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THE HIGHER FUNGI OF OREGON'S CASCADE HEAD EXPERIMENTAL FOREST AND VICINITY—I. THE GENUS PHAEOCOLLYBIA (AGARICALES) AND NOTES AND DESCRIPTIONS OF OTHER SPECIES IN THE AGARICALES

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SUMMARY

It was established that one of the characteristics of the sitka spruce forest of the Pacific Northwest is an abundance of basidiocarps of species of *Phaeocollybia*. The presence of *Russula nigricans* Fr. in North America is reaffirmed. New species and varieties described are: *Phaeocollybia deceptiva, P. dissiliens, P. gregaria, P. oregonensis, P. piceae, P. scatesiae, Cortinarius vanduzerensis, Phylloporus arenicola, Suillus imitatus* var. *viridescens*.

INTRODUCTION AND ACKNOWLEDGMENTS

In discussions at the North American Conference on Mycorrhiza at the University of Illinois in 1969 the authors considered studying, at a future date, the higher fungi of the Cascade Head Experimental Forest. Since it later developed that the fall of 1970 fitted our individual and mutual plans, arrangements were made to undertake the work during that season. The location appeared to be good for field work on Smith's project of a manual on the higher fleshy fungi of the western United States, as well as for furthering the interest of the Forest Service in mycorrhizae and mycorrhiza-forming fungi.

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of winter near the end of November. Winter in this area features temperatures roughly from 20–25° F to maxima in the 40–50-degree range with most of the precipitation as rain or freezing rain. From the facilities at the Experimental Forest headquarters near Otis as a base of operations, we worked both up and down the coast as well as up the stream valleys. Frequent visits were made to the various types of forest cover, sand dunes, pastures and their borders, and of course the coastal "jungle" of salmon berry (*Rubus spectabilis* Pursh), sword fern [*Polystichum munitum* (Kaulf.) Presl], willows, vine-maple (*Acer circinatum* Pursh.), Devil's-club [*Oplopanax horridum* (J. Smith) Miquell], and a generous mixture of the debris left from timber cutting, all under a canopy of red alder mixed with conifers. We attempted, in short, to visit all types of habitat where higher fungi might be expected.

The season was a "slow" one. At no time did we experience an "avalanche" of fungi, as can happen in the coastal area, but on the other hand at no time did we lack material for study. In this respect it was both an unusual and an ideal season. Smith recorded 1440 collections for the period of residence, while Trappe's collections from the same and previous seasons number nearly a thousand.

Since the present report is in the nature of a preliminary paper, it deals with some of the highlights, so to speak, of the season. The more complex problems still await critical study, and collecting will be continued.

In the following account, color names within quotation marks are taken from Ridgway (1912) and are followed by the ISCC-NBS near-synonym in parentheses (Kelly and Judd, 1955). When a Ridgway name is used without quotation marks it means that the color approximated that of the designated plate, but that a critical comparison was not actually made. The following abbreviations for solutions are used: Melzer's, to designate Melzer's solution; KOH, for a 2.5% aqueous solution of potash; $FeSO_4$, for iron salts in about a 5% aqueous solution and used for certain color reactions.

Field work was aided materially by members of the Oregon Mycological Society with special credit going to Mr. and Mrs. Donald Goetz. In addition Mrs. Robert M. Scates of Post Falls, Idaho, a member of the Northern Idaho Mycological Association, and Mr. Elwin Stewart, Research Assistant of the Oregon State University Department of Botany, also made many valuable contributions.

Smith's efforts were supported by the National Science Foundation Grant GB-16969, and by the Northwest Forest and Range Experiment

Station which made available the facilities of the Cascade Head Experimental Forest. Trappe's participation was supported in part by National Science Foundation Grant GB-2738. This help is deeply appreciated.

THE GENUS PHAEOCOLLYBIA HEIM

The data included here form a supplement to the treatment of the North American species by Smith (1957). From the standpoint of the gill-fungi encountered, this genus furnished the most interesting data of any including *Cortinarius*. Six previously undescribed species were collected and are here described, but of equal interest was the occurrence of such previously described taxa as *Phaeocollybia kauffmanii* (Smith) Singer, *P. fallax* Smith, and *P. attenuata* (Smith) Singer. Earlier, Smith (1957) considered *P. kauffmanii* as uncommon to rare. It was a common species, however, in the sitka spruce–hemlock and sitka spruce stands of the Experimental Forest in October, 1970. In spite of repeated attempts, we still have not established the point of origin of the basidiocarps. The pseudorhiza becomes so thin, and the mat of tree rootlets so dense, that after the pseudorhiza has become reduced to a thread it always breaks before its point of origin can be ascertained. For *P. kauffmanii,* however, it seems apparent that the pseudorhiza extends deep into the mineral soil below the level of the densest distribution of mycorrhizae.

