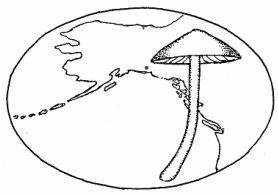
Pacific Northwest Fungi



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Cortinarius rubellus Cooke from British Columbia, Canada and Western Washington, USA

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Abstract: *Cortinarius rubellus* is reported from British Columbia and Western Washington. This is the first report of *C. rubellus* from western North American since it was published as *C. rainierensis* by A. H. Smith and D. E. Stuntz in 1950.

Key words: ectomycorrhiza, orellanine, *Sphagnum* bog.

Introduction: *Cortinarius rubellus* Cooke is well known in the literature through papers on its taxonomy, nomenclature, ecology, toxicology and fluorescent pigments. Keller-Dilitz et al. (1985) did not consider the name *C. rubellus*, and maintained *C. orellanoides* R. Henry, *C. speciosissmus* Kuhner and Romagnesi, and *C. rainierensis* A. H. Smith & D. E. Stuntz as separate species. *C. rainierensis* was described from Washington by Smith & Stuntz (1950) and *C. speciosissimus* was reported from Ontario

and Nova Scotia, Canada as well as Maine, USA by Thorn & Malloch (1994). Brandrud et al. (1990) considered *C. orellanoides* and *C. speciosissimus* as synonyms of *C. rubellus*. Bidaud et al. (1991) presented an extensive treatment of the European species in subsection *Orellani* and maintained use of the names *C. orellanoides* and *C. speciosissimus*, the former as characteristic of deciduous forests and the latter characteristic of acidic coniferous woods and moorlands (see also Moser, 1983).
Peintner et al. (2004) placed *C. rubellus* in the Orellani clade (subgenus *Leprocybe,* sec. *Orellani* Kühn. & Romagn. ex Mos.) together with *C. orellanoides* R. Henry and *C. orellanus* Fr. All of the species in this clade contain the nephrotoxin orellanine and similar fluorescent compounds (Keller-Dilitz et al., 1985). Benjamin (1995) provides an excellent review of poisoning by these species. All of the above names represent the same morphological species, with *C. rubellus* the first available name for it.

Materials and Methods: Specific colors are from Munsel (1975) for example, 7.5YR4/6. Basidiospore measurements were made in 3 % KOH at 1,250 X. All collections are deposited in the Burke Museum, University of Washington Herbarium (WTU) unless otherwise indicated.

Results: Nomenclature and a brief description of the species are provided below. Additional descriptive information for North American material is provided in Thorn & Malloch (1994).

Cortinarius rubellus Cooke, Grevillea 16: 44. 1887.

= *Cortinarius rainierensis* A. H. Smith & D. E. Stuntz, Mycologia 42:80-134. 1950.

= *Cortinarius speciosissimus* Kühner & Romagn., in Bidaud, Henry, Moënne-Loccoz & Reumaux, Fl. Analyt. Champ. Supér. (Paris):287. 1953.

= *Cortinarius orellanoidies* Rob. Henry, Bull. Soc. Mycol. Fr. 53(1): 61 (1937).

≡ *Cortinarius orellanoides* var. *speciosissimus* (Kuhner & Romagnesi) Consiglio, D. Antonini & M. Antonini, Il Genere *Cortinarius* in Italia. Associazione Micologica Bresadola 1: A 109. 2003.

Pileus 15-53 mm diameter, campanulate to convex then plano-convex, more or less umbonate, sometimes conical in profile, edge inrolled to incurved then decurved to plane, margin even or sometimes crenate-sulcate or virgate to rugulose, surface sometimes rimose, dry, dull, unpolished, fibrillose to velutinous, sometimes minutely scaly on disc, margin sometimes decorated with veil fibrils, evenly reddish brown (2.5YR4/4 - 4/6) to rust brown, scales sometimes dark reddish brown.

