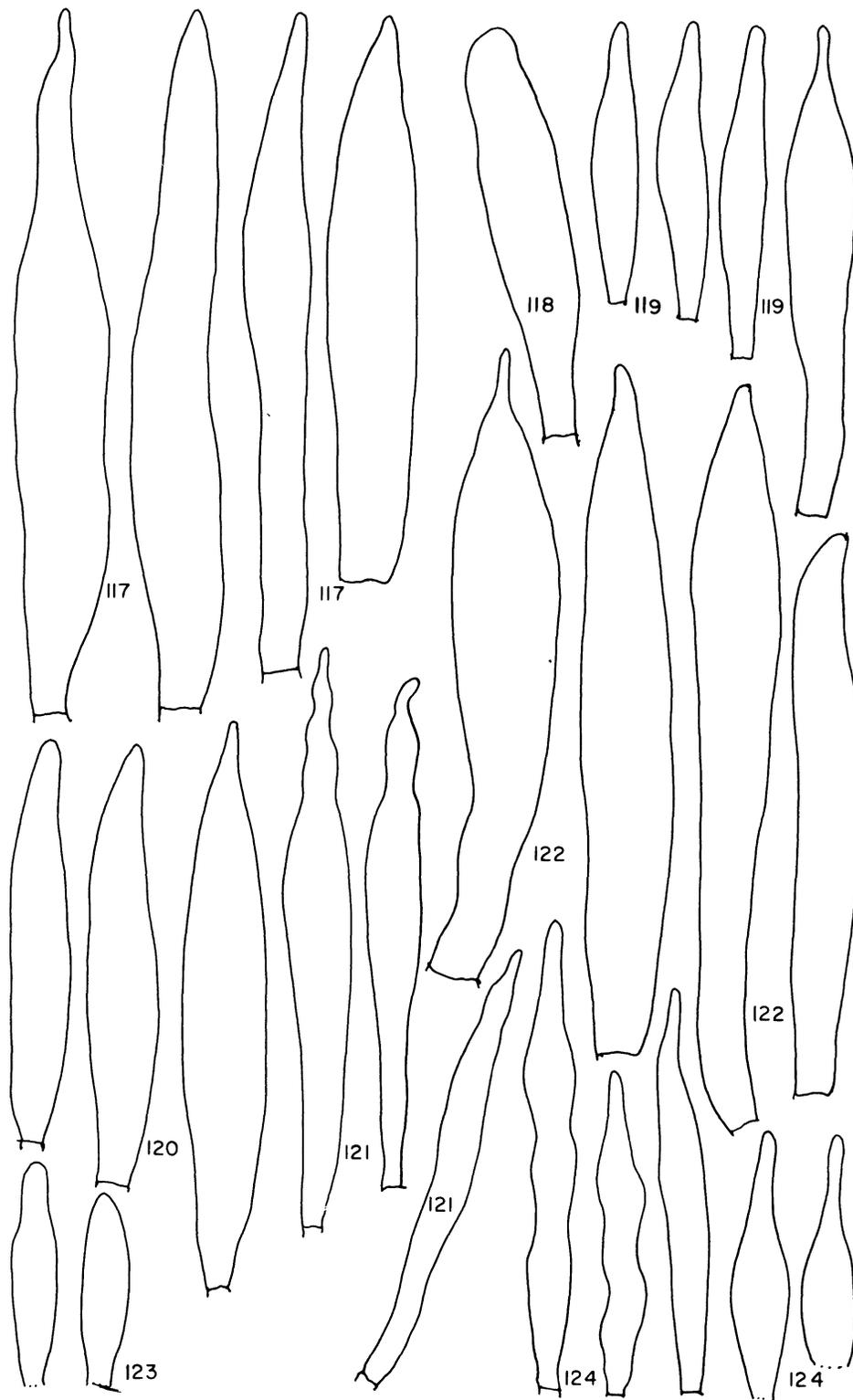
*Material cited*.—CALIFORNIA: Smith 56278, 56532; Thiers 8312, 21335, 21438 (all SFSC); IDAHO: Smith 54534 (type, MICH), 74011, 82049, 82337, 82342, 82382, 82411, 82413, 82414, 82416, 82417, 82418, 82419, 82420, 82447, 82448, 82450, 82451, 82579, 82624, 82627, 82745, 82752, 82831, 82833, 83015, 83016, 83017, 83062, 83063, 83064, 83065, 83066, 83155, 83162; MICHIGAN: Weber 4032 (MICH); OREGON: Kauffman, October 10, 1922 (MICH); Smith 79152, 79186, 79247, 82697, 82698, 82702, 83728, 83729, 83769; WASHINGTON: Kauffman, October 10, 1915 (MICH); Smith 16897, 17544, 29481, 31189, 31212, 40476, 40910, 40913, 47640, 48874, 77062, 77067, 82082; WISCONSIN: Weber 4262, 4264 (all MICH).

Canada. BRITISH COLUMBIA: Harrison, September 3, 1966 (MICH).