Among the larger species, *P. olivacea* Smith was the only one previously found producing truly large numbers of basidiocarps. Characteristically, this species fruits in dense clusters or in arcs in which the fruit bodies are gregarious to clustered. In 1970 we found it rarely and only as individual basidiocarps. *Phaeocollybia kauffmanii* occurred gregariously in limited areas in groups of a dozen or more, but the basidiocarps did not appear to come from a common localized substrate such as a buried log. On the other hand, *P. attenuata* fruited in masses of hundreds of basidiocarps over a wide area, as if the spores had been broadcast over the ground and each spore had produced a fruit body. This pattern of fruiting, we believe, excluded the possibility of their point of origin being a buried stump, tree trunk or mass of dead roots. The situation as regards the species Mrs. Scates discovered creates the opposite impression. In this instance approximately 380 basidiocarps occurred in a gigantic loose cluster on a mossy hummock which likely represented the remains of a long-decayed stump, though the evidence was not conclusive. Again, the pseudorhizae tapered to a fine thread and their ultimate attachments were not determined, though the im-

pression one obtained was that they eventually became reduced to rhizomorphs. The possibility of mycorrhizal association cannot be discounted, since rotten wood on or in the soil of the coastal forests is permeated with living roots and mycorrhizae.

From our studies in 1970 it is evident that the genus *Phaeocollybia* is a mycological feature of the sitka spruce [*Picea sitchensis* (Bong.) Carr.] and hemlock [*Tsuga heterophylla* (Raf.) Sarg.] mixed stands of the coastal area, but that the ecological relationships of the species to this forest association still remain to be determined. To facilitate further study of this problem we take this occasion to revise Smith's (1957) key to the species. Also, a new species from Idaho and one from the Oregon area of the Cascade Range are included to round out our current knowledge of the genus in the Pacific Northwest.

A REVISED KEY TO THE NORTH AMERICAN SPECIES OF PHAEOCOLLYBIA

1. Spores 5–7.5 × 3–5 μ 2
1. Spores 7–11 × 4–7 μ 7
2. Stipe 8–20 mm thick at apex 3
2. Stipe 3–6 mm thick at apex 4
3. Pileus 50–110 mm broad; pleurocystidia none; cheilocystidia filamentous to clavate, 12–30 × 4–8 μ ..... 4. *P. oregonensis*
3. Pileus 30–60 mm broad; pleurocystidia scattered, similar to cheilocystidia (filamentous, not clavate), 28–37 × 3.5–6 μ ..... 2. *P. dissiliens*
4. Hyphae of pileus pellicle with clamp connections ..... *P. radicata*
4. Hyphae of pileus pellicle lacking clamp connections 5
5. Pileus slimy to viscid; cheilocystidia 7–9 μ broad at apex ..... *P. sipei*
5. Pileus moist to viscid; cheilocystidia 2–4 μ broad at apex 6
6. Spores rusty brown in KOH ..... *P. jennyae*
6. Spores hyaline to ochraceous in KOH ..... *P. christinae*
7. Stipe 1.5–3 mm thick at apex; spores 6–7 μ broad ..... *P. similis*
7. Stipe thicker; spores mostly narrower than 6 μ 8
8. Hyphae of pileus pellicle with large, looping clamp connections ..... 1. *P. deceptiva*
8. Clamp connections absent or rare and inconspicuous on hyphae of the pellicle 9
9. Stipe 3–8 (–10) mm thick at apex 10
9. Stipe 8–20 (–40) mm thick at apex 18
10. Pileus lubricous, not viscid ..... *P. attenuata*
10. Pileus viscid to slimy 11
11. Cheilocystidia clavate to subcylindric 12
11. Cheilocystidia tapered in the upper part, acute to minutely capitate, on one species rare 15
12. Spores 9–11 × 4.4–5.5 μ; pileus ochraceous-salmon to salmon when moist ..... *P. laterarius*
12. Spores 7–9 × 4–5.5 μ; pileus olive to brown 13
13. Pileus olive fading to green; young lamellae violet ..... *P. fallax*

13. If pileus olivaceous then lamellae not violet 14
14. Pileus usually with olivaceous tones; apical part of cheilocystidium 6–9 μ broad ..... *P. festiva*
14. Pileus lacking olivaceous tones; apical part of cheilocystidium 3–6 μ broad ..... *P. rufipes*[1]
15. Pileus olive-green, fading to olive-buff or paler ..... *P. pseudofestiva*
15. Pileus cinnamon to gray-brown or reddish brown 16
16. Pleurocystidia present, scattered to abundant ..... *P. lugubris*
16. Pleurocystidia absent or only a few near the edge 17
17. Young gills yellowish; pileus dull cinnamon fading to gray-brown ..... 6. *P. scatesiae*
17. Young gills pallid brownish; pileus amber brown or redder when faded ..... *P. californica*
18. Young gills, violet; spores 7–8.5 × 5–5.5 μ ..... *P. lilacifolia*
18. Young gills not violet; many spores larger 19
19. Cheilocystidia with an enlarged base, narrow neck and acute to capitate apex ..... *P. spadicea*
19. Cheilocystidia clavate to filamentous 20
20. Pileus dark olive, fading to deep olive-buff; cheilocystidia gelatinous ..... *P. olivacea*
20. Pileus lacking olivaceous tones; cheilocystidia not gelatinous 21
21. Pileus 80–150(–250) mm broad; stipe 15–35(–40) mm thick at the apex ..... *P. kauffmanii*
21. Pileus smaller and stipe narrower than in above choice 22
22. Pileus orange-rufous; taste bitter; cheilocystidia filamentous to clavate, 4.5–8 μ broad ..... 5. *P. piceae*
22. Pileus gray-brown; taste not distinctive; cheilocystidia filamentous to tapering, 2–5 μ broad ..... 3. *P. gregaria*

