

# MYCOLOGIA

OFFICIAL ORGAN OF THE MYCOLOGICAL SOCIETY OF AMERICA

VOL. LXIII

NOVEMBER–DECEMBER, 1971

No. 6

---

## PILEATE HYDNACEAE OF THE PUGET SOUND AREA. I. WHITE-SPORED GENERA: AURI- SCALPIUM, HERICIUM, DENTINUM AND PHELLODON

D. HALL<sup>1</sup> AND D. E. STUNTZ

*Department of Botany, University of Washington, Seattle, Washington 98105*

### SUMMARY

Descriptions of fifteen taxa in four genera are provided, with keys for their determination. In the genus *Hericium* a subgeneric classification is proposed and five new forms are described. In the genus *Dentinum* a provisional variety is proposed. Macroscopic illustrations, as well as photomicrographs of spores, are provided for all taxa.

This is the first of three papers dealing with the taxonomy of the pileate Hydnaceae of the Puget Sound area in the state of Washington. The objectives of these papers will be to survey the species of pileate Hydnaceae occurring in the area, and provide keys and descriptions of important macroscopical and microscopical features. It will be of particular concern to present adequate photographs of the fungus itself and of its microscopic features. Lastly, these papers will contain descrip-

<sup>1</sup>This manuscript is abstracted in part from a dissertation submitted to the Graduate School of the University of Washington by Dennis Hall in partial fulfillment of the requirements for the degree of Doctor of Philosophy. Present address: Biology Department, Northeastern Illinois State College, Bryn Mawr at St. Louis Avenue, Chicago, Illinois 60625.

[MYCOLOGIA for September–October, 1971 (63: 937–1098)  
was issued October 11, 1971]

tions of taxa which have been subjected to chemotaxonomic analysis according to the procedures of Robbers et al. (1965) with some slight modification. The results of the chemotaxonomic aspects of the study will appear in *Lloydia*. In anticipation of a comparison of the morphological and chemotaxonomic systems, taxa have been separated that differ only slightly on morphological grounds. The reason for doing this is simply to avoid the mistake of combining different, chemically discernible entities.

The species have been grouped into stirpes, those in a given stirpe appearing to be more closely related to each other than to other members of the genus. This grouping was adopted to see if the chemical method employed could be utilized to distinguish between species appearing to be closely related morphologically, or if it was only sensitive enough to distinguish between stirpes within the genera.

K. A. Harrison (1961) published a survey of the group in Nova Scotia in which are presented his views on ecology and development of certain of the species. Harrison (1964) also published a paper concerned primarily with new species occurring in Idaho, Washington, Oregon and California. This paper has been extremely useful in dealing with certain taxa in this study.

Macrochemical reactions of fresh material were noted, using the following four reagents: 3% KOH, Sulfobenzaldehyde, Melzer's solution and Cotton blue solution.

The 3% KOH reagent is used to reinflate hyphae in dried carpophoral tissues but it is also applied to the cut flesh of fresh specimens. In certain cases such application turns the flesh blue-green to olive-green. This reaction was tested with some thelephoric acid crystals which had been isolated and purified by the methods outlined in Sullivan et al. (1967). The bluish black crystals of the terphenylquinone dissolved forming a bluish green to olive-green solution. Perhaps the addition of the base facilitates the air oxidation of the terphenylquinone to form the colored solution. Sulfobenzaldehyde reagent was also added to a few crystals of thelephoric acid. The result was bluish purple solution. Perhaps the chromophore formation is brought about by a Schiff-base reaction.

Melzer's solution reacts with starch and certain starch-like polysaccharides to form a blue-black colored complex. Cotton blue (=Aniline blue) solution is thought to be selectively absorbed on the walls of spores which have a dextrinoid reaction with Melzer's solution. Those which stain are called cyanophilous, those which do not are called

acyanophilous. For a detailed account of spore staining with this reagent see Kotlaba and Pouzar (1964).

Color designations preceded by a single asterisk are taken from Ridgway (1912). Those preceded by two asterisks were taken from Kornerup and Wanscher (1962). If a series of colors is given, the author citation will precede only the first color in the series. All collections listed with "Hall" numbers were made by the senior author, and are deposited in the private herbarium of D. Hall, at Northeastern Illinois State College, Chicago, Illinois.

All bright-field photomicrographs were taken with a Zeiss G.F.L. microscope equipped with a Wild Heerbrugg microphotoautomat (Model MKa4). The transformer was set at 6 volts; the film used was Kodak Panatomic X. Two types of mounting media were employed: Melzer's solution to photograph amyloid spores, using a yellow filter for better contrast, and 3% KOH, 2% phloxine, and 1% Congo red for structures other than the amyloid spores. Blue and green filters were employed when this medium was used.

KEY TO GENERA OF PILEATE HYDNUMS OF THE PUGET SOUND AREA

- 1A. Spores white in print.....2
- 2A. Spores amyloid; cystidia present in the hymenium.....3
- 3A. Basidiocarp white, variously branched, growing on logs; cystidia thick-walled, not reacting with sulfobenzaldehyde..*Hericium*
- 3B. Basidiocarp dark brown or blackish (weathered specimens), hirsute, growing on conifer cones; pileus reniform, laterally stipitate; cystidia thin-walled, reacting with sulfobenzaldehyde to give a bluish color.....*Auriscalpium*
- 2B. Spores inamyloid; cystidia absent from the hymenium.....4
- 4A. Spores smooth, apiculate; clamp connections present in the pileal trama.....*Dentinum*
- 4B. Spores ornamented, echinulate; clamp connections absent from the pileal trama.....*Phellodon*
- 1B. Spores brown in print.....5
- 5A. Basidiocarp turbinate or infundibuliform; context fibrous-woody or fibrous-corky, never fleshy-fibrous ..... *Hydnellum*
- 5B. Basidiocarp not turbinate or infundibuliform; context fleshy-fibrous.....*Hydnum*

AURISCALPIUM S. F. Gray, Nat. Arr. Brit. Pl. 1: 650. 1821.

TYPE SPECIES: *Auriscalpium vulgare* S. F. Gray.

Plants growing on buried conifer cones, dark brown, hispid, leathery-membranaceous. Pileus reniform, 1-2 cm diam, laterally attached at a

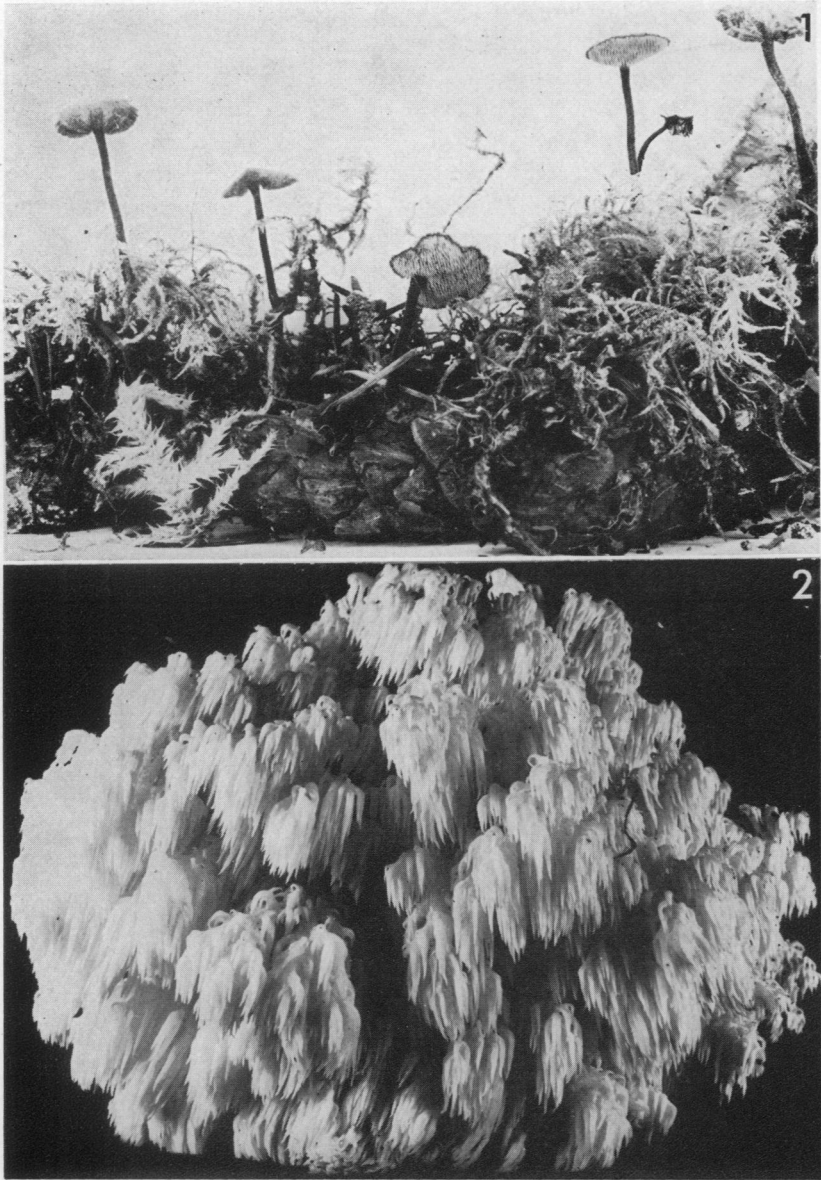


FIG. 1. *Auriscalpium vulgare*,  $\times 1/2$ .

FIG. 2. *Heridium abietis* forma *abietis*,  $\times 1/15$ .

sinus to a flexuous stipe. Spores smooth to finely punctate-roughened, \*\*white in print, amyloid. Cystidia present in the hymenium.

AURISCALPIUM VULGARE S. F. Gray, Nat. Arr. Brit. Pl. 1: 650. 1821.

Figs. 1, 16

Plants small, inconspicuous, 2–7.5 cm tall, occurring singly or in groups of two or three carpophores on *Pseudotsuga* cones buried in moss. Pileus hispid, convex-reniform, \*Liver Brown, Chocolate or \*\*cocoa. Spines short, up to 2.5 mm long, \*\*white to yellowish white. Stipe lateral, pliable, hispid, 3–7 cm long, 0.5–2 mm wide, \*\*rust-brown to dark brown.