Lamellae caramel, yellowish (5YR7/8) to yellow-brown (5YR4/6), orange-brown or reddish brown (2.5YR4/6, 5YR5/8) to dark rusty brown, sometimes with rusty brown spots, not bruising, ascending to sinuate, 3 mm broad on average, ventricose, close to subdistant (about 14 lamellae/lamellulae/cm) or distant, edges straight, even, entire.

Microscopic features of the pileus and lamellae are as reported in Thorn & Malloch (1994) as *C. speciosissimus* and Smith & Stuntz (1950) as *C. rainierensis* and are not included here.

Stipe 35-82 mm long, up to 15 mm thick, base up to 10 mm thick, clavate to bulbous, tapered or pointed below, becoming fusiform when mature, sometimes splitting at base, at times longitudinally striate, base sometimes scaly, apex flocculose, surface dry, apex dark reddish orange (10R4/8), base reddish brown (5YR8/8), dark reddish

orange to moderate reddish brown (7.5R3/6 – 4/12) or rusty yellow orange, becoming yellow, with yellow to bright yellow-brown (5YR4/6) veil bands, fibrils and cortina remnants bright yellow-brown (5YR4/6), color not changing when bruised or bruising dark rusty at times.

Context compact, firm, fibrous in stipe, about 3 mm thick beneath disc, yellow to golden red (7.0YR9/4) throughout pileus and stipe at first, becoming pale yellowish, buff, or light brown in places, sometimes more yellowish brown in base, and in apex yellowish buff; no color changes after cutting or breaking; in age tunneled by larvae. Odor fungoid, taste mild.

Features of basidiomata from Shadow Lake Bog, in their natural habitat (Fig. 1), and microscopic features (Fig. 2) are provided below. Basidiospores from basidiomata collected at Shadow Lake Bog are subglobose to broadly elliptical or elliptical, with considerable variation in shape. The size is variable as well, but most fall into the range 8.9-10.4 (-11.1) X 6.7-7.8 (-8.9) µm. Average basidiospore length and width are smaller than reported for European specimens (8-11 X 6.5-8.5 µm) but compare well with other material from North America (Thorn & Malloch (1994) and Smith & Stuntz (1950).

Habit and Habitat: Gregarious to caespitose; under second generation young to mature Douglas-fir with western hemlock, western redcedar and vine maple, also on very rotten moss covered wood logs under western hemlock and western redcedar.

Collections Examined: **Canada.** British Columbia: S. Gamiet 2150 (UBC), Malcolm Knapp Research Forest, UBC, Alouette Trail, 49º 16' N, 122º 30' W; S. Gamiet 3060 (UBC), same location, July 23, 2005; S. Heard 94-43 (UBC) same location, July 4, 1994. **USA.** Washington: Pierce County. D. E. Stuntz 3998, Lower Tahoma Creek, Mt. Rainier National Park, August 18, 1948, same location, D. E. Stuntz 4064, August 21, 1948. King County, Shadow Lake Bog, 47° 29' N 122° 13' W, 2005-07-10-07, July 10, 2005.

Discussion: Comparison of material from Vancouver, British Columbia and Washington with that from Sweden (JFA12113, 12131, 12139) clearly shows that they represent the same taxon, *Cortinarius rubellus*. In western Washington and British Columbia, C. *rubellus* produces basidiomata in the summer from early July into the later part of September. According to D. E. Stuntz (personal communication) this species was locally common in Mt. Rainier National Park and Barlow Pass in the summer of 1948 in old-growth or mature Douglas fir/western hemlock forests. Since 1979 we have looked for this species numerous times in these two locations without success; for example, the species was not found in the survey of fungi from Barlow Pass (Ammirati et al., 1994). It appears that basidiome production of this species is either localized and/or the mycelia do not produce basidiomata every year.