1. Phaeocollybia deceptiva sp. nov.

Pileus 5–10 cm latus, obtuse conicus demum plano-umbonatus, glaber, udus, hygrophanus, fusco-cinnamomeus demum subalutaceus, ad centrum fulvus; lamellae cinnamomeae, latae, confertae; stipes 8–15 cm longus, radicatus, 8–15 mm crassus, sordide cinnamomeus, glaber; sporae 8–10(–10.5) × 4.5–6 μ, verrucosae; cheilocystidia clavata, 20–30 × 3–8 μ; fibulae adsunt. Typus: Smith n. 77000 (MICH).

Pileus 5–10 cm broad, obtusely conic expanding to nearly plane with an obtuse umbo, glabrous, moist, hygrophanous, dark cinnamon to "Sayal brown" (a strong yellowish brown), fading to "cinnamon buff" (moderate orange yellow), with the disc reddish tawny; margin inrolled at first. Context thick, dull cinnamon, odor and taste not distinctive, no reaction with either KOH or $FeSO_4$. Lamellae concolorous with pileus (some shade of cinnamon), broad, close, narrowly adnate, in age dark rusty cinnamon, eroded on the edges finally. Stipe 8–15 cm long, the pseudorhiza 10–12 cm long to the breaking point, stipe near apex 8–15 mm thick, solid, dull cinnamon within, surface pallid

[1] *Phaeocollybia rufipes* Bigelow, Rhodora 65: 297. 1963. For authorities of other species not mentioned in the text see Smith (1957).

cinnamon or paler toward the base, pseudorhiza also paler, surface above ground transversely undulated, lacking color changes on injury; veil absent.

Spores 8–10(–10.5) × 4.5–6 μ, coarsely warty-rugulose, lacking a beak, in profile obscurely inequilateral, in face view elliptic or nearly so, rusty brown in KOH. Basidia 2- and 4-spored. Pleurocystidia none. Cheilocystidia clavate, 20–30 × 3–8 μ, numerous, but basidia also present on the edge. Cuticle of pileus poorly formed, of appressed scattered nongelatinous hyphae 4–6 μ wide; subcutis (hypodermium ?) of compactly arranged hyaline hyphae as reviewed in KOH. Clamp connections present on epicuticular hyphae of the pileus, large and looping.

Under conifers (mostly *Tsuga*), Macabee Falls Area, Priest Lake district, Bonner County, Idaho, Oct. 7, 1968, Smith 77000 (type).

Observations.—This species lacks a viscid pellicle, the stipe does not develop "ferruginous" (moderate reddish orange) tones, and the clamps are large and looping. Because of the lack of a gelatinous pellicle this species will undoubtedly eventually be placed in a section by itself in spite of the similarity in aspect to *P. kauffmanii.*

2. Phaeocollybia dissiliens sp. nov.

Pileus 3–6 cm latus, obtuse conicus demum late conicus, glaber, glutinosus, aurantio-cinnamomeus vel pallide rufo-cinnamomeus, hygrophanus; lamellae confertae, angustae, subliberae, dilute luteae demum rufo-cinnamomeae; stipes 7–12 cm longus, 8–18 mm crassus, radicatus, sursum pallidus, deorsum rufo-cinnamomeus, glaber, dissiliens; sporae 6–7.5 × 3.7–4.5(–5) μ, verruculosae; pleurocystidia 28–37 ×3.5–6 μ, filamentosa; cheilocystidia pleurocystidiis similis. Typus: Smith n. 79252 (MICH).

Pileus 3–6 cm broad, obtusely conic with an inrolled margin, becoming expanded-umbonate, slimy viscid, color "orange cinnamon" (moderately orange) to "pinkish buff" (light yellowish pink) or a pale tan in some, opaque when moist, hygrophanous, fading to dingy orange-tan. Context watery tan, thin, cartilaginous, odor and taste not distinctive; $FeSO_4$ no reaction; KOH giving a slight brown reaction. Lamellae crowded, narrow, ascending-adnate to free, at first pale yellowish, in age cinnamon to pale rusty cinnamon. Stipe 7–12 cm long (above ground), 8–18 mm thick, the pseudorhiza long (6 cm or more) and rather fragile, watery pallid in color in apical region at first but in age pale cinnamon, lower down soon rusty orange to reddish orange or finally red, naked, moist, very readily splitting lengthwise.