Spores \*\*white in print, subglobose,  $4.7\text{--}5.3 \times 3.3\text{--}5.3 \mu$ ,<sup>2</sup> smooth or minutely punctate-roughened, apiculate, amyloid in Melzer's solution. cyanophilous. Cystidial elements in the hymenium thin-walled, not encrusted, turning purplish in sulfobenzaldehyde. Hyphae of the teeth 2.0–2.7  $\mu$  diam, with abundant clamp connections.

DISTRIBUTION: Island, King, Mason, San Juan, Snohomish and Thurston counties.

COLLECTIONS EXAMINED: Hall 83, 91, 92, 93, 97, 100, 101, 102, 103, 168, 1098, 1395 and 1630; Stuntz 1480 and 9319 (WTU).

Maas Geesteranus (1963a) gives a detailed discussion of the hyphal structure of *Auriscalpium vulgare*, and cites its synonymy at some length in another paper (Maas Geesteranus 1959). In all our collections the fungus grew on cones of *Pseudotsuga menziesii* (Mirb.) Franco.

HERICIUM Pers. ex S. F. Gray, Nat. Arr. Brit. Pl. 1: 652. 1821.

TYPE SPECIES: *H. coralloides* Scop. ex S. F. Gray.

Plants growing on wood, basidiocarp white, tuberculate, or variously branched, lacking a true, conspicuous stipe. Spines pendant, subulate. Spores smooth to finely punctate-roughened, \*\*white in print, amyloid. Gloeocystidia present in the hymenium.

KEY TO STIRPES

- 1A. Basidiocarp branched to varying degrees, at times forming a compact system; spines 1–25 mm long, borne on the undersides of branches or in fascicles at the branch tips.....2
- 2A. Spines in fascicles on the branch tips; spores  $5.3\text{--}6.7 \times 4.7\text{--}5.3 \mu$  .....Stirps *Coralloides*

<sup>2</sup> Dimensions given in tenths of microns here and in subsequent descriptions and keys are the result of the averaging of a number of measurements.

- 2B. Spines borne on the undersides of branches; spores  $4.0-4.7 \times 2.7-3.0 \mu$   
 ..... Stirps *Ramosum*
- 1B. Basidiocarp unbranched, tuberculate; spines to 4 cm long, borne on the  
 periphery of the carpophore; spores  $5.3-6.7 \times 4.7-5.3 \mu$ ..... Stirps *Erinaceus*

### Stirps CORALLOIDES

Basidiocarp branched, the branches either short or long; spines borne in fascicles on branch ends or knob-like appendages on the branches, small to medium length (1-25 mm). Spores  $5.3-6.7 \times 4.7-5.3 \mu$ , apiculate, smooth or slightly punctate-roughened, amyloid, acyanophilous.

#### KEY TO SPECIES

- 1A. Spores globose,  $5.8-6.3 \times 5.4-5.6 \mu$  (from Maas Geesteranus, 1959);  
 growing on hardwoods.....*H. coralloides*
- 1B. Spores globose to subglobose,  $4.8-5.3 \times 4.3-4.9 \mu$ ; growing on conifer  
 wood.....*H. abietis* and forms

#### KEY TO FORMS OF *H. ABIETIS*

- 1A. Plants branched to form a more or less open basidiocarp.....2
- 2A. Spines 1-3 mm long; basidiocarp composed of flexuous branches  
 .....*H. abietis* forma *brevispineum*
- 2B. Plants not as above.....3
- 3A. Spines regularly 10 mm long, rarely greater than 13 mm  
 long; basidiocarp obviously branched to base..*H. abietis* forma *abietis*
- 3B. Spines regularly 15-25 mm long; basidiocarp obviously  
 branched but not always to the base.....*H. abietis* forma *alpestre*
- 1B. Plants with extremely abbreviated branches, forming a compact mass;  
 spines 15-25 mm long.....*H. abietis* forma *weirii*

*HERICIUM ABIETIS* (Weir ex Hubert) K. A. Harrison, Canad. J. Bot.  
 42: 1208. 1964. forma *ABIETIS* FIGS. 2, 17  
*Hydnum abietis* Hubert. Outline of Forest Path., p. 305 New  
 York. 1931.

Plants of variable size, massive when mature, occurring singly on decaying conifer (*Abies* and *Pseudotsuga*) wood. Basidiocarp composed of a knob-like "stipe" inserted into the cracks in the wood, from which arise numerous branches. Branches glabrous, pliable, fleshy-fibrous, to 3 cm thick, rebranched and terminating in fascicles of fleshy, subulate, terete spines up to 1 cm long and 1 mm wide; some spines found in the interior of the carpophore on short knob-like appendages arising from the main branch. Carpophore \*\*white to cream colored, bruising to "yellowish gray and finally light \*Ochraceous-Orange, the

entire basidiocarp becoming very brittle and dark \*Ochraceous-Orange on drying.

Spores 4.8–5.3 × 4.3–4.9  $\mu$ , smooth or finely punctate-roughened, apiculate, spherical to subspherical, \*\*white in print, amyloid, acyanophilous. Basidia 30–40 × 6.7  $\mu$ , clavate, 4-spored. Cystidia elongate, 4.7–5.5  $\mu$  wide, extending into and becoming part of the interwoven tramal hyphae of the spine, thick-walled, distributed sparsely throughout the hymenium except at the spine tip where their occurrence is more frequent, encrusted, with granular contents, not reactive with sulfo-benzaldehyde. Hyphae 2.7–13  $\mu$  diam, dimitic, with abundant thick-walled elements leading to cystidia in the spine trama, clamps present.

DISTRIBUTION: Kittitas, Lewis, Mason, Pierce, Snohomish and Yakima counties.

COLLECTIONS EXAMINED: Hall 17, 26, 125, 130, 546, 556, 902, 1555, 1558, 1559, 1568, 1569, 1571, 1573, 1578, 1579, 1580, 1581, 1585, 1592.

Harrison (1964) considers that this species is confined to the coniferous woods of the Pacific Northwest and that the spores are intermediate in size between those of *Hericium coralloides* (Scop. ex Fr.) S. F. Gray and *H. ramosum* (Buss. ex Mérat) Letellier. Maas Geesteranus (1959), however, lists *Hydnum abietis* and *Hericium abietis* (Hubert) Nobles under species of doubtful position. He indicates that collections of these taxa conformed to his concept of *Hericium coralloides* except that the spores are slightly smaller.

We have chosen to recognize *Hericium abietis* because its spore size and substrate are sufficiently distinct, and have also recognized several forms, all having spore size and coniferous substrate in common.

In his treatment of *H. abietis* Harrison (1964) described two growth forms, one openly branched (the "alpestre" form), the other compact (the "caput-ursi" form). However, the use of "alpestre" and "caput-ursi" forms for this species entails some difficulties. *Hericium caput-ursi*, according to Maas Geesteranus (1959), is a compact form of *H. ramosum*, hence reference to a "caput-ursi" form of *H. abietis* would, we feel, lead to confusion. For this reason we have chosen to call the compact form *H. abietis* forma *weirii*.

*Hericium alpestre* is a species that also seems involved in a good deal of confusion. Bresadola (1932, Pl. 1062) figured as *H. alpestre* Pers. a specimen having short spines that point in every direction at the branch tips. Maas Geesteranus (1959, p. 121), after having studied and redescribed Persoon's specimen, stated that Bresadola's illustration does

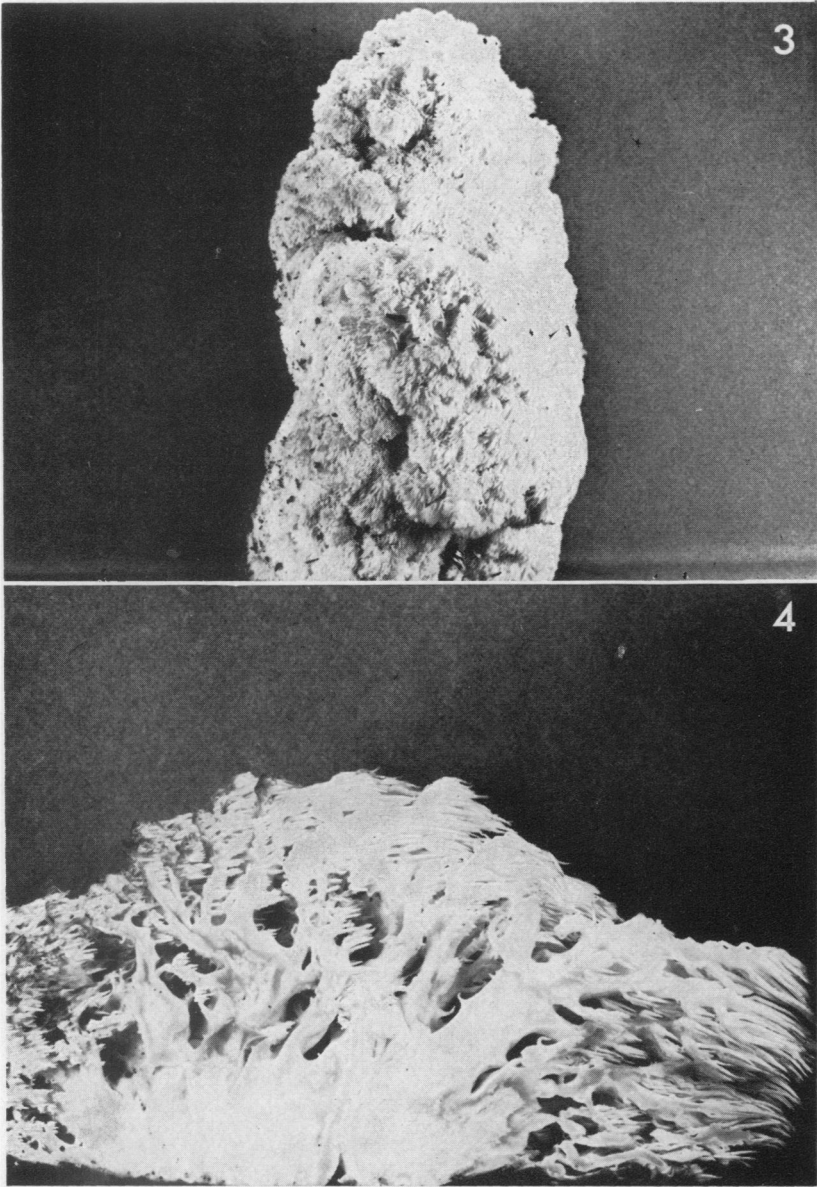


FIG. 3. *Hericium abietis* forma *weirii*,  $\times 1/15$ .

