

Nomenclatural novelties : Ditmar Bojantchev

Calonarius cracens Bojantchev & Ammirati, sp. nov.

IF 901476

Holotype: UC 2060200

Etymology (Latin): graceful.

Diagnosis: Pileus (40–) 50–100 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age margin involute, undulating in age, yellow, pale yellow on the margin, discoloring orange-brown where bruised or oxidized, surface smooth, innately fibrillose, glutinous when wet. Lamellae crowded, pale lilac at first then grayish blue to brownish as the spores mature. Stipe (32–) 40–100 mm long, (10–) 20–35 mm wide, cylindric to subclavate, marginate bulbous, white discolored somewhat brownish to yellowish in age, becoming spore coated, basal mycelium white, rim of bulb whitish to sordid, discolored brownish. Universal veil pale white. Partial veil composed of white fibrils, leaving a sparse annular zone on the stipe. Context solid, firm, white to yellowish, watery mottled in places, brownish around larvae tunnels. Odor earthy. Taste mild. Macrochemical Reactions 5% KOH orange red on the pileus, negative on the context. Basidiospores (7.0–) 7.5–8.5 (–9.5) × (4.0–) 4.5–5.0 (–5.5) μm (mean 8.0 × 4.7 μm), Qav = 1.70, amygdaliform to broadly amygdaliform, moderately verrucose. Basidia 21–36 × 9–15 μm, 4-spored, cylindro-clavate. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis a thick epicutis, composed of parallel to interwoven hyphae, 6–17 μm wide in a gelatinous matrix, hypodermium developed, hyphae 22–32 μm wide hyphae. Clamp connections present throughout.

Ecology and distribution: interior and coastal montane conifer-broadleaf forests, thus far known only from California, USA.

Comments: the overall graceful stature and coloration of this species place it firmly in *Calonarius* subgen. *Calochroi*, which is also supported by phylogenetic analysis. What is unusual for this species are the relatively small spores, compared to the rest of the genus. The closest related species to *Calonarius cracens* is *Cortinarius roseobulbus* M.M. Moser, described from USA, California, which also has small spores less than 10 μm length. These two species differ by 9 base pairs of ITS1/2 marker. From the well-known European taxon, *Cortinarius citrinolilacinus* M.M. Moser ex M.M. Moser is another close relative with a difference of 12 base pairs of the ITS1/2 region.

Collections examined: USA. California, Del Norte County. Danger Point, Highway 199, mixed woods *Quercus*, *Notholithocarpus* and scattered *Arbutus*, *Pseudotsuga*, *Pinus*, 3 Dec. 1995, JFA11854 (=IB19950655), (GenBank: EU056984) Tuolumne County, Stanislaus National Forest, elev. 4000ft, under *Abies* spp., *Pseudotsuga menziesii*, and *Pinus ponderosa*. 19 Nov. 2006, DBB00687 (Holotype: UC2060200, Genbank: OR726393). iNaturalist: 188437269. Yuba County, New Bullard's Bar Reservoir, Elev. 2200ft, under *Notholithocarpus densiflorus* and *Pinus ponderosa*.

Calonarius exquisitus Bojantchev, Ammirati, Beug, Liimat. & Niskanen, sp. nov.

IF 901401

Holotype UC 2060209

Etymology (Latin): exquisite.

Diagnosis: Pileus 60–100 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age margin involute pale yellow to yellow, or pale purplish on the margin, with brown discolorations where bruised. Lamellae crowded, saturated blue purple at first then purple-brown to