In our region, *C. rubellus* is most easily confused with *C. limonius* (Fr.) Fr., *C. callisteus* (Fr.) Fr., and *C. gentilis* (Fr.) Fr.; these species plus *C. orellanus* are compared in Table 1.
To date, *C. orellanus* has not been documented from North America. In Europe, it often occurs with oak and prefers warmer sites. *C. orellanus* is distinguished by a red- to orange-brown, finely scaly, thin-fleshed pileus, by distantly spaced lamellae, and by a rather smooth, golden yellow to red-brown stipe. *Cortinarius rubellus, C. gentilis, C. limonius* and *C. callisteus* all occur in the Pacific Northwest during the summer or autumn seasons. *Cortinarius gentilis* and *C. limonius* are the two most frequently encountered of these species. The former has bright brownish yellow colors, a hygrophanous pileus, often a more or less acute umbo, rather long, slender, radicating stipe often with distinct yellow veil bands, and distant lamellae. *Cortinarius*

limonius usually has a combination of yellow, brown and red colors, a hygrophanous pileus like *C. limonius*, an often-indistinct yellow veil on the stipe, and moderately crowded lamellae. *C. rubellus* is most similar to *C. limonius.* The former has distant lamellae and distinct yellow veil bands on the stipe, while the basidiospores are much more coarsely ornamented than those of the latter. *Cortinarius callisteus* is not so frequent in our region. It has a peculiar odor of diesel fuel or warm motor oil, an orange-yellow to reddish brown pileus that is finely tomentose scaly at the center, and often a reddish brown (brown mixed with the color of red wine) color on the interior stipe.

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Table 1. A comparison of *C. rubellus* with similar-appearing species.

Characteristics	C. rubellus	C. limonius	C. calliteus	C. gentilis	C.orellanus
Habitat	Coniferous forests in Europe with beech and oak	Coniferous forests	Coniferous forests	Coniferous forests	Mixed or deciduous forests with beech, oak, and hazel nut, rarely in conifer forests
Pileus	Reddish brown to warm ochraceous brown, not hygrophanous	Red-brown, brownish yellow to reddish orange, fading to bright yellowish, hygrophanous	Bright orange-yellow to reddish brown, not hygrophanous, often finely tomentose scaly, especially at the center	Deep brownish yellow fading to pale yellow, hygrophan-ous, sometimes slightly striate	Red-brown, orange-brown or ochraceous brown, more dark brown with age, not hygrophanous, finely scaly
Lamellae	Ochraceous brown to reddish brown, distant	Dark yellow to brownish yellow or ochraceous-brown, moderately crowded	Orange-yellow to yellow brown, close to distant	Brownish yellow, may have dull olivaceous, dark reddish or violaceous tinge, distant	Warm ochraceous to rust-brown, distant
Stipe	Clavate with pointed base, ochraceous yellow to reddish brown, veil usually forming distinct yellow bands	Cylindric to fusiform, yellow to yellow brown, veil pale yellow forming indistinct zones	Clavate, sometimes rooting, orange-yellow to reddish brown, reddish brown toward base, fibrillose to scaly	Cylindrical, base tapered or rooting, yellow to yellow-brown, darkening below, veil yellow, thinly sheathing, forming a distinct zone and thin girdles below	Equal, base sometimes tapered, golden yellow to red brown, veil slightly fibrillose, pale yellow
Odor/Taste	Radish/mild or radish	Indistinct/mild	Peculiar odor of locomotive diesel/mild	Wet cement or raw potatoes, radish or indistinct/mild	Indistinct or radish/mild
Basidiospores	8-11 X 6.5-8.5µm, subglobose to broadly ovoid or broadly ellipsoid, distinctly ornamented	7.5-8.5 (-9) µm, ellipsoid to subglobose, finely ornamented	8-10.5 X 6.2-8 µm, broadly ellipsoid to subglobose, moderately ornamented	7-8.5 X (5.5-) 6-6.5µm, ellipsoid to subglobose, distinctly ornamented	8-10 X 6-6.5 µm, ellipsoid, distinctly ornamented

Figure 1 – Macroscopic Features of *Cortinarius rubellus*. A – Basidiomata growing from rotten *Tsuga heterophylla* log. B – Base of stipe, ranging from bulbous to tapered. Yellow cortina visible on young specimen. C – Close-up showing the gill attachment and cortina of young specimen. D – Gill color of mature basidiomata. E – Flesh and gill color of young basidiomata in cross section.