Spores 6–7.5 × 3.7–4.5(–5) μ, minutely warty, in profile somewhat inequilateral, ovate in face view, lacking a distinct beak (or pore), rusty brown in KOH, in Melzer's pale rusty cinnamon. Basidia 4-spored.

Pleurocystidia 28–37 × 3.5–6 μ, hyaline, thin-walled, filamentous, scattered. Cheilocystidia similar to pleurocystidia (filamentous), lacking a capitellum or a beak at the tip. Gill trama parallel. Pileus with a gelatinous pellicle of hyaline, smooth to hyaline-incrusted, narrow (3.5–4 μ) hyphae with clamps at some septa.

Gregarious under sitka spruce (*Picea sitchensis*), Cape Lookout State Park, Tillamook County, Oregon, Oct. 23, 1970, Smith 79252 (type).

Observations.—The filamentous cheilocystidia, the stipe which splits into longitudinal segments with little provocation, the relatively small spores, and thick stipe along with the "orange-cinnamon" pileus are distinctive. It has the aspect of *P. californica* Smith.

3. Phaeocollybia gregaria sp. nov.

Pileus 3–6 cm latus, conicus, demum late conicus, glaber, glutinosus demum rugulosus, griseo-brunneus; lamellae pallide griseae demum cinnamomeae, confertae, angustae; stipes 8–18 cm longus, 8–15 mm crassus, radicatus, sursum pallide griseus, deorsum castaneus vel rufus; sporae 9–11 × 5.5–6 μ, inaequilaterales; cheilocystidia 20–35 × 2–5 μ, filamentosa, ad apicem late rotundata vel acuta. Fibulae desunt. Typus: Smith n. 79075 (MICH).

Pileus 3–6 cm broad, conic, the margin inrolled, expanding to broadly conic in age, surface glabrous, slimy, becoming radially rugulose in some, evenly near "wood brown" (light grayish yellowish-brown) when young, grayish buff when faded, hygrophanous, opaque at all stages. Context thin and cartilaginous-pliant, odor and taste not distinctive, no reaction in KOH or $FeSO_4$. Lamellae grayish pallid becoming dull cinnamon when mature, crowded, ascending-adnate, narrow, edges even. Stipe 8–18 cm long, 8–15 mm thick at apex, tapered to a long pseudorhiza, pallid avellaneous (pinkish gray) and naked near apex, rusty red to "chestnut brown" (moderate reddish brown) on the pseudorhiza; veil absent.

Spores 9–11 × 5.5–6 μ, inequilateral in profile, ovate-pointed in face view, with a prominent beak, nearly smooth, pale rusty brown in KOH. Basidia 4-spored. Pleurocystidia absent. Cheilocystidia intermediate in shape between sections *Phaeocollybia* and *Versicolores:* filamentous with a rounded apex to tapering apically, 20–35 × 2–5 μ. Gill trama parallel. Pileus with a gelatinous pellicle of hyaline, smooth, narrow hyphae 2–6 μ wide. Clamps absent.

Densely gregarious in small areas (not truly cespitose) under spruce (*P. sitchensis*), Cascade Head Experimental Forest, Tillamook County, Oregon, Oct. 16, 1970, Smith 79075 (type).

Observations.—This species differs from *P. spadicea* Smith in its longer spores, in lacking any indication of a bitter taste, and in the paler colored pileus. There is also some difference in the cheilocystidia.

4. Phaeocollybia oregonensis sp. nov.

Pileus 5–11 cm latus, conicus demum plano-umbonatus, glaber, glutinosus, subhepaticus demum dilute rufobrunneus; lamellae latae, confertae, argillaceae; stipes 8–15 cm longus, 1–2 cm crassus, radicatus, demum vinaceo-ruber; sporae 6–7.5 × 3.5–4.5 μ, verruculosae; cheilocystidia filamentosa vel clavata, 12–30 × 4–8 μ. Typus: Smith n. 28420 (MICH).

Pileus 5–11 cm broad, conic with an inrolled margin when fresh and young, expanding to plano-umbonate with a sharply conic umbo and a decurved to spreading margin, surface glabrous and slimy-viscid, color dark reddish brown to dull liver-brown, paler when fadded or dried, margin opaque; context (no data available on fresh specimens). Lamellae broad, close, narrowly attached to stipe but pulling away in drying, leaving a violaceous zone around the apex of the stipe, dingy "clay color" (a strong yellowish brown), in age or as dried. Stipe 8–15 cm long, 1–2 cm thick at apex, tapered to a long pseudorhiza, soon stained vinaceous red and this color present over all in age, as dried purplish red-brown, naked; veil absent.