brown, as the spores mature. Stipe: 50–100 mm long, 20–35 mm wide, cylindric to subclavate with an emarginated bulb. Universal veil white. Partial veil white, forming a distinct annular zone on the stipe (cortina), turning brown due to spore drop. Context whitish with bluish grey longitudinal areas and pale brown discoloration where bruised. Odor mild. Taste mild. Macrochemical Reactions 5% KOH distinctly bright pinkish-red on the pileus, bulb and mycelial strands, light brown to negative on most of the context. Basidiospores (8.5–) 9.5–10.5 (–12) × (4.5–) 4.5–5.5 (–6.0) μm (mean 10.2 × 5.3 μm), Qav = 1.92, amygdaliform, occasionally citriform, moderately verrucose. Basidia 23–39 × 5–11 μm, 4-spored, cylindro-clavate, clamped. Lamella edges fertile. Cystidia not observed. Pileipellis an ixocutis, simplex, no hypodermium detected, composed of parallel to interwoven hyphae in a dense gelatinous matrix 230–300 μm thick, made up of 4–12 μm wide, irregular hyphae. Clamp connections common in all parts.

Ecology and distribution: This species is known from oaks, both evergreen and deciduous, along the Pacific areas of California, Oregon, and Washington. Distribution may be wider.

Comments: this rather infrequent species is one of the most attractive calonarii found in our area and the distinctive combination of colors, plus the bright pink-red KOH reaction on the pileus and bulb make it an easy species to identify in the field. The closest well known European relatives are in the /dibaphus /sodagnitus clades, differing in no less than 15 base pairs from all of them.

Collections examined: USA. California, Santa Cruz, UCSC campus: 24 Dec. 1907, DBB04027 (GenBank: OR725041; iNaturalist: 188430224) under *Quercus agrifolia*; Holotype UC 2060209. USA. California, Santa Cruz, UCSC campus: 15 Dec. 2012, DBB12-338 (Genbank: OR725040) under *Quercus agrifolia*; Washington, Klickitat County, Beug Farm 03MWB110813, under *Quercus garryana*.

Calonarius flavobrunneus Bojantchev, sp. nov.

IF 901417

Holotype UC 2060202

Etymology: Latin flavo=yellow, brunneus=brown.

Diagnosis: pileus 60–110 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age margin involute fawn to nut-brown to dark mustard, lighter on the margin to olive brown, uniformly colored at age, with distinct patches of brown-olive remnants of the universal veil. Lamellae crowded, pinkish tan at first then tan then brown, as the spores mature. Stipe 50–100 mm long, 20–35 mm wide, cylindric to subclavate with a bulb, often emarginated, light buff to white. Universal veil olive-brown. Partial veil olive-brown, forming a distinct annular zone (cortina) on the stipe and leaving remnants on the pileus and bulb margins. Context whitish with brown discoloration where bruised. Odor farinaceous. Taste farinaceous. Macrochemical Reactions 5% KOH reddish-brown on the pileus, light brown to negative on the context. Basidiospores (9.0–) 9.5–10.5 (–11.5) × (4.5–) 5.0–5.5 (–6.0) μm (mean 10.2 × 5.7 μm), Qav = 1.82, amygdaliform, coarsely verrucose. Basidia 24–38 × 6–12 μm, 4-spored, cylindro-clavate, clamped. Lamella edges fertile. Cystidia not observed. Pileipellis a thick epicutis, composed of parallel to interwoven hyphae within a gelatinous matrix, 7–23 μm wide. Clamp connections common in all parts.

Ecology and distribution: this species is known from a single location where it fruits regularly. The habitat is calcareous soil in a mixed stand of *Notholithocarpus densiflorus*, *Picea sitchensis* and *Pseudotsuga menziesii*. At the present time it is not possible to determine conclusively the exact host and other habitat factors that determine its distribution. Comments: the farinaceous odor and taste offers an important clue when identifying this species in the field. The closest well known European relative is *Cortinarius flavovirens* Rob. Henry from which it differs by 14 base pairs.

Collections examined: USA: California, Mendocino County, Caspar, Caspar Cemetery (39°21'34.1N 123°48'44.4W), elev. 150 ft, under *Notholithocarpus densiflorus*, *Picea sitchensis*, *Pseudotsuga menziesii*, 9 Dec. 2014, DBB74635 (Holotype: UC 2060202, Genbank: OR725037). iNaturalist:

188429756; Mendocino County, Caspar, Caspar Cemetery: 24 Nov. 2007, DBB01556 (Genbank: OR725039) 22 Nov. 2008, DBB09380 (Genbank: OR725038).