FIG. 4. *H. abietis* forma *alpestre*,  $\times 1/15$ .



not accurately represent the Persoon specimen, which has long spines (14 mm) that are stout (1 mm diam) and all directed downward. The spores measure (from Maas Geesteranus, 1959)  $5.8-6.3 \times 5.4-5.6 \mu$  in 3% KOH. We maintain the epithet "*alpestre*" in the sense of Persoon as the name of a form of *H. abietis* that occurs in the Pacific Northwest.

In the Pacific Northwest there is also a short-spined form, with spines 1-3 mm long, and directed at all angles from the branch tips. Peck (1899) described a small-spined *Hericium* that he called *H. caput-ursi* forma *brevispineum*. His description of this taxon agrees well with Bresadola's illustration of *H. alpestre* (1932; see above), which in turn is a good representation of the short-spined form that occurs in the Pacific Northwest. We shall, therefore, call this form *H. abietis* forma *brevispineum*.

In summary, the forms of *Hericium abietis*, all of which occur on conifer logs, can be listed in tabular fashion as follows:

<i>H. abietis</i> f. <i>brevispineum</i>	f. <i>abietis</i>	f. <i>alpestre</i> sensu Persoon	f. <i>weirii</i>
1. Basidiocarp flexu- ously branched	basidiocarp branched	basidiocarp closely branched	basidiocarp compact
2. spines 1-3 mm long	spines 8-12 mm long	spines 5-25 mm long	spines 15-25 mm long

These forms are perhaps caused by environmental variation. They are maintained, however, since they are morphologically distinguishable and could conceivably be separable chemotaxonomically.

***Hericium abietis* forma *weirii* (A. H. Sm.) Hall & Stuntz, stat. nov.**

Figs. 3, 18

*Hericium weirii* A. H. Sm. Mushroom Hunters Field Guide, revised and enlarged ed., p. 60. 1963 (nomen nudum).

Plants large, massive, to 21 cm  $\times$  20 cm, growing on decaying conifer logs, arising from a solid knot of fungal tissue emerging from a crack in the log. Basidiocarp very compact, branches extremely abbreviated, partially hidden by the spines, \*\*white to cream color, bruising to \*\*yellowish gray; context firm, fleshy-fibrous, \*\*white when first cut, then taking on a \*\*yellowish discoloration on standing; taste and odor none or fungoid. Spines \*\*white to cream color, bruising to \*\*yellowish gray, 10-25 mm  $\times$  1 mm, fleshy-fibrous, terete, subulate, found only on the branch tips in dense fascicles that obscure the branches, giving the fungus the appearance of a solid sheet of spines.

Spores  $5.0 \times 4.5\text{--}5.0 \mu$ , globose to subglobose, smooth, apiculate, amyloid, 1-guttulate, acyanophilous. Basidia clavate,  $30\text{--}40 \times 8 \mu$ , 4-spored. Cystidia  $5\text{--}8 \mu$  wide, cylindrical, encrusted, thick-walled, arising from the trama of the spine, where they are intertwined with the interwoven hyphae of the spine trama. Hyphae thin-walled,  $5\text{--}10 \mu$  diam, dimitic, with abundant clamps.

COLLECTION EXAMINED: Yakima county, Hall 1557.

This form is distinguished from forma *abietis* by its shorter and thicker branches and its longer spines (10–25 mm long).

***Hericium abietis* forma *alpestre*** (Pers. per Bres.) Hall & Stuntz,  
stat. nov. FIGS. 4, 19

*Hericium alpestre* Pers., Mycol. Eur. II: 151. 1825.

Plants large, 24 cm  $\times$  20 cm  $\times$  11 cm, roughly heart shaped, occurring singly on decaying conifer logs. Stipe composed of a solid knot of tissue attached to the log, with an open-branched system arising from the stipe, \*\*yellowish white to white, bruising to \*\*yellowish gray color; context firm, fleshy-fibrous, to 3 cm thick, \*\*cream color, extremely amyloid, taste and odor none or faintly fungoid. Spines to 2.5 cm  $\times$  1 mm, attached to the ends of the branches or in fascicles on knobby projections from the branch sides, thick, fleshy, terete, subulate.

Spores  $5.0\text{--}5.6 \times 4.6\text{--}4.9 \mu$ , globose, smooth, apiculate, amyloid, 1-guttulate, acyanophilous. Cystidia encrusted, to  $10 \mu$  wide, thick-walled, extending down into an interwoven with the spine trama. Basidia clavate,  $30\text{--}40 \times 8 \mu$ , 4-spored. Hyphae up to  $12 \mu$  diam, dimitic, thin-walled and thick-walled, with abundant clamp connections.

DISTRIBUTION: Kittitas, Mason and Pierce counties.

COLLECTION EXAMINED: Hall 122, 1557, 1584.

This form is distinguished from forma *abietis* by its longer spines (10–25 mm long). It is distinguished from forma *weirii* in that it is not a tuberculate mass or compact form, but is branched like forma *abietis*.

***Hericium abietis* forma *brevispineum*** (Pk.) Hall & Stuntz, stat.  
nov. FIG. 20

*Hydnum caput-ursi* Fr. var. *brevispineum* Pk., N. Y. State Mus.  
Bull. 25: 656. 1899.

*Hericium alpestre* Pres. per Bres., Icon. Mycol. 22. pl. 1062. 1932.

Plants large, 20  $\times$  15  $\times$  10 cm, occurring singly on conifer logs. Basidiocarp attached to the log by a knot-like mass of tissue from which

arise many flexuous branches; \*\*white to yellowish white, becoming \*\*yellowish gray when bruised; context firm, \*\*white or yellowish white and becoming \*\*yellowish on standing, taste and odor none or fungoid. Spines 8–10 per mm<sup>2</sup>, to 2 mm long, fleshy, terete, subulate, found in fascicles on the branches, sometimes along the branch sides, but arising in clusters from tubercles of tissue.

Spores 5.0–5.1 × 4.7–4.9 μ, apiculate, smooth, spherical, amyloid, acyanophilous. Basidia 30–40 × 5–10 μ, 4-spored. Cystidia encrusted, to 10 μ wide, extending down into the interwoven spine trama. Hyphae 5–10 μ diam, dimitic, thin-walled primarily, with thick-walled elements connected to the cystidia, clamp connections abundant.

DISTRIBUTION: Pierce and Yakima counties.

COLLECTIONS EXAMINED: Hall 160, 1586.

This form is distinguished from the others of the species by its short (2 mm) spines which are in widely spaced fascicles along the branches. The spines on the branch tips are somewhat clustered and tend not to be uniformly pendant, but rather to point in all directions.

Stirps RAMOSUM

Basidiocarp varying from a flexuous, branched system to a compact mass of abbreviated branches; spines short (to 6 mm long) borne on the undersides of the branches, spores small (4–4.7 × 2.7–3.3 μ), apiculate, smooth, amyloid, acyanophilous.

In this stirps there is one species that occurs in two forms.

KEY TO FORMS

- 1A. Basidiocarp composed of a system of flexuous branches.....  
.....*H. ramosum* forma *ramosum*
- 1B. Basidiocarp composed of a system of abbreviated branches.....  
.....*H. ramosum* forma *caput-ursi*

HERICIMUM RAMOSUM (Bull. ex Mérat) Letellier, Hist. Descr. Champ.  
p. 43. 1826. forma RAMOSUM. FIGS. 5, 21

*Hericium laciniatum* Leers ex Banker, Mem. Torrey Bot. Club  
12: 114. 1906.

Plants variable in size and shape, 15 cm or more wide, occurring singly, on rotting coniferous wood. Basidiocarps consisting of a series of rebranched, delicate branches, \*\*white or cream color when fresh, becoming \*Buffy Brown to \*\*clay color in the herbarium, flesh homo-

