

***Cantharellus formosus* Corner**, Cantharelloid Fungi, Ann. Bot. Mem. 2: 45 (1960).

Figs. 1,3-5, 9-13.

Basidiomes brightly coloured dull orange yellow to orange, fleshy, and medium sized, with a pileus between 2 and 14 cm wide, well developed hymenophore folds typically paler and brighter than the pileus with a hint of pink, and a medium sized solid fleshy stipe coloured much like the pileus. Flesh whitish to paler than Ivory Yellow (Ridgway) except immediately below the pigmented surfaces, mild tasting and not strongly odoriferous. Edible. Spore print yellowish white (26 yrs. old, DAOM 142211).

Normal colouration on the pileus from three distinct pigments, a very thin centrally concentrated fuscous layer overlying a brightly coloured, orange yellow zone of at least two pigments extending <1 mm into the flesh. Under wet conditions brilliant to soft orange yellow [apricot to orange or saffron - Rayner; Antimony Yellow or Deep Chrome - Ridgway] coloured with a slightly dusky centre and largely obscured overlying fuscous layer. In strong shade salmon to rosy buff-coloured, with yellow pigment apparently not fully developed. Upon partial drying or in dry conditions the subhygrophanous fuscous layer becoming more conspicuous, appearing either as an even dusky coating and then the surface medium orange yellow to light yellow brown (or Yellow Ocher or Warm Buff - Ridgway), or breaking up into conspicuous appressed darker patches in scales or bands on a brighter background. Bruising from handling inconspicuous to conspicuous, inducing a slow yellowing which changes to ochraceous, most in freshly picked basidiomes that have developed under humid but not dripping wet weather conditions.

Surface texture under humid conditions like chamois or suede when young and never beaten by heavy rain or dried by hot weather, more often subglabrous, subpolished, or even appressed scaly and roughened, or sometimes developing epitopical hymenial patches.

Hymenophore decurrent, consisting of radiating well developed folds (up to 2 mm deep) tending to fork towards the margins, depending on growth conditions either crowded (1 mm apart) or subdistant (2 mm apart) and varying from scarcely anastomosing to distinctly intervenose with ladder-like branches, occasionally developing cracks when growth continues afterwards in dry weather. Colouration pale orange yellow (Kelly) to saffron (Rayner) or Pale Pinkish Cinnamon to Capucine Buff in some areas (Ridgway) when moist to salmon (Rayner) in drier forms, or

even yellow white to buff on heavily shaded specimens. Bruising yellow then ochraceous if fresh and humid.

Stipe solid, 40 - 80 mm long, 4 - 22 mm wide, equal or tapered downwards (almost never upwards) and sometimes compressed, concolourous with or slightly paler than the pileus (Ridgway – Maize Yellow or Buff Yellow to Warm Buff) and usually not as dusky, varying surface and colouration dependent on growth conditions, apically sheathed by a decurrent smooth hymenium extending beyond the folds, with sheath occasionally fragmenting into small patches or bands and exhibiting the salmon colours of the hymenophore unless bruised. Lower portions subglabrous and bruising yellow then ochraceous (Kelly), Capucine Yellow or slightly paler than Buckthorn Brown (Ridgway), more conspicuously fibrillose after handling.