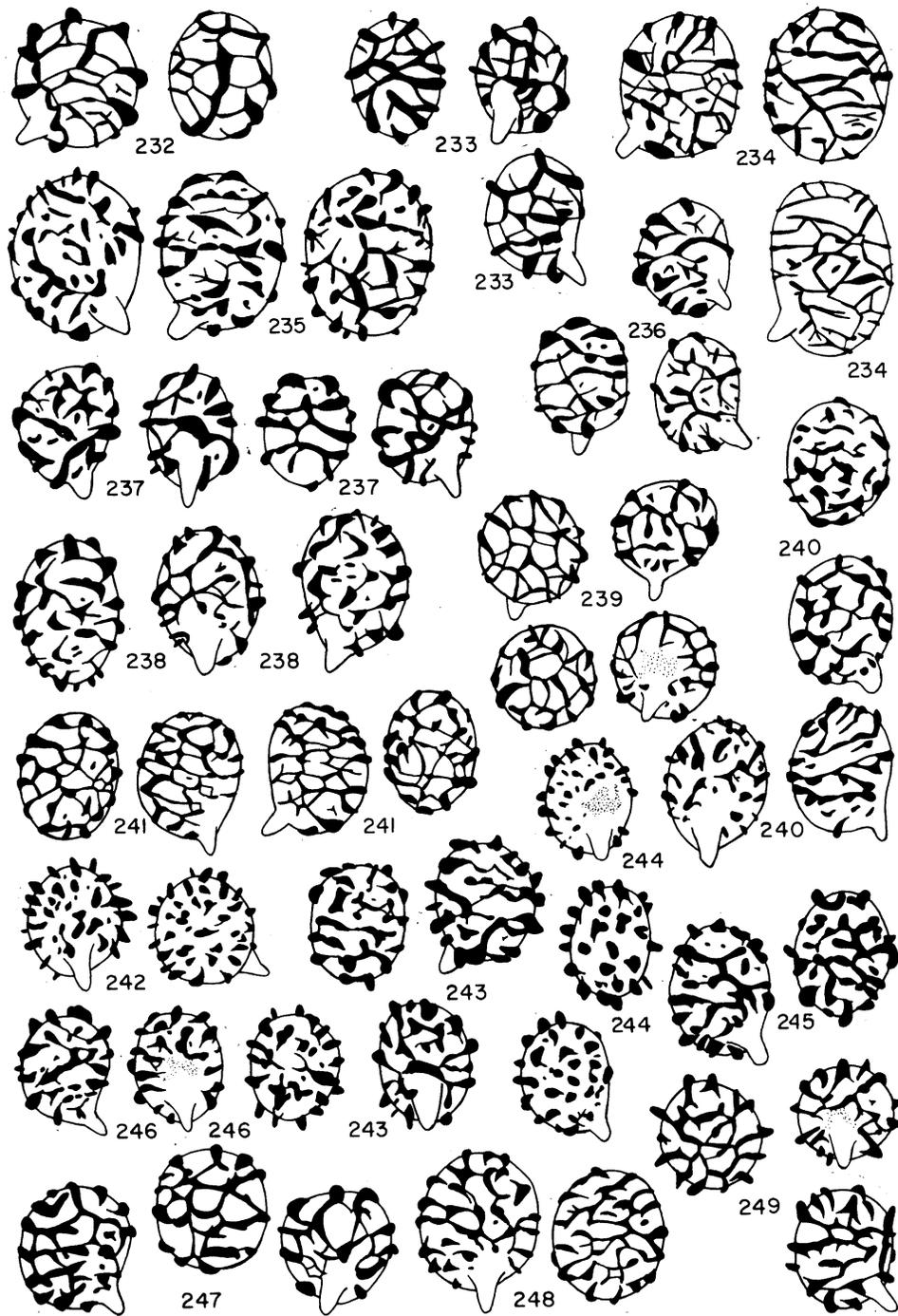
**125a. *Lactarius kauffmanii* var. *sitchensis* var. nov.**

Illus. Pl. 55.

Pileus (3)6-15 cm latus, late convexus demum plano-depressus, glaber, viscidus, atrovinaceus demum ligno-brunneus vel sordide luteo-brunneus, acer; latex albolacteus, acer, constans; lamellae confertae, adnatae vel decurrentes, albiae demum pallide ochraceae, leviter brunneo-maculatae; stipes 5-9 cm longus, (0.6)1-2 cm crassus, viscosus, subvinaceus vel pallidus, rare scrobiculatus; sporae in cumulis luteae, 7-9(10)  $\times$  6-7.5(8)  $\mu$ . Specimen typicum in Herbarium University of Michigan conservatum; legit prope Neskowin Creek,



Figs. 117-24. *L. kauffmanii* var. *kauffmanii*: macro, fig. 117; cheilo, fig. 119. *L. cordovaensis*: cheilo, figs. 118 and 123. *L. caespitosus*: macro, fig. 122; cheilo, fig. 120. *L. vietus*: macro, fig. 121; cheilo, fig. 124.



Figs. 232-49. *L. kauffmanii* var. *kauffmanii*: fig. 232, 2 spores. *L. mucidus* var. *fuscogriseus*: fig. 233, 2 spores. *L. caespitosus*: fig. 234, 3 spores. *L. mackinawensis*: fig. 235, 3 spores. *L. depressus*: fig. 236, 3 spores. *L. pseudoflexuosus*: fig. 237, 4 spores. *L. affinis* var. *viridilactis*: fig. 238, 3 spores. *L. hyginus* var. *americanus*: fig. 239, 4 spores. *L. trivialis*: fig. 240, 4 spores. *L. rufus* var. *rufus*: fig. 241, 4 spores. *L. rimosellus*: fig. 242, 2 spores. *L. hepaticus*: fig. 243, 3 spores. *L. thejogalus*: fig. 244, 2 spores. *L. occidentalis*: fig. 245, 2 spores. *L. areolatus*: fig. 246, 3 spores. *L. fragilis* var. *rubidus*: fig. 247, 3 spores. *L. imperceptus*: fig. 248, 2 spores. *L. subseriftuus*: fig. 249, 3 spores.

PLATE 54



Smith 54534

× 1

*Lactarius kauffmanii* var. *kauffmanii*