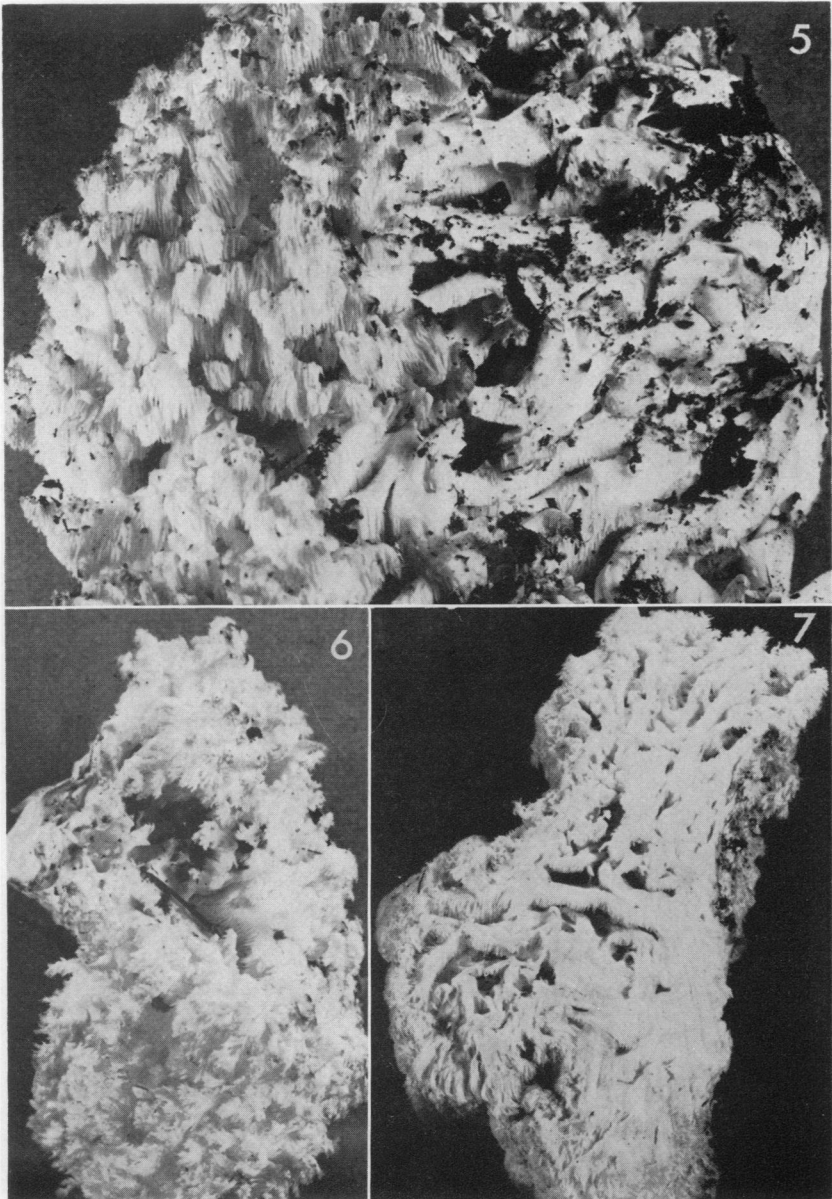


FIG. 5. *Hericium ramosum* forma *ramosum*,  $\times 1/15$ .

FIG. 6-7. *H. ramosum* forma *caput-ursi*,  $\times 1/15$ .

geneous, soft, \*White or Cream Color. Spines 1–6 mm long, terete, slender, subulate, \*White, more or less uniformly distributed on the underside of the branches. Stipe short, tough, imbedded in the substratum.

Spores  $4\text{--}4.7 \times 2.7\text{--}3.3 \mu$ , smooth, apiculate, subspherical to ellipsoidal, \*\*white in print, 1-guttulate, amyloid, acyanophilous. Basidia  $20\text{--}35 \times 5.3\text{--}6 \mu$ , clavate, 4-spored. Cystidia extending into the spine trama and lying parallel with the hyphae,  $45\text{--}53.3 \times 6\text{--}7.3 \mu$  in diam, thin-walled, cylindrical, with or without knob on the tip, distributed throughout the hymenial layer, not becoming purplish in sulfobenzaldehyde. Hyphae  $3.3\text{--}20 \mu$  in diam, hyaline, thin-walled, clamps present.

DISTRIBUTION: Chelan, Kittitas, Mason, Pierce and Yakima counties.

COLLECTIONS EXAMINED: Hall 110, 111, 1556, 1558, 1560, 1570, Isaacs 679, 686 and Stuntz 9595 (WTU).

There has been a good deal of confusion in the literature concerning the interpretation of this species. Fries (1821, p. 408) misapplied the epithet *coralloides* to it, and as Maas Geesteranus (1959) points out, most European mycologists have followed his interpretation. Banker (1906) interpreted the species correctly, but unfortunately used the wrong epithet, *H. laciniatum*, which is a synonym of *H. ramosum*. Banker was followed both in this interpretation and in his nomenclature by Coker and Beers (1951) and by Miller and Boyle (1945).

There are two forms of this species. Maas Geesteranus (1959) chose to combine them, but after having seen both in the fresh condition, we feel that they are sufficiently different to warrant status as forms.

**Hericium ramosum** (Bull. ex Mérat.) Letellier forma **caput-ursi**  
(Fr.) Hall & Stuntz, stat. nov. FIGS. 6, 7, 22

*Hydnum caput-ursi* Fr., Monogr. Hymen. Suec. 2: 278. 1863.

Plants compact, to  $15 \times 10$  cm deep, occurring singly on rotting coniferous wood. Basidocarp an extremely compact mass of short branches, \*\*white when fresh, bruising to \*\*yellowish gray and remaining that color upon drying; flesh homogeneous, fleshy-fibrous, white when fresh becoming \*\*yellowish gray when bruised or dried. Spines to 1 cm long, terete, subulate, white, distributed on the undersides of the branches. Stipe short or not apparent, imbedded in the substratum.

Spores  $4.0 \times 3.0\text{--}3.5 \mu$ , smooth, apiculate, subspherical to ellipsoidal, white in print, guttulate, amyloid, acyanophilous. Basidia clavate,

30–40 × 7  $\mu$ , 3–5 spored, commonly 4-spored. Cystidia 45–55.3 × 6–8  $\mu$ , cylindrical, extending into the spine trama and intertwined with the generative hyphae of the trama, 5–10  $\mu$  in diam, thin-walled, cylindrical, with or without an apical knob, more abundant at spine tips but distributed throughout the hymenial layer, not staining purplish in sulfobenzaldehyde. Hyphae up to 10  $\mu$  in diam, dimitic, thin-walled, with clamps.

COLLECTION EXAMINED: Yakima county, Hall 1561.

This is apparently a rare form of *Hericium ramosum*. The name has been misapplied for some time to various forms of *H. coralloides*. It has all of the characteristics of *H. ramosum* forma *ramosum* except that it is much more compact than that form, and it therefore is easily recognized as distinct in either fresh or dried condition.

#### Stirps ERINACEUS

Basidiocarp a solid knot of tissue, not branched; spines borne on the periphery of the carpophore, long (to 4 cm). Spores 5.3–6.7 × 4.7–5.3  $\mu$ , apiculate, smooth to punctate-roughened, amyloid, cyanophilous.

This stirps contains a single species, *H. erinaceus*.

HERICIUM ERINACEUS (Bull. ex Fr.) Pers., Mycol. Eur. 2: 153. 1825.

FIGS. 8, 23

An excellent description of the macroscopic features of this fungus can be found in Coker and Beers (1951). The following data are taken from the single dried specimen collected in the Puget Sound area.

Spores 5.3–6.6 × 4.7–5.3  $\mu$ , smooth or minutely punctate-roughened, apiculate, subglobose to ellipsoidal, white in print, amyloid, cyanophilous. Basidia clavate, 40–50 × 5.3–6.0  $\mu$ , 4-spored. Cystidia 43–52 × 5–7  $\mu$ , cylindrical, distributed evenly throughout the hymenial layer, extending into the spine trama, thick-walled, with contents denser than those of the surrounding cells, sometimes with an encrusted tip, not turning purplish in sulfobenzaldehyde. Hyphae up to 14  $\mu$  in diam, dimitic, thick-walled, curling and interwoven, moderately branched, clamp connections present.

COLLECTION EXAMINED: King county, Stuntz 5904 (WTU).

This species occurs on hardwoods and is easily recognized by the tuberculate sporocarp and the extremely long, peripheral spines.

DENTINUM S. F. Gray, Nat. Arr. Brit. Pl. 1: 650. 1821.

TYPE SPECIES: *Hydnum repandum* Fr.

Plants varying in size, mesopodous. Pileus smooth to furfuraceous, glabrous, context \*\*white, homogenous. Spines slightly decurrent or not decurrent, fleshy, subulate. Hymenium simple, spores smooth, apiculate, white in print, inamyloid, acyanophilous.

KEY TO SPECIES

- 1A. Spores large (9.0–10 μ in length); pileus small, abruptly umbilicate; stipe long and slender.....*D. umbilicatum*
- 1B. Spores large or small; pileus large, convex or slightly depressed; stipe short.....2
- 2A. Spores small, less than 9.0 μ long; pileus \*\*White or Cartridge Buff to Orange-Buff.....3
- 3A. Pileus \*Buffy Brown to Orange-Buff; spores 8.0–8.7 × 6.2–7.0 μ.....*D. repandum* var. *repandum*
- 3B. Pileus and stipe \*White; spores 6.7–7.3 × 4.7–6.7 μ.....*D. repandum* var. *album*
- 2B. Spores large, (9.0 μ or longer); plants \*Pinkish Buff to Cinna-mon-Buff.....*D. repandum* var. *macrosporum*

DENTINUM REPANDUM (Fr.) S. F. Gray, Nat. Arr. Brit. Pl. 1: 650. 1821. var. REPANDUM FIGS. 9, 24

*Hydnum repandum* Fr., Syst. Mycol. 1: 400. 1821

*Sarcodon repandum* (Fr.) Quél. in Cooke and Quél., Clav. Syn. Hymen. Eur., p. 196. 1878.

*Hydnum washingtonianum* Ell. & Ev., Proc. Acad. Nat. Sci. Philadelphia for 1894, p. 323. 1894.

Plants up to 7 cm tall, occurring singly or gregariously, on ground in duff and moss, under *Pseudotsuga*, *Abies*, and *Tsuga*. Pileus 2.0–6.5 cm broad, convex to slightly depressed, \*\*yellowish white to pale orange or light orange, becoming \*\*dark orange when bruised; surface smooth to slightly furfuraceous, margin inrolled in young specimens, becoming irregular and undulate in age, concolorous with the disc; context of pileus to 2 cm thick, homogeneous, pulpy or fleshy-fibrous, \*\*white when fresh, becoming \*Ochraceous-Orange when cut, odorless or with a slight fungoid odor, tasteless. Spines irregularly decurrent to nondecurrent, up to 7 mm long, 2–4 per mm<sup>2</sup>, fleshy, terete, subulate, \*\*yellowish white to pale yellow, becoming \*Ochraceous-Orange when bruised, extending all the way to the margin. Stipe central to slightly eccentric, 4.5–9 × 0.6–1.5 cm, \*\*yellowish white to pale yellow, becoming \*Ochraceous-Orange to \*Zinc Orange when bruised; context

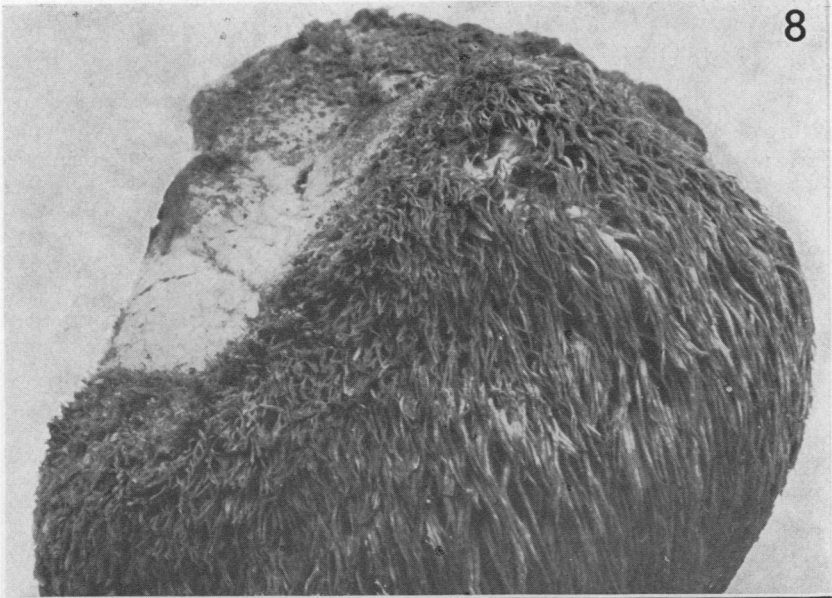


FIG. 8. *Hericium erinaceus*,  $\times 1/2$ .