Spores 6–7.5 × 3.5–4.5 μ, nearly smooth, somewhat inequilateral in profile, in face view elliptic to ovate, lacking a distinct beak, dingy ochraceous to brownish in KOH. Basidia 4-spored. Pleurocystidia none. Cheilocystidia filamentose to clavate, hyaline, 12–30 × 4–8 μ. Cuticle of pileus of gelatinous hyaline narrow hyphae, possibly a collapsing trichodermium. Clamp connections very rare.

Gregarious under conifers, Larch Mt. Columbia Gorge, on the Oregon side, Oct. 20, 1947, Smith 28420 (type).

Observations.—This species is easily mistaken in the field for *P. kauffmanii* but the spores readily distingiush them. The cystidia are the wrong type for *P. lugubris* (Fr.) Heim.

5. Phaeocollybia piceae sp. nov.

Pileus 2–4 cm latus, obtuse conicus, demum late conicus, glaber, viscidus, aurantio-rufus tarde demum aurantio-subochraceus; sapor amarus; lamellae pallide cinnamomeae demum aurantio-cinnamomeae, confertae, angustatae; stipes 8–12 cm longus, 8–13 mm crassus, radicatus, glaber, udus, subargillaceus, deorsum ferrugineus; sporae 8.5–11 × 4.5–6 μ, verruculosae. Cheilocystidia (10–)20–32 × 4.5–8 μ, filamentosa vel clavata. Fibulae desunt. Typus: Smith n. 79085 (MICH).

Pileus 2–4 cm broad, obtusely conic with an inrolled margin, broadly conic in age or campanulate, thinly viscid, glabrous, color evenly

"orange-rufous" (deep orange), fading slowly to "orange buff" (moderate orange-yellow), often with a sinus on one side. Context thin and cartilaginous, odor slight, taste bitter, no reaction with KOH or $FeSO_4$. Lamellae "cinnamon buff" becoming "orange-cinnamon" (moderate orange) to pale cinnamon, crowded, narrow, reaching the apex of the stipe, edges even. Stipe 8–12 cm long, 8–13 mm at apex, tapered to a long pseudorhiza, naked and moist, "cinnamon buff" (moderate orange-yellow) above, "ferruginous" (deep orange) below and in age or when dried purplish red; veil absent.

Spores 8.5–11 × 4.5–6 μ, minutely warty, ovate in face view, broadly inequilateral in profile, apex obscurely beaked, rusty brown in KOH. Basidia 4-spored. Pleurocystidia absent. Cheilocystidia abundant (10–)20–32 × 4.5–8 μ, filamentose to clavate, hyaline in KOH. Pellicle of pileus of gelatinous hyphae interwoven in the basal area and forming a turf in what might be termed the epicutis. Clamp connections absent.

Cespitose under spruce (*P. sitchensis*), Cascade Head Experimental Forest, Tillamook County, Oregon, Oct. 16, 1970, Smith 79085 (type).

Observations.—In section *Phaeocollybia* this species is distinct from *P. kauffmanii* in its cespitose habit, narrower stipe, redder pileus and more orange-cinnamon gills. A reddish tone in well-dried specimens is pronounced. It has about the same color as *P. christinae* (Fr.) Heim but the latter is distinguished by its cheilocystidia.

6. Phaeocollybia scatesiae sp. nov. FIG. 1

Pileus (2–)3–6 cm latus, obtuse conicus demum plano-umbonatus, glaber, glutinosus, cinnamomeus demum cinnamomeo-ochraceus, hygrophanus, demum griseo-brunneus; sapor mitis; lamellae dilute luteae demum cinnamomeae, confertae, angustae; stipes 9–18 cm longus, 3–7 mm crassus, radicatus, glaber, nitens, sursum pallide griseus deorsum cinnamomeus vel aurantio-cinnamomeus; sporae 8–9.5 × 5–6 μ, verruculosae; cheilocystidia 15–30 × 4.5–6 × 1.5–3 μ, filamentosa vel subcapitata; fibulae desunt. Typus: Smith n. 79286 (MICH).

Pileus (2–)3–6 cm broad, when young obtusely conic with an inrolled margin, becoming expanded-umbonate with the margin long remaining more or less decurved, surface glabrous, slimy-viscid, somewhat hygrophanous, color when moist a dull cinnamon (rather dark over the disc and paler to the ochraceous-cinnamon often striatulate margin), when faded a grayer brown. Context thin, cartilaginous, watery brownish fading to pallid or grayish; odor and taste not distinctive, no reaction with KOH or $FeSO_4$. Lamellae pale dingy yellowish when young, by maturity pale to dark cinnamon, crowded, narrow, narrowly attached to the stipe. Stipe 9–18 cm long, 3–7 mm thick, with a long (5–12 cm or more) tapering pseudorhiza, naked and shining but not slimy (veil absent), pallid grayish near apex at first, gradually more cinnamon colored to "orange-cinnamon" and finally cinnamon-red down to the ground line.