Pileipellis initially, and often remaining so towards the incurled margins, a radially inclining turf of free hyphal ends exhibiting many long, bluntly tipped hyphal ends, soon collapsing into a radially matted, thin, fuscous layer, sometimes aggregated into flat appressed darkened scales which especially develop during growth phases in dry weather. Hyphae and hyphal ends 4-9 μ m diam. with fuscous contents and smooth, slightly thickened walls up to 0.8 μ m thick. Hypodermal hyphae slightly more compactly arranged than hyphae deeper in the trama and more heavily pigmented with yellowish contents. Tramal hyphae 3.5-15 μ m diam, subhyaline to faintly yellowish, interspersed with oleiferous hyphae, 4-5 μ m diam with refractive contents. Hymenial cystidia absent. Hymenium thickening (-167 μ m), hence the subhymenium a thick ill-defined zone. Basidia 4-(5-)6-spored, clavate, 86-120 X 8-11.6 μ m; sterigmata large, 5-7 μ m long, incurved, with the fifth and sixth further from the apex. Basidiospores (Fig. 13) 7.2-9.2 X 4.7-6.1 μ m, N = 10, av. 8.0-8.2 X 5.0-5.5 μ m, L/W 1.47-1.6, broadly ovoid to ellipsoid or broadly cylindrical in face view, slightly inequilateral to broadly cylindrical in profile, typically with a broadly rounded and nontapered nearly truncated apex in profile, very rarely constricted centrally, smooth, thin-walled, hyaline, nonamyloid. Hyphae in the stipe similar to the tramal hyphae but more clearly vertically aligned. Basal mycelial hyphae smooth, thin-walled, 2.3-5 μ m. Clamp connections abundant in all tissues.

Chemical tests (on LLN 94.10.17-1 after refrigeration for several days): FeSO₄ - pale green, leaving a bright orange ring after evaporation; PDAB - bright orange yellow after 30 minutes (bright yellow after 15 minutes, yellow orange immediately); no reactions noted with ParaCresol, Syringaldazine or KOH solution spot tests.

Habit and Habitat: Solitary to gregarious, often in small clusters or slight arcs, on bare and mossy needle beds, sometimes near coarse woody debris, in both second growth and old growth western North American forests, most often under hemlock (*Tsuga heterophylla*) sometimes mixed with Douglas fir (*Pseudotsuga menziesii*), spruce (*Picea sitchensis*) and other associates, and at least once seen in virtually pure *Pinus contorta* Dougl. stands on dunes in Oregon.

Specimens examined: **Canada: British Columbia (all DAOM):** North Vancouver, Capilano Canyon, 8 Oct 1973, SA Redhead (220890), Lynn Valley, 30 Sept 1961, RJ Bandoni et al. (91075); Vancouver, Point Grey, Sept 1947, WG Ziller (22097); Vancouver Island, Bowser, 8 Oct 1952, AT Foster (44769), 9 Oct 1952, DJ MacPherson (45006), Vancouver I., Cowichan, 25 Oct 1942, A Nicholls (4190), Vancouver I., Caycuse, 15 Oct 1969, HM Craig & D Chu (130447), Vancouver I., Lake Cowichan, Gordon Bay, 18 Oct 1971, JH Ginns (142211), 19 Oct 1971, JHG (142207), Vancouver I., L. Cowichan, Miller Creek, 27 Sept 1979, SAR (220891); Vancouver I., Pacific Rim National Park, Wickaninnish Bay, N49°03' W125°43', Long Beach, 15 Sept 1995, SAR (220727 to 220731); Vancouver I., Barkley Sound, Uchucklesit Inlet, Kildonan, N49°00'00" W125°00'00", 12-13 Sept 1995, SAR (220707 to 220714). **USA: California:** Del Norte Co., Wilson Creek Rd., ~5 mi N Klamath on Hwy 101, N41°05' W124°04', 23 Oct 1982, HD Thiers 45201 (SFSU); Del Norte Co., Alder Camp Rd, Jedediah Smith State Park, N41°78' W124°10', 3 Nov 1984, HDT 48125 (SFSU); Humboldt Co., Big Lagoon State Park, N41°16' W124°13', 3 Nov 1984, MT Seidl 178 (SFSU); Humboldt Co., N41°14' W124°16', Patrick's Point State Park, study plots, sample from season of 1995, AD Sime (TENN 54702); Mendocino Co., N39°275' W123°79', Pygmy Forest, Van Damme State Park in Fern Canyon, 22 Nov 1986, H Saylor 3764 (SFSU). **Oregon:** Cascade Head Experimental Forest, N45°0447', W123°9175', 10 Oct 1970, AH Smith 78909 (MICH); Clackamas Co., Mt. Hood Natl. Forest, Bull Run Watershed, Oregon Mycol. Soc. Chanterelle plots, N45°51' W122°10', elev. 2010', 17 Oct 1994, LL Norvell 94.10.17-1 (WTU) (**Fig. 5**), additionally hundreds of specimens and in situ measurements observed by LLN and OMS members at this site, deposited in WTU; Wildcat Mountain, ca 3500' elev., 18 Oct 1995, LLN 95.10.18-16, LLN 95.10.18-25 (**Fig. 12**), LLN 95.10.18-26 (all WTU & DAOM).