FIG. 9. *Dentium repandum* var. *repandum*,  $\times 1/4$ .



pallid, fleshy-fibrous, tasteless, with a slight fungoid odor; stipe base slightly swollen, blunt, concolorous with the rest of the stipe, becoming \*Ochraceous-Orange when bruised.

Spores  $8.0-8.7 \times 6.2-7.0 \mu$ , smooth, apiculate, globose to subelliptical, \*\*white in print, inamyloid, acyanophilous. Basidia  $45-50 \times 4.7-6.7 \mu$  clavate, 3-4 spored. Cystidia absent. Hyphae  $2.7-4.0 \mu$  in diam, thin-walled, with abundant clamps, reinflating well in 3% KOH.

DISTRIBUTION: Grays Harbor, Mason, Pierce, San Juan and Snohomish counties.

COLLECTIONS EXAMINED: Hall 59, 84, 99, 249, 250, 551.

*Dentinum repandum* var. *repandum* is said to be a variable fungus. It has been separated from *D. umbilicatum* by the following criteria:

<i>D. repandum</i> v. <i>repandum</i>	<i>D. umbilicatum</i>
1. Plant large.	Plant small.
2. Pileus convex or depressed.	Pileus abruptly umbilicate.
3. Pileus *Buffy Brown to Orange-Buff.	Pileus deep *Mars Orange.
4. Stipe thick, medium to short.	Stipe thin, long.
5. Spores $8.0-8.7 \times 6.2-7.0 \mu$	Spores $9.0-10.0 \times 7.0-8.6 \mu$

It would appear that spore size is the most dependable criterion on which to separate the species since the other criteria may vary with environmental conditions during the growing period and therefore should be used only as secondary characteristics. However, if one separates the species on the aforementioned criteria, using spore size and plant size and shape where possible, a category of intermediate specimens is found. These intermediates are large plants with convex pilei and large spores. We have tentatively assigned plants with these characteristics to *Dentinum repandum* var. *macrosporum* nom. prov.

For a detailed analysis of hyphal structure in the carpophore of species of *Dentinum* see Maas Geesteranus (1963b).

***Dentinum repandum* (Fr.) S. F. Gray var. *macrosporum* Hall & Stuntz, nom. prov.** FIGS. 10, 25

Plants 6-11 cm tall, occurring singly or gregariously, on ground in duff under *Abies*, *Thuja*. Pileus 6-7(-10) cm broad, convex or plane with slight central depression in age, \*Pinkish Buff to Cinnamon-Buff or Clay Color, surface smooth of furfuraceous, some evidence of rimose cracking in age, margin concolorous or \*Cartridge Buff, irregular and undulate in age; context to 2 cm thick, homogenous, fleshy-fibrous, pallid, becoming tinted with yellow when cut, taste and odor not distinctive. Spines slightly decurrent, to 7 mm long, 3-4 per mm<sup>2</sup>, fleshy, terete, subulate, \*Cartridge Buff to \*YO-Y (pl. XXX) with no apparent change on bruising, extending all the way to the margin. Stipe ec-

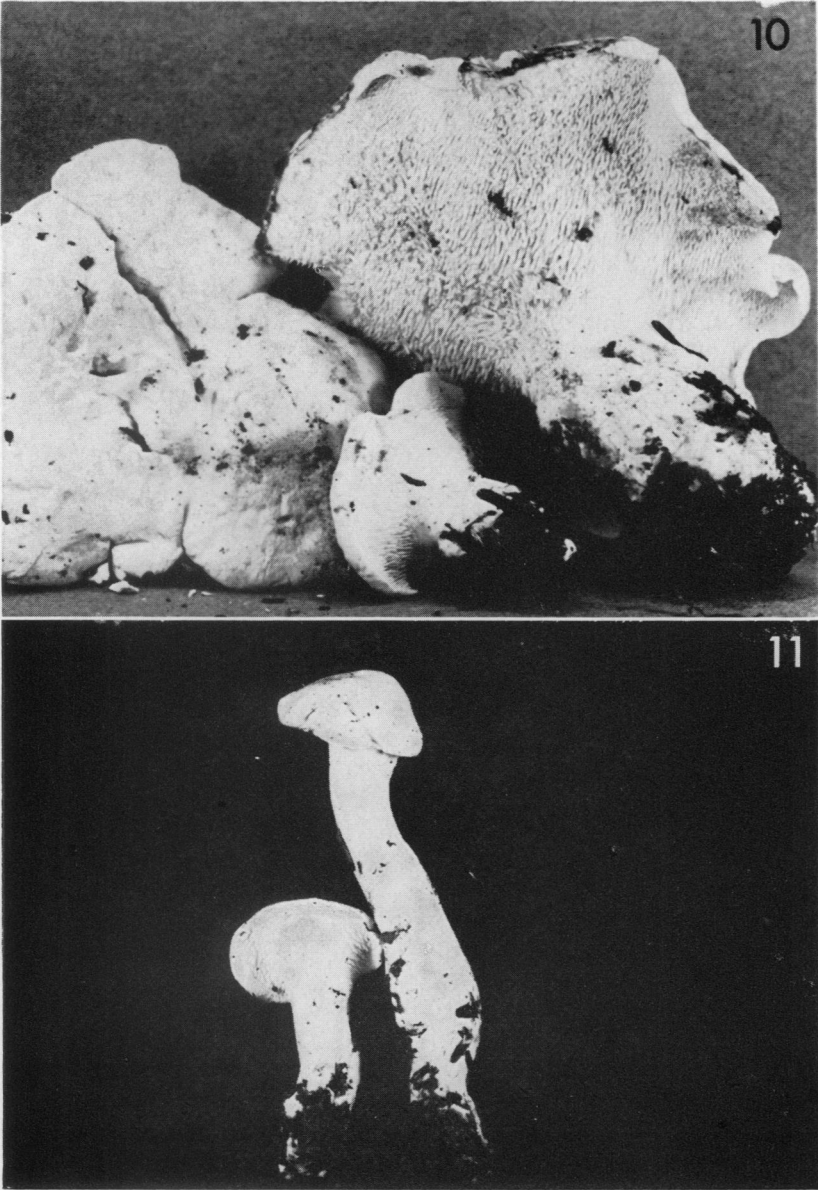


FIG. 10. *Dentium repandum* var. *macrosporum*,  $\times 1/2$ .

FIG. 11. *D. repandum* var. *album*,  $\times 1/2$ .

centric, 4–7 cm × 1–2.5 cm, usually flattened so as to be oblong in cross section, \*Chamois, becoming \*Clay Color to Tawny or Honey Yellow where bruised, slightly tapered, not swollen at the base, base concolorous with the rest of the stipe; context fleshy-fibrous, pallid, taste and odor not distinctive.

Spores 9.0–9.8 × 7.6 μ, smooth, apiculate, subglobose, \*\*white in print, inamyloid, acyanophilous. Basidia 40–50 × 4–7 μ, generally 4-spored. Cystidia absent. Hyphae up to 8 μ in diam, thin-walled, with abundant clamps, reinflating well in 3% KOH.

DISTRIBUTION: Island, Pierce and Snohomish counties.

COLLECTIONS EXAMINED: Hall 24, 116, 163, 667, 668, 703.

This taxon differs from *D. repandum* var. *repandum* and *D. umbilicatum*, and is intermediate between them, in the following points.

<i>D. repandum</i> v. <i>repandum</i>	<i>D. repandum</i> v. <i>macrosporum</i>	<i>D. umbilicatum</i>
Pileus large.	Pileus large.	Pileus small.
Pileus convex or slightly depressed.	Pileus convex or slightly depressed.	Pileus abruptly umbilicate.
Pileus *Cartridge Buff.	Pileus *Pinkish Buff to Cinnamon-Buff.	Pileus *Mars Orange.
Spores small, 8.0–8.7 × 6.2–7.0 μ	Spores large, 9.0–9.8 × 7.6 μ	Spores large, 9–10 × 7–8.6 μ

DENTINUM REPANDUM (Fr.) S. F. Gray var. ALBUM (Quél.) K. A. Harrison, Stip. Hyd. of Nova Scotia., p. 19. 1961. FIGS. 11, 26

*Hydnum repandum* var. *album* (Quél.) Rea, Brit. Basid., p. 630. 1922.