Spores 8–9.
in face view, b
cystidia absent.
slightly ventric

Spores 8–9.5 × 5–6 μ, warty-rugulose, inequilateral in profile, ovate in face view, beaked, rusty brown in KOH. Basidia 4-spored. Pleurocystidia absent. Cheilocystidia 15–30 × 4.5–6 × 1.5–3 μ, filamentose to slightly ventricose near the basal septum, most with a thin neck and

FIG. 1. *Phaeocollybia scatesiae*, × 1. Smith 79286—type.

capitate to subcapitate apex. Pellicle of pileus of interwoven hyaline smooth hyphae 2.5–5 μ wide; clamps absent.

In massive clusters gregarious under conifers, Cascade Head Experimental Forest, Tillamook County, Oregon, Oct. 24, 1970, Smith 79286 (type).

Observations.—The gray-brown faded pileus is unusual for the genus, as are the massive clusters of fruit bodies. The pseudorhiza tapers to a thread and is difficult to follow in the duff filled with fine fibrous rootlets of spruce. It is doubtful if a species fruiting in such giant masses as this one could be a mycorrhiza-former, but the question should be carefully checked. The species is named in honor of its discoverer, Mrs. Robert M. Scates of Post Falls, Idaho.

MISCELLANEOUS NEW AND CRITICAL SPECIES

RUSSULA NIGRICANS Fr.

Pileus 6–12(–20) cm broad, convex to convex-depressed, expanding to broadly convex, in age at times broadly funnel-shaped, surface dull and unpolished, typically dry but somewhat tacky when wet, dull white to pallid at first, gradually becoming black. Context rigid and hard, brittle, white to pallid and when cut staining reddish to reddish cinnamon and then progressing to black, with $FeSO_4$ olive to olive-black, taste mild, odor slight. Lamellae distant to subdistant, narrow becoming moderately broad, thick, broadly adnate to short decurrent, whitish to grayish or in age finally black, staining reddish before blackening when injured. Stipe 4–10 cm long, 2–5 cm thick, equal, solid, hard, central part soon worm-riddled, when cut staining reddish then black; surface unpolished, white at first, usually black in age but apex remaining pallid, veil absent.

Spore deposit dull white. Spores 6.5–8.5(–9) × 5–6.5(–7) μ, broadly ellipsoid to subglobose, ornamentation very low (< 0.25 μ) and in the form of warts arranged in short rows but unconnected or else some connected by fine lines; plage area clearly outlined in most spores and with very little amyloid material on it. Basidia 4-spored. Pleurocystidia 52–75 × 4–6(–7) μ, cylindric or nearly so, abundant, content of refractive amorphous globular material in many. Cheilocystidia (of the type termed leptocystidia) arising from a subcellular layer, versiform, apex often proliferated, some having secondary septa, 8–15 μ wide in ventricose part. Cuticle of pileus a layer of interwoven hyphae 5–9 μ wide, many with smoky brown content, some end-cells cystidioid but these not forming a palisade or even a lax turf.

Observations.—Shaffer (1962) cited no material of this species from North America thereby implying that it does not occur here. In his chart comparing *R. nigricans* with his new species *R. dissimulans,*

our specimens are clearly the former: They had: 1) distant gills; 2) an olive $FeSO_4$ reaction on the pileus margin and context; 3) spores 6.5–8.5(–9) × 5–6.5(–7) μ; and 4) spore ornamentation less than 0.25 μ high. No appreciable slime was noted on or between the hyphae of the pileus cuticle in fresh or revived material.

Russula nigricans, in other words, is a common and easily recognized species clearly distinct from *R. dissimulans* as Shaffer pointed out. There is a possible slight difference between European and Oregon specimens of *R. nigricans,* however, that may deserve further study. In the Cascade Head collections, the hyphae are broader and the presence of interhyphal slime was questionable, but the degree of difference appears to us to be too slight to justify taxonomic emphasis.

Cortinarius vanduzerensis sp. nov. FIG. 2

Pileus 4–8 cm latus, ovatus vel obtuse conicus, glaber, rugulosus, glutinosus, atrocastaneus, demum castaneus vel cinnamomeo-brunneus; sapor mitis; lamellae alutaceae demum cinnamomeae, confertae, latae, adnatae; stipes 10–18 cm longus, 1–2 cm crassus, caeruleo-glutinosus, deorsum pallidus; sporae (11–)12–14(–15) × 7–8(–9) μ; cheilocystidia 17–26 × 9–15 μ, clavata vel clavato-mucronata. Typus: Smith n. 79292 (MICH).

FIG. 2. *Cortinarius vanduzerensis,* × 0.8. Smith 79287—paratype (left); 79292—type (right).

Pileus 4–8 cm broad, oval to obtusely conic with the margin appressed at first, expanding to broadly conic, surface covered with a thick layer of slime, color chestnut-black at first, the margin soon chestnut-brown, opaque when moist. Context pallid but soon pale "cinnamon buff" (moderate orange-yellow); odor and taste not distinctive; $FeSO_4$ olivaceous. Lamellae "pinkish buff" (light pinkish yellow) when young (in unopened pilei), dull cinnamon at maturity, close, adnate, only moderately broad. Stipe 10–18 cm long, 1–2 cm thick, narrowed slightly to the base, pallied within but slowly "cinnamon buff" at least near the base; surface with a thick slime-veil, "lobelia violet" (light purple) to "dark lavender" above, paler over lower third, at times broken into concentric zones over lower third.