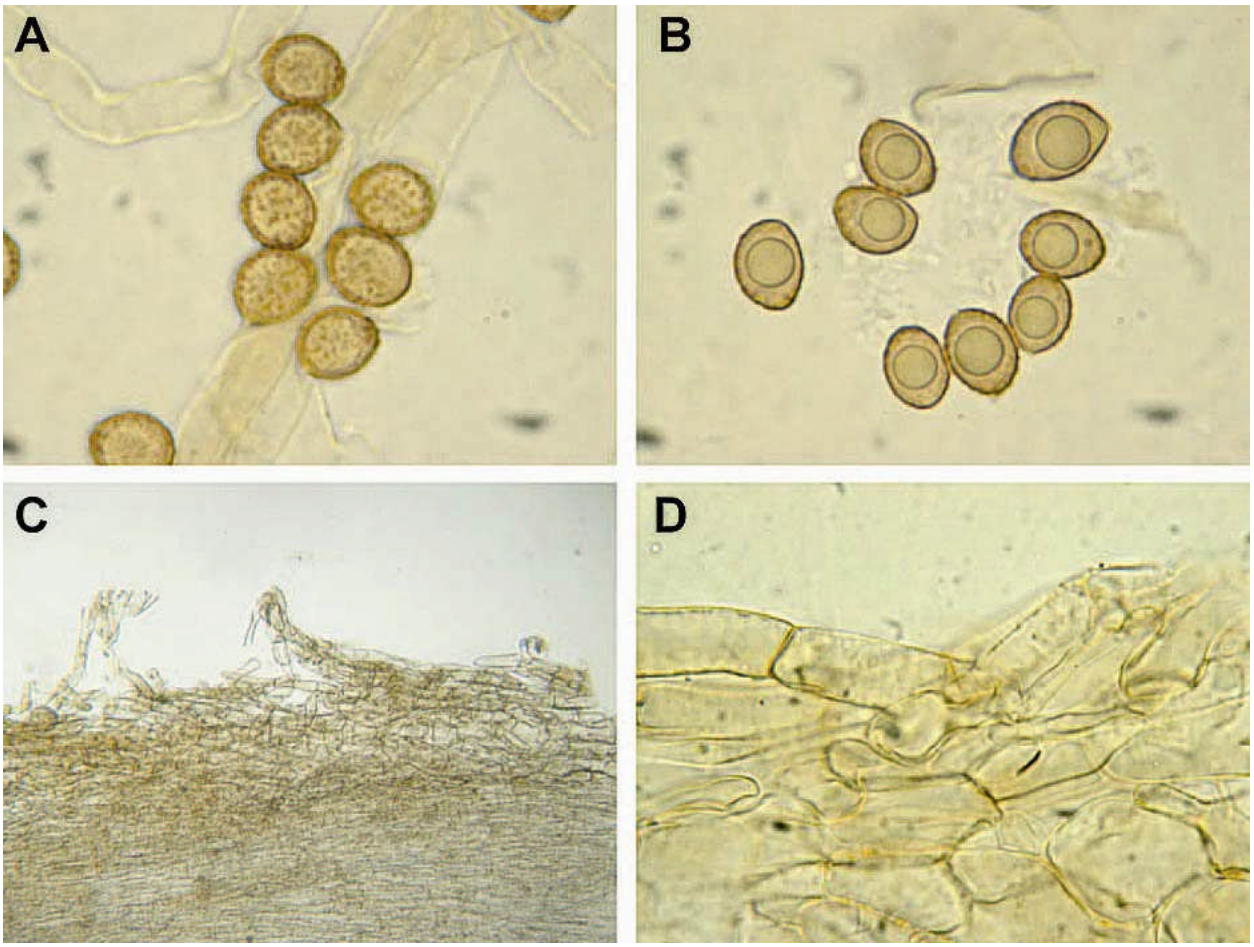

Figure 2 – Microscopic Features of *Cortinarius rubellus*. A – spores, showing ornamentation. B – Spores. C – Cap cuticle. D – Incrustations on the cap cuticle hyphae.