Plants up to 5.5 cm tall, occurring singly or gregariously on ground in duff, under *Pseudotsuga* and *Tsuga*. Pileus 3.5–6.5 cm broad, convex to slightly depressed, umbilicate, \*White to Cream Color when fresh, not changing color immediately when bruised but eventually becoming \*Ochraceous-Orange, surface smooth to slightly furfuraceous, margin irregular, undulate, concolorous with the rest of the pileus, not immediately changing color when bruised but eventually becoming \*Ochraceous-Orange; context up to 2 cm thick, homogeneous, fleshy-fibrous, pallid, becoming \*Ochraceous-Orange when cut, odor slightly fungoid, tasteless. Spines sometimes irregularly decurrent, up to 0.5 cm long, 3–4 per mm<sup>2</sup>, fleshy, terete, subulate, \*\*white to yellowish white not changing color when bruised, extending from the stipe to the margin of the pileus. Stipe eccentric, crooked, up to 4.5 cm × 1–0.5 cm, flattened on one side, elliptical in cross-section, \*\*yellowish white when fresh becoming \*\*light yellow when bruised, fleshy-fibrous, slightly tapered, context pallid, tasteless, odorless or with a slight fungoid odor; stipe base swollen, blunted, concolorous with the rest of the stipe.

Spores  $6.7-7.3 \times 4.7-6.7 \mu$ , smooth, apiculate, subglobose to elliptical, \*White in print, inamyloid, acyanophilous. Cystidia absent. Basidia  $45-50 \times 4.7-6.0 \mu$ , clavate, 4-spored. Hyphae  $2.7-4.0 \mu$  in diam, thin-walled, with abundant clamps, reinflating well in 3% KOH.

COLLECTION EXAMINED: King county: Hall 35.

Variety *repandum* can be separated from this variety by the color of the pileus, that of var. *album* being \*White to Cream Color, that of var. *repandum* being some shade of orange.

*Dentinum repandum* var. *album* can be separated from *D. albidum* (Pk.) Snell of the basis of spore size; the spores of *D. albidum* measure  $4-5.2 \times 3.5-4.0 \mu$  whereas those of var. *album* measure  $6.3-7.4 \times 7-8 \mu$ , according to Coker and Beers (1951). These authors, however, do not recognize *Dentinum* S. F. Gray in their work and place these taxa in the genus *Hydnum*.

DENTINUM UMBILICATUM (Pk.) Pouzar, *Česká Mykol.* 10: 76. 1956.  
Figs. 12, 27

*Hydnum umbilicatum* Pk., *Bull. N. Y. State Mus.* 54: 953. 1902.

Plants 4.5-6(-9) cm tall, occurring singly or gregariously, on ground in duff, under *Pseudotsuga*, *Abies*, or *Tsuga*. Pileus 2.0-6.5 cm (4.5 cm commonly) broad, convex or plane, depressed or abruptly umbilicate, \*Mars Orange, Orange-Rufus, light Ochraceous-Orange to Pinkish Buff, becoming Ochraceous-Orange when bruised; surface smooth to slightly furfuraceous; margin in young specimens slightly in-rolled, becoming irregular and undulate in age, concolorous with the disc; context 0.4-0.6 cm thick, homogeneous, fleshy-fibrous, \*White when fresh, becoming \*Ochraceous-Orange where bruised or cut, odorless or with a fungoid odor, tasteless. Spines not decurrent, 2-4(-7) mm long, 2-4 per mm<sup>2</sup>, fleshy, terete, subulate, \*Pale Ochraceous-Buff, pale Ochraceous-Tawny or Pale Ochraceous-Salmon, becoming \*Ochraceous-Orange where bruised, extending all the way to the margin. Stipe central to slightly eccentric, 3-4(-10)  $\times$  0.5-1.0(-1.5) cm, usually elliptical in cross section, \*Pale Ochraceous-Buff to Pale Ochraceous-Salmon or Light Buff, becoming \*Ochraceous-Orange when bruised, slightly tapered; context pallid, fleshy-fibrous, tasteless, odorless; stipe base slightly swollen, blunt, \*Ochraceous-Buff, Antimony Yellow, Ocher or Light Buff, becoming \*Ochraceous-Orange when bruised.

Spores  $9.0-10.0 \times 7.0-8.6 \mu$ , smooth, apiculate, subglobose, \*White in print, inamyloid, acyanophilous. Basidia  $45-50 \times 4.7-6.7 \mu$ , clavate, 3-4 spored. Cystidia absent. Hyphae  $2.7-4.0 \mu$  in diam, thin-walled, with abundant clamps, reinflating in 3% KOH.

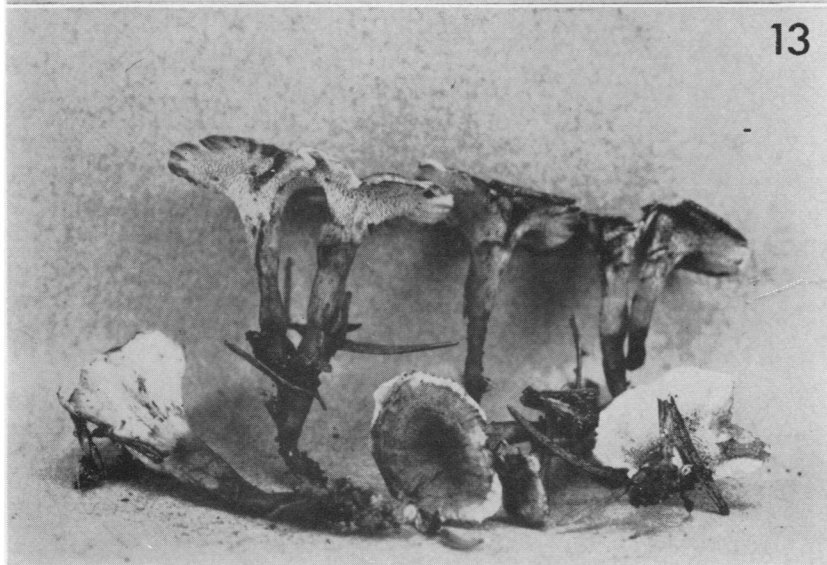


FIG. 12. *Dentium umbilicatum*,  $\times 1/2$ .

FIG. 13. *Phellodon melaleucus*,  $\times 1/2$ .

DISTRIBUTION: Island, King, Mason, Pierce, San Juan and Snohomish counties.

COLLECTIONS EXAMINED: Hall 2, 3, 4, 5, 21, 22, 27, 28, 29, 30, 32, 33, 34, 55, 84, 90, 94, 164, 658, 659, 749 and 1428.

This species and its relationships to other members of the genus *Dentinum* are discussed in the remarks concerning *D. repandum* var. *repandum* and *D. repandum* var. *macrosporum*.

PHELLODON Karst., Meddeland. Soc. Fauna Fl. Fenn. 6: 15. 1881;  
Rev. Mycol. 3(9): 19. 1881.

TYPE SPECIES: *Hydnum nigrum* Fr.

Plants with a fibrous context; trama of pileus of septate hyphae, without clamps. Spores white in print, echinulate-roughened, spherical to subspherical, inamyloid, acyanophilous.

#### KEY TO STIRPES

- 1A. Pileus context duplex.....2
- 2A. Stipe context duplex.....3
  - 3A. Hard portions of pileal and stipe context black.....*Stirps Niger*
  - 3B. Hard portions of stipe and pileal context \*Slate Color, Aniline Black, or Purplish Vinaceous.....*Stirps Melaleucus*
- 2B. Stipe context not duplex.....4
  - 4A. Hard context some shade of brown.....*Stirps Tomentosus*
  - 4B. Hard context \*Slate Color, Purplish Vinaceous or Aniline Black.....*Stirps Melaleucus*
- 1B. Pileus context not duplex.....5
  - 5A. Stipe context duplex; context \*Slate Color, Purplish Vinaceous or Aniline Black.....*Stirps Melaleucus*
  - 5B. Stipe context not duplex.....6
    - 6A. Context brown or some shade of brown.....*Stirps Tomentosus*
    - 6B. Context \*Slate Color, Purplish Vinaceous, or Aniline Black; spines ash gray (sometimes with lilaceous tints), pileus colored \*Purplish Vinaceous or Aniline Black.....*Stirps Melaleucus*

#### Stirps NIGER

Context of pileus duplex, the soft, spongy upper layer gray, gray-brown or black, the hard fibrous lower context black. Context of the stipe duplex, the corky outer layer gray, the hard inner layer black.

Although representatives of this stirps have not as yet been found in the Pacific Northwest, a description of the stirps was included so that the treatment of the genus would be complete.

### Stirps MELALEUCUS

Context of pileus duplex or not, if duplex then the soft spongy upper layer concolorous with the hard lower context, \*Aniline Black, Purplish Vinaceous, or Dark Slate-Violet; stipe context thinly duplex or not, the hard inner core \*Aniline Black, Purplish Vinaceous or Dark Slate-Violet; the outer corky layer concolorous or slightly darker.

PHELLODON MELALEUCUS (Fr.) Karst., Rev. Mycol. 3: 19. 1881.

FIGS. 13, 28

Plants 3.5 to 5 cm tall, occurring singly or in small groups, on ground in duff under *Pseudotsuga*, *Pinus*, or *Tsuga*. Pileus to 3 cm broad, centrally depressed or slightly infundibuliform, \*Purplish Gray or Light Purplish Gray on the disc, becoming darker when bruised and taking the imprint of a finger when handled, faintly zonate, velvety, appressed-tomentose, some small radial ridges present on some specimens; margin thin, undulate, irregular, \*Vinaceous-Fawn to Avellaneous; context 2-3(-5) mm thick, azonate, faintly duplex, the upper layer soft-felty, the lower layer fibrous-papery, taste not distinguishable, odor of fenugreek (especially when dried). Spines irregularly decurrent, to 15 mm long, 4-6 per mm<sup>2</sup>, fleshy, terete, subulate, \*Lilac-Gray or \*\*ash gray, violet white or white, becoming \*\*brownish black when bruised, sterile areas at margin. Stipe central, 1-3 × 0.3 cm, tapered, \*Dark Neutral Gray, \*\*somalis or brownish gray, becoming \*Blackish Brown when bruised; context duplex, the hard inner core \*\*grayish brown, the corky, thin, outer layer \*\*somalis; stipe base not swollen, pointed or truncate, concolorous with the rest of the stipe.