Spores (11–)12–14(–15) × 7–8(–9) μ, in face view broadly elliptic to ovate, in profile broadly inequilateral, warty-rugulose, lacking an apical pore. Basidia 4-spored, broadly clavate, content often in the form of yellow masses or granules (in Melzer's). Pleurocystidia none. Cheilocystidia 17–26 × 9–15 μ, clavate to clavate-mucronate. Trama of lamellae subparallel, brownish to orange-brown oleiferous hyphae present. Epicutis of pileus a turf of gelatinous hyphae 2.5–6 μ wide, clamps absent to rare. Veil hyphae 4–8(–9) μ wide, hyaline to yellow in KOH. Hyphae of the cortex of the stipe subparallel, clamps present.

Solitary to gregarious under spruce-hemlock, Cascade Head Experimental Forest, Tillamook County, Oregon, October and November, 1970, Smith 79292 (type).

Observations.—This species reminds one of *Cortinarius elatior* Fr., a second species of subgenus *Myxacium* also found at the Experimental Forest. However, it has violet lamellae at first. *Cortinarius vanduzerensis* is one of the large more conspicuous members of subgenus *Myxacium*. Its combination of features includes pale brown gills at first, the strikingly violaceous lavender color of the slime over much of the stipe, the dark chestnut color of the pileus, and the tendency of the latter to become corrugated by maturity.

Phylloporus arenicola sp. nov.

Pileus 1.5–4.5 cm latus, plano-convexus, subvelutinus, olivaceus vel olivaceo-fuscus, demum olivaceo-ochraceus, cum "NH_4OH" violaceo-fuscus demum fuscus; tactu immutabilis; lamellae emarginatae, secedentes, subdistantes, laete luteae; stipes 4–6 cm longus, 6–8 mm crassus, luteus, rufo-pruinosus, deorsum laete luteus vel cinnabarinus; sporae 9–12 × 4–5 μ; pleurocystidia 52–86 × 9–16 μ, fusoide ventricosa vel subfusiformia. Typus Smith n. 79766 (MICH).

Pileus 1.5–4.5 cm broad, plane becoming convex-depressed, unpolished to velvety, "olive" (moderate olive) on the margin to olive-fuscous on the disc, in age more olive-brown, in fading becoming "olive-

ocher" (olive-yellow) and possessing a sheen, NH_4OH when applied on the cuticle immediately producing a violaceous-fuscous stain which soon becomes mahogany red. Context pallid to yellowish, not staining blue when cut, odor none, taste mild, $FeSO_4$ slowly weakly olive. Lamellae adnexed-seceding, broad, subdistant, "mustard yellow" (a bright yellow), not staining, edges even and concolorous with the faces. Stipe 4–6 cm long, 6–8 mm thick at apex, narrowed downward, ground color dull yellow but this overlaid with brown to reddish pruina, bright yellow in and around the base or in some becoming cinnabar toned.

Spores 9–12 × 4–5 μ, olive-hyaline in KOH, weakly dextrinoid, smooth (under the light microscope), shape in profile somewhat inequilateral, in face view subelliptic to subfusoid, apex lacking a distinct pore. Basidia 4-spored, 38–60 × 9–13 μ, clavate, with oil droplets, pale yellow in Melzer's. Pleurocystidia subfusoid to fusoid-ventricose, 52–86 × 9–16 μ, thin-walled, smooth, hyaline, content not distinctive. Cheilocystidia similar to pleurocystidia but shorter. Gill trama of wide (9–13 μ) cylindric hyphae slightly divergent near the subhymenium. Pileus cuticle a trichodermium of elongate cells in the hyphae, the end cells not cystidioid, with a slight constriction at the cross-walls, smooth in KOH, in Melzer's the hyphae of the subcutis and lower part of the trichodermium with incrustations and interhyphal deposits of somewhat dextrinoid material. No clamp connections were found.

Solitary under *Pinus contorta* Dougl. ex Loud on sand dunes along the Oregon Coast; the type was collected near Pacific City, Tillamook County, Oregon, Nov. 10, 1970, Smith 79766 (type).

Observations.—It is impossible at present to connect American variants in this genus with those from Europe in any meaningful way as the data simply are not available. The outstanding features of *P. arenicola* are the immediate NH_4OH reaction to violet-fuscous of the cuticle of the pileus when fresh, the olive to olive-fuscous color of the pileus, the lack of any blue stain when the hymenophore or context are injured, the adnexed to emarginate-seceding lamellae, and the bright yellow base of the stipe. We know the common *P. rhodoxanthus* (Schw.) Bres. well. It also occurs in the Cascade Head area. It is readily distinguished by a number of characters such as the gills being decurrent, by the ammonia reaction, and the dull red to bay colored pileus.