Published illustrations of *C. formosus*: Corner (1966: type line drawing, fig. 1, p. 3, colour painting plate 1, fig. A); Tylutki (1987: black & white photograph, p. 59).

Additional illustrations published as *C. cibarius*, but suggesting *Cantharellus formosus* instead: Arora (1986: colour figure 178, large wet specimen, but not figs. 175, 177 which are eastern North American taxa); Arora (1991: colour photograph, bottom page 3 - dryish weather, but not species figured elsewhere on pages 1-3); Bandoni & Szczawinski (1976: colour photograph p. 39); Fischer & Bessette (1992: colour photographs in market p. 5, possibly p. 24 if western in origin); Lincoff (1981), colour photograph, pl. 427, presumably western); Miller (1972: colour photograph, pl. 259, if western); Persson & Mossberg (1994: colour painting, p. 84); Schalkwijk-Barendsen (1991: colour painting, p. 165); Smith (1949: stereo colour slides, reel 4, no. 27, excellent illustration).

Discussion: Two scaly varieties of *C. cibarius* have been described and were included in Corner's key in group "C", series "2" with *C. formosus*. *Cantharellus cibarius* var. *squamosus* Pöhl apud. Murr (1916) from Austria has dark squamules on an egg-yellow pileus and presumably an egg-yellow hymenium, while *C. cibarius* var. *squamulosus* Blytt (1904) from

Norway has a rufous brown pileus and therefore neither matches *C. formosus*. These varieties described from Europe require additional study if ever rediscovered. Corner suggested that they might better be compared to *C. friesii* Quél., which also has been reported to have darker squamules. Currently there is no accumulated body of evidence to determine whether either variety was based upon genetically different or stable populations that could ever be relocated or were simply based upon unusually weathered or environmentally induced basidiomes. In North America, *C. formosus* has been shown to be a common species endemic to the west coast, that can be repeatedly recollected. It appears to be confined to western temperate rain forests. Examination of collections labelled "*C. cibarius*" in DAOM from across North America and Europe failed to reveal additional collections of *C. formosus* outside of western British Columbia, Washington, Oregon and northwestern California. Its recognition at the species level is supported by the fact that its rDNA ITS is approximately 200 base pairs longer than that in *C. cibarius*, i.e. approximate rDNA ITS lengths of 1600bp versus 1400bp (Daniel et al., in preparation).

Our studies support the suspicions and statements made by several authors (Petersen 1969; Thiers 1985; Tylutki 1987; Norvell 1995a) who believed that *C. formosus* was a common western species. Its listing as a Strategy "1" fungus (USDA/DI 1994a,b) should be re-evaluated and its status changed in consideration of its widespread use as a commercially harvested species.

Part II - *Cantharellus cibarius* var. *roseocanus*

The second, brighter and more yellow-coloured species of chanterelle (Figs. 15, 16) at the Long Beach site occurred in abundance in the forested band closest to shore. It differed conspicuously from *C. formosus* and more subtly from *C. cibarius* var. *cibarius* as the latter is known to us. Apparently it was not seen by Corner in 1938. On Vancouver Island, this new taxon occurred in the absence of hemlock under nearly pure stands of Sitka spruce (*Picea sitchensis*) with Western Red cedar (*Thuja plicata*) occasionally present. Understorey growth there was restricted to salal (*Gaultheria shallon*), with scattered sedges or grasses occasionally present. Association with spruce might be important. Specimens resembling this coastal Vancouver Island taxon were later collected in Skamania County, Washington State by Jan Lindgren in 1996 and air-freighted fresh to Redhead. Redhead determined that they differed from the 1995 collections by being slightly denser and hence firmer. The Washington collection also was found under spruce (*Picea* sp.) but in the