Spores 3.6-4.2 × 3.2-4.0 μ, globose to subglobose, echinulate, apiculate, inamyloid, acyanophilous. Basidia 30-35 × 4-5 μ, clavate. Hyphae to 8 μ in diam, brownish, thin-walled, without clamp connections, reinflating in 3% KOH.

DISTRIBUTION: Clallam, Island, and Mason counties.

COLLECTIONS EXAMINED: Hall 23, 45, 80, 706, 752, 851, 959, 990, 1000, 1012, 1057, 1058, 1059, 1089, 1095, 1100, 1104, 1115, 1280, 1603, 1624, 1626 and 1641.

This species as it occurs in the Pacific Northwest is a very delicate form. The surface of the pileus has a thin tomentum which takes the imprint of a finger very readily. When wet *Phellodon melaleucus* can

be confused with small specimens of *P. atratus*, though the latter is generally the more robust. Upon drying, the two species can be separated readily. For details on the differences see the remarks after *P. atratus*.

PHELLODON ATRATUS K. A. Harrison, *Canad. J. Bot.* 42: 1209. 1964.  
Figs. 14, 29

Plants 4.5–6 cm tall, occurring singly or in extensive patches, on ground in duff, under *Pseudotsuga*, *Abies*, or *Tsuga*. Pileus 2–4 cm broad, sometimes confluent with other pilei, plane or slightly depressed to umbilicate, appearing zonate, \*Deep Quaker Drab, Quaker Drab, Dark Quaker Drab or Slate Color, smooth or slightly scrobiculate on the disc; margin uneven, undulate, tapered on the edge, \*French Gray to Lilac-Gray, bruising to \*Blackish Purple when handled; context up to 5 mm thick, may or may not be duplex depending on weathering, the upper layer thin, spongy, the lower layer azonate, papery-fibrous, both layers \*Aniline Black. Taste mild, odor of fenugreek. Spines irregularly decurrent, up to 2 mm long, 2–9 per mm<sup>2</sup>, fleshy, terete, subulate, \*Light Plumbago Gray, Rood's Lavender, Lavender or Lavender-Blue, becoming \*Blackish Brown to Vandyke Brown when bruised. Stipe central, 4–5 cm tall, to 0.5 cm in diam, tapered downward, \*Dusky Purplish Gray to Dusky Slate-Violet or black, becoming \*Blackish Brown when bruised; context duplex or not, both layers \*Aniline Black or Purplish, becoming \*Sepia or Blackish Brown when bruised, tough, pliable, odor faintly smokey, taste mild; stipe base slightly swollen, blunted, \*\*yellowish green to bluish green, \*Dark Zinc Green or Bottle Green, proliferating mycelium present and holding soil particles to the stipe base.

Spores 3.8–4.2 × 3.3–3.8 μ, echinulate, apiculate, spherical to subglobose, \*\*white in print, inamyloid, acyanophilous. Basidia 33–38 × 4–7 μ, clavate. Cystidia absent. Hyphae up to 6 μ in diam, brownish, septate, lacking clamps, reinflating in 3% KOH.

DISTRIBUTION: Island, Mason, and San Juan counties.

COLLECTIONS EXAMINED: Hall 46, 56, 167, 700, 721, 822, 840, 1010, 1011, 1013, 1015, 1023, 1296, 1605, 1606, 1622, 1643 and 1651.

*Phellodon atratus* is very similar to *P. melaleucus*. The former has an Aniline Black pileus with \*Violaceous Blue margin, and a \*Vinaceous-Drab hymenium, the latter a \*Dark Vinaceous-Brown pileus, at times tinged \*Violaceous Blue, with \*\*whitish margin and \*\*ash gray hymenium. The two species can be distinguished in the field by the color of the pileus and hymenium. In extremely wet weather this



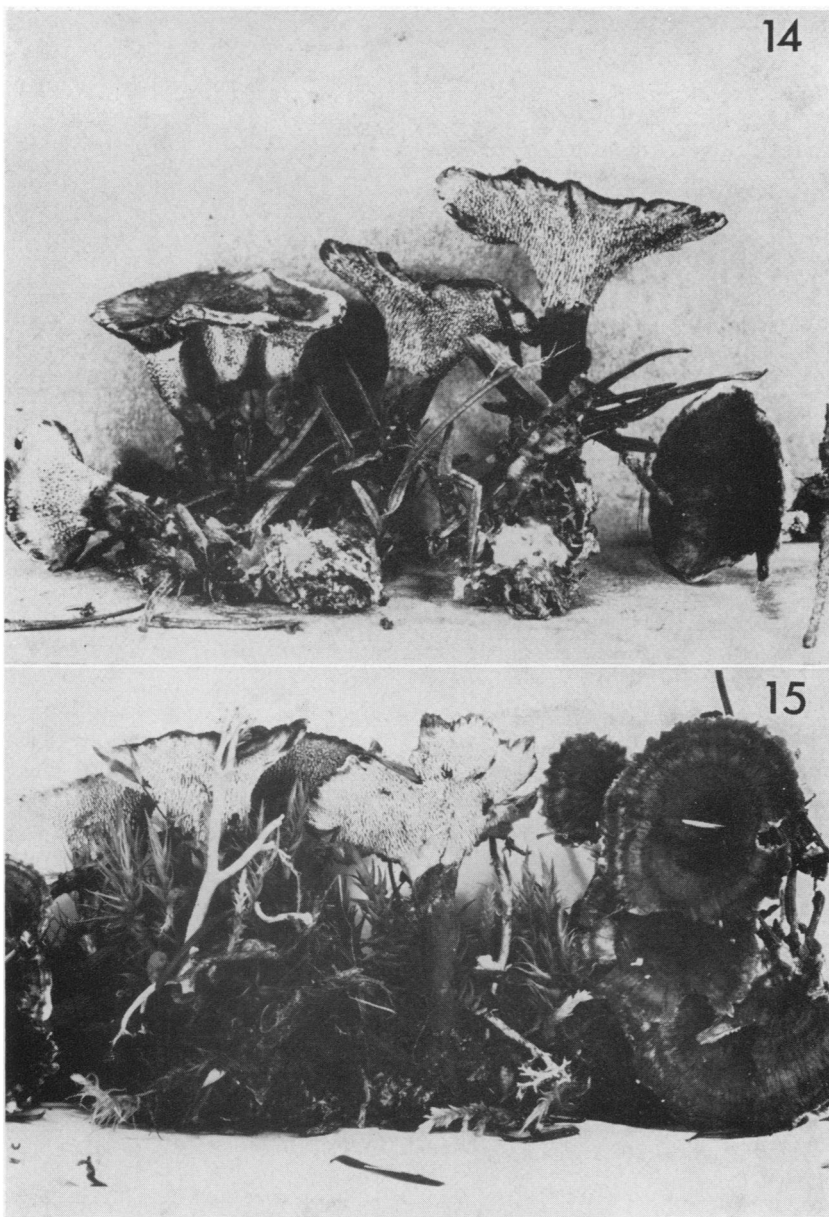


FIG. 14. *Phellodon atratus*,  $\times 1/2$ .

FIG. 15. *P. tomentosus*,  $\times 1/2$ .

distinction is more difficult, but on drying the collections can again be separated.

*Phellodon atratus* is very abundant in the second-growth conifer woods of the Pacific Northwest. It apparently is able to withstand the winter rains in this area. We have seen old, partially decayed carpophores of this species in the spring.

### Stirps TOMENTOSUS

Pileus context duplex or not, some shade of brown. Stipe context not duplex, or not obviously so, some shade of brown, concolorous with or darker than the pileal context.

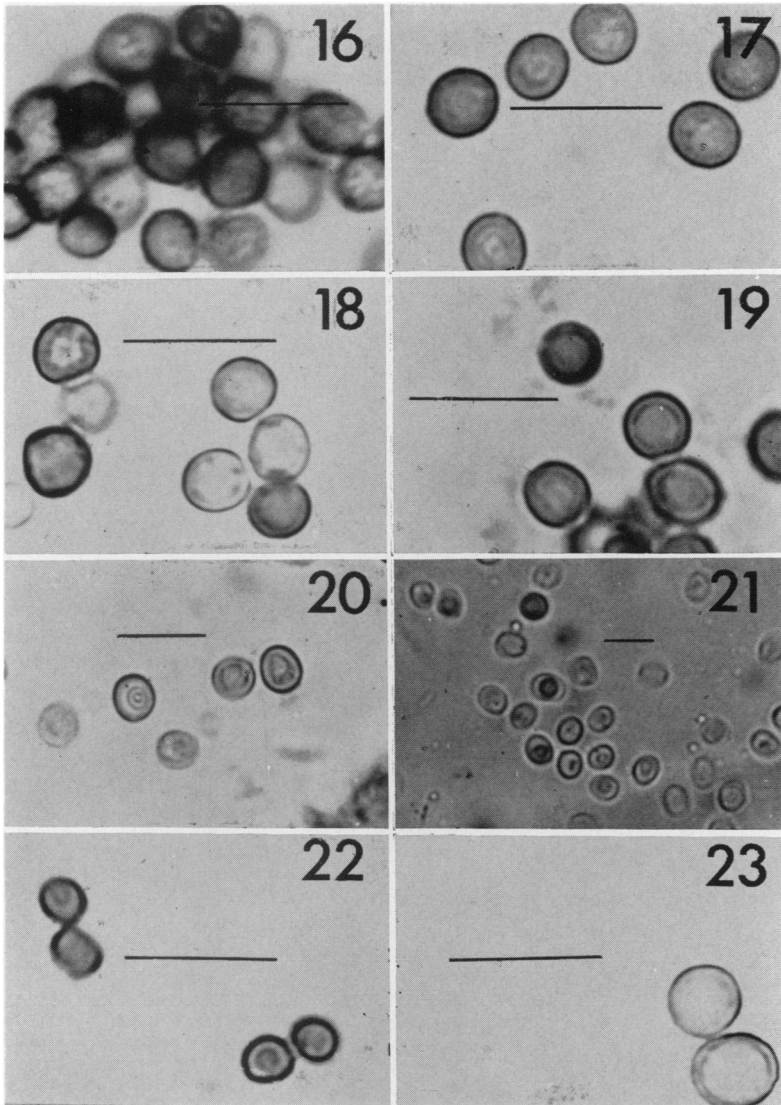
PHELLODON TOMENTOSUS (Fr.) Banker, Mem. Torrey Bot. Club **12**:  
171. 1906. FIGS. 15, 30