Suillus imitatus Smith & Thiers var. **viridescens** var. nov.

Pileus 4–12(–15) cm latus, convexus, glutinosus, ferrugineus demum pallide luteus, interdum viridimaculatus vel fuscoviridis; caro luteus; pori tactu brunnescens; stipes interdum annulatus, non-glandulosus; sporae 8–11 × 4–4.5 μ. Typus: Smith n. 78754 (MICH).

Pileus 4–12(–15) cm broad, convex with an incurved margin, surface slimy-viscid, glabrous, evenly reddish orange to "Sanford's brown" (ferruginous), becoming paler to "cinnamon rufous or finally yellow ("cream-buff") (the pigment soluble in water and leaching out, hence pilei developing in dry weather more deeply colored than those developing in wet weather), at times with dingy cinnamon streaks, by maturity at times showing dark green spots as if stung by an insect or flushed olive to dark green over wide areas and rarely the surface "dull blackish green" (blackish green) to "dusky bluish green" (a dingy bluish green), with the dingy yellowish ground color showing only near the margin; margin often appendiculate with veil remnants or these forming a sterile zone as in *Suillus albidipes* (Pk.) Singer. Context lemon-yellow in brightly colored (ferruginous) pilei, slowly staining brownish when cut, odor acidulous to metallic; taste mild; $FeSO_4$ gray to olive to fuscous, with KOH vinaceous to fuscous. Tubes shallow, 4–7 mm deep in a 12-cm pileus, pale yellow, decurrent; pores boletinoid, angular, many about 1 mm wide, staining dingy cinnamon to dull brown where bruised. Stipe 3–9 cm long, 1–3 cm thick above, narrowed downward, solid, lemon-yellow within, soon becoming olive-brown in the base, not regularly staining blue or green when cut (at least in dry-weather specimens), in some basidiocarps staining greenish and in some bluish (and in one with blue on one cut surface and green on the other in a longitudinally sectioned stipe), surface lemon-yellow in dry weather forms when young, often spotted pinkish cinnamon from veil material and frequently reticulate above the annulus, in age the base blackish brown, in specimens with a dark green pileus the stipe also green over most of its area but apex usually remaining yellow. Annulus a wide band with a slimy edge, upper surface buff-color, often an orange band of slime forming on lower surface reminding one of the violaceous-brown zone in *Suillus luteus* (Fr.) S. F. Gray, annulus often fragmentary in mature specimens (or in age often absent).

Spores dull cinnamon in a deposit, 8–11 × 4–4.5 μ, yellowish singly in KOH, subelliptic in face view, elliptic but with a broad shallow suprahilar depression in profile, wall scarcely thickened, apex lacking a pore. Basidia 4-spored. Pleurocystidia in bundles and with both brown content and some brown incrusting material around the bundle (as revived in KOH), individual cystidia cylindric, narrowly clavate or weakly obfusoid-ventricose, 52–75 × 6–12 μ; cheilocystidia and cheilobasidia both often with dark brown content as revived in KOH. Pellicle of pileus a thick gelatinous layer of hyaline (in KOH) to yellow (in Melzer's) hyphae 3–5 μ wide, smooth, clamps if present rare; subcutis a region of hyphae with deposits of brownish material (in KOH) giving it a spotted appearance, in Melzer's orange-brown droplets to large globules forming in this region (as in *Rhizopogon* of the Hymenogastrales).

Common in the sitka spruce-Douglas fir-western hemlock zone on the Oregon Coast, Smith 78754 (type), collected in the VanDuzer Corridor, Tillamook County, Oregon, Oct. 2, 1970.

Observations.—Suillus imitatus Smith & Thiers (1964) var. *imitatus* was also abundant in the area the entire fall. Var. *viridescens* was the subject of prolonged observation. Trappe insisted that there was a dark green *Suillus* in the coastal area, and we finally found a single dark green basidiocarp which was in perfect condition. By continued collecting during the remainder of the season we found all degrees of intergrading basidiocarps from those represented in the type collection made early in the season and featuring a few greenish spots or slight local flushes on some pilei, to those late in the season that were blackish green over all except the pores and which were in merely the early stages of maturity and in perfect condition in every respect.

The color change is not the result of damage to the basidiocarp from injury of any kind. The extreme dark green variant was never found in quantity, though collections showing some degree of staining were observed almost every day that collecting was done in the Douglas fir zone. The type collection was at first identified as *S. ponderosus* Smith & Thiers. We thought it was a variant with small basidiocarps. In fact a critical study in culture of *S. ponderosus* and *S. imitatus* would be highly desirable. In a second *Suillus* with a green stage in the development of the pileus, *S. pungens* Thiers, all pilei in a typical fruiting show the same pattern of color development, and it is not the pattern exhibited by var. *viridescens*. *Suillus amabilis* (Pk.) Singer, is also very close, especially to the dry weather variant, but should have pallid flesh and it is very likely that it has a glandular dotted stipe.

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