Plants up to 6 cm tall, subcaespitose or occurring singly on ground in duff and moss under *Tsuga* and *Abies*. Pileus up to 5.5 cm broad, plane to depressed or infundibuliform, \*Pecan Brown to Rood's Brown or Vandyke Brown (\*Tawny to Ochraceous-Tawny, Vinaceous-Russet, Cameo Brown or Chocolate), becoming \*Chocolate to \*\*teak or dark brown (\*\*earth colored or grayish brown) when bruised, the surface tomentose; margin irregular, undulate, tapered, \*Terra Cotta to Vinaceous-Russet or Mikado Brown (\*Orange-Cinnamon, Cinnamon or Tawny), becoming \*\*chocolate or teak when bruised; flesh up to 5 mm thick, homogeneous, fibrous-leathery, brownish, with a fenugreek to fungoid odor, tasteless. Spines slightly decurrent, up to 5 mm long, 10-14 per mm<sup>2</sup>, fleshy, terete, subulate, \*\*pale pink to \*Cinnamon-Buff or Buffy Brown (\*Army Brown, Fawn Color or Wood Brown), becoming \*Vandyke Brown to \*\*golden wheat when bruised. Stipe central, 2-4 × 0.8 cm, appearing elliptical in cross-section, \*Pale Pinkish Cinnamon to Pinkish Buff or Orange-Cinnamon (\*Cinnamon, Sayal Brown or Mummy Brown), becoming \*Warm Sepia or Verona Brown when bruised; context fibrous, mild tasting, with a fenugreek odor, stipe tapered, stipe base not swollen, concolorous with the rest of the stipe.

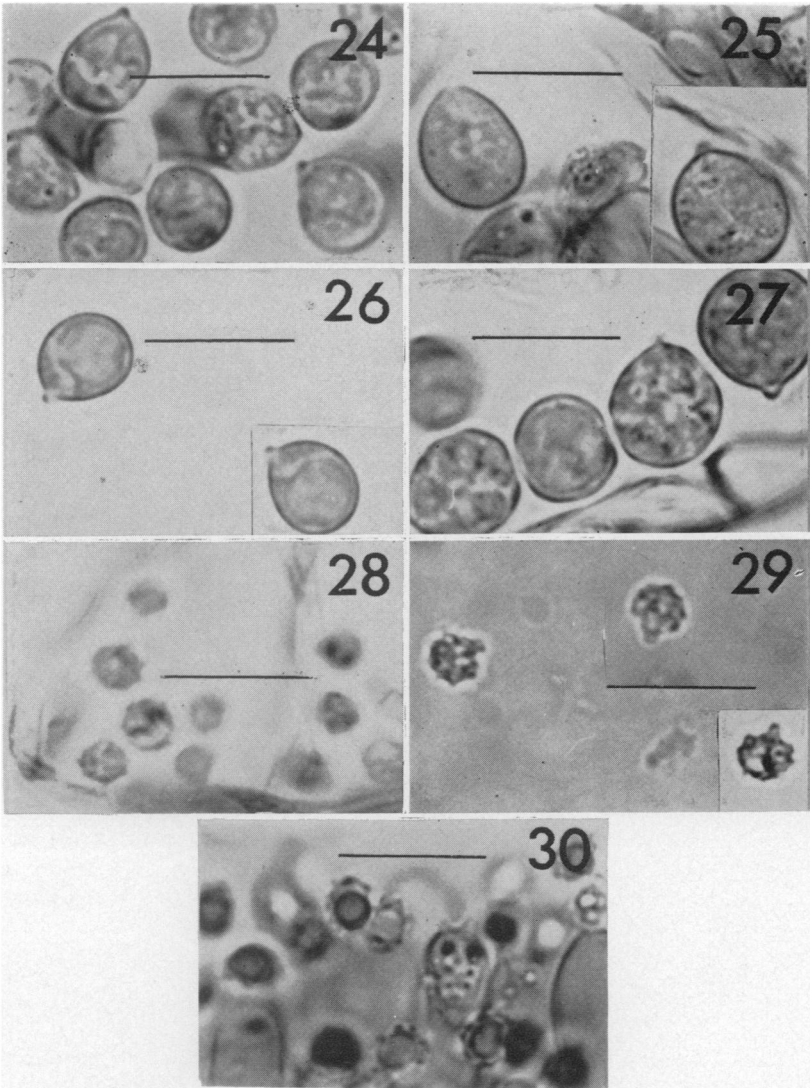
Spores 3.3-4.4 × 3.3-4.0 μ, echinulate, spherical to subspherical, \*White in print, inamyloid, acyanophilous. Basidia 35-43 × 3.3-5.3 μ, cylindroclavate, 4-spored. Cystidia absent. Hyphae up to 4.7 μ in diam, hyaline, thin-walled, without clamps, septate, reinflating in 3% KOH.

DISTRIBUTION: Island, King, Kittitas, Mason and Pierce counties.

COLLECTIONS EXAMINED: Hall 11, 20, 49, 64, 74, 79, 81, 252, 693, 697, 704, 776, 849, 875, 933, 971, 1212, 1275, 1607, 1637, 1644, 1646 and 1649; Lanphere 1 and Stuntz 12074 (WTU).



FIGS. 16-23. Basidiospores. 16. *Auriscalpium vulgare*. 17. *Hericium abietis* forma *abietis*. 18. *H. abietis* forma *weirii*. 19. *H. abietis* forma *alpestre*. 20. *H. abietis* forma *brevispineum*. 21. *H. ramosum* forma *ramosum*. 22. *H. ramosum* forma *caput-ursi*. 23. *H. erinaceus*. (Scales = 10  $\mu$ ).



FIGS. 24-30. Basidiospores. 24. *Dentinum repandum* var. *repandum*. 25. *D. repandum* var. *macrosporum*. 26. *D. repandum* var. *album*. 27. *D. umbilicatum*. 28. *Phellodon melaleucus*. 29. *P. atratus*. 30. *P. tomentosus*. (Scales = 10  $\mu$ ).

*Phellodon tomentosus* can be distinguished from the other *Phellodons* in the Pacific Northwest by its brownish, zoned pileus, its duplex stipe with brownish tan outer corky layer and zoned, dark brown inner layer,

and its ashy gray-brown hymenium. The species is an extremely variable one, occurring abundantly in the second growth forests of the Pacific Northwest. Collections vary from thin-fleshed, delicate, small specimens to very large, thick-fleshed, robust plants. The pileus surface in some collections is smooth, in others corrugated.

The spores of the collections we have made are variable in size. We think this variability may be partially explained as follows. The spores when still attached to the sterigma are very obviously elongate; one very seldom sees attached spores that are spherical. However, when released they begin to inflate, or so it would appear, and finally become spherical. When one squashes a spine to measure spores, it is easily seen that there is an intergradation between the elongate and the spherical shapes.

#### ACKNOWLEDGMENTS

Thanks are due to K. A. Harrison for a series of his collections from the midwest and east coast which aided in the determination of certain taxa, as well as for much helpful discussion and pleasant company during the 1967 collecting season; and to Dr. E. Haskins for his advice regarding photomicrographic techniques.

#### LITERATURE CITED

- Banker, H. J.** 1906. A contribution to a revision of the North American Hydna-ceae. Mem. Torrey Bot. Club. 12: 99-194.
- Bresadola, G.** 1932. Iconographia mycologica. Vols. 21 and 22. Soc. Bot. Italiana, Milan.
- Coker, W. C., and A. H. Beers.** 1951. The stipitate hydnums of the Eastern United States. University of North Carolina Press. Chapel Hill, North Carolina. 211 p.
- Fries, E. M.** 1821. Systema mycologicum, sistens fungorum ordines, genera et species huc usque cognitae, Vol. 1. Ernest Mauritius, Greifswald. 520 p.
- Harrison, K. A.** 1961. The stipitate hydnums of Nova Scotia. Research Branch, Canada Department of Agriculture, Ottawa, Ontario. 60 p.
- . 1964. New or little known North American stipitate hydnums. Canad. J. Bot. 42: 1205-1233.
- Kornerup, A., and J. H. Wanscher.** 1962. Reinhold color atlas. Reinhold Publishing Corporation, New York. 224 p.
- Kotlaba, F., and A. Pouzar.** 1964. Preliminary results on the staining of spores and other structures of Homobasidiomycetes in cotton blue and its importance for taxonomy. Feddes Repert. 69: 131-141.
- Maas Geesteranus, R. A.** 1959. The stipitate hydnums of the Netherlands. IV. *Auriscalpium* S. F. Gray, *Hericium* Pers. ex S. F. Gray, *Hydnum* L. ex Fr., *Sistotrema* Fr. emend Donk. Persoonia 1: 115-147.

- . 1963a. Hyphal structures in hydnums. II. Proc. Koninkl. Ned. Akad. Wetenschap., Ser. C. **66**: 426-436.
- . 1963b. Hyphal structures in hydnums. IV. Proc. Koninkl. Ned. Akad. Wetenschap., Ser. C. **66**: 447-457.
- Miller, L. W., and J. S. Boyle.** 1943. The Hydneaceae of Iowa. University of Iowa Studies in Natural History 18, No. 2. University of Iowa. Iowa City, Iowa. 92 p.
- Peck, C. H.** 1899. Report of the State Botanist. New York State Museum Bull. **5**: 619-688.
- Ridgway, R.** 1912. Color standards and color nomenclature. Published by the author, Washington D. C. 43 p.
- Robbers, J., L. R. Brady, and V. E. Tyler, Jr.** 1965. A chemical and chemotaxonomic evaluation of *Inocybe* species. Lloydia **27**: 342-353.
- Sullivan, G., L. R. Brady, and V. E. Tyler, Jr.** 1967. Occurrence and distribution of terphenylquinones in *Hydnellum* species. Lloydia **30**: 84-90.

Accepted for publication May 5, 1971.