Calonarius xanthoporphyrus Bojantchev & N. Siegel, sp. nov.

IF 901480

Holotype: UC 2060200

Etymology (Greek): xantho = yellow and porphyro = purple.

Diagnosis: pileus 50–95 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age margin involute, undulating in age uniformly bright to pale yellow at first, developing irregular ochraceous-purple discoloration in age where bruised or oxidized, surface smooth, innately fibrillose, glutinous when wet. Lamellae crowded, bright yellow at first then golden brown to brown as spores mature. Stipe 40–100 mm long, 20–35 mm wide, cylindric to subclavate, typically with a small emarginated bulb, yellow, frequently with an olivaceous tinge at age, bruising purplish, base often with pale yellow mycelial felt. Universal veil pale yellow. Partial veil composed of pale-yellow fibrils, leaving a sparse annular zone (cortina) on the stipe. Context yellowish white, bruising purplish. Odor earthy to unpleasant. Taste mild. Macrochemical Reactions 5% KOH weak olive brown on surface and context. Basidiospores (8.0–) 9.0–10.0 (–12.0) × (4.5–) 5.0–5.5 (–6.5) μm (mean 9.4 × 5.2 μm), Qav = 1.84, amygdaliform to citriform, due to an extended distal end, moderately verrucose. Basidia 20–35 × 8–14 μm, 4-spored, cylindro-clavate, clamped, intracellular pigment reacting purple in KOH. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis a thick epicutis, composed of parallel to interwoven hyphae, 6–17 μm wide in a gelatinous matrix, hypodermium developed, hyphae 22–32 μm wide hyphae. Clamp connections common in all parts.

Ecology and distribution: Infrequent, growing in association with *Quercus* spp. typically in drier oak woodlands of central and southern California, USA.

Comments: the combination of bright yellow coloration and purplish discoloration where bruised make this species rather unique and easy to identify in the field. *Calonarius xanthoporphyrus* is in the /citrinus clade and the closest well-known European species is *Calonarius citrinus* (P.D. Orton) Niskanen & Liimat., also known for its Fagaceae association. The two species differ by 12 base pairs in the ITS1/2 marker. Both species have relatively small spores (8–10 μm long) for genus *Calonarius*. The purplish tinges in the context are not reported from any collections of *C. citrinus*.

Collections examined: USA. California, Santa Cruz County, UCSC Campus under *Quercus agrifolia* and *Notholithocarpus densiflorus*. 9 Jan. 2009, DBB13308 (Holotype: UC2060200, Genbank: OR726411). iNaturalist: 188436943 Santa Barbara Co., Las Cruces, Sally's Ranch, under *Quercus agrifolia*, 9 Feb. 2013, DBBNS9 (Genbank: OR726413) Yolo County, Putah Creek State Wildlife Reserve, Franklin Canyon, under *Quercus agrifolia*, *Quercus wislizenii*, 6 Jan. 2011, DBB13309 (Genbank: OR726412).

Cortinarius corpulentus Bojantchev, S.D. Adams, Liimat. & Niskanen, sp. nov.

IF 901399

Holotype UC 2060211

Etymology (Latin): corpulentus (adjective)=plump, corpulent.

Diagnosis: Pileus 40–130 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age margin involute blue to brown to golden-tan, bluer on the margin, copiously glutinous when wet. Lamellae crowded, pale bluish at first then tan, turning brown as the spores mature, lighter bluish near the margin. Stipe 50–130 mm long, 15–75 mm wide, subclavate, very variable in stature, occasionally bulbous, white, very glutinous when wet. Universal veil whitish to pale lilac. Partial veil white at first, leaving a slight to moderate cortina on the stipe, sometimes membranous, sheathing. Context white to pale bluish. Odor earthy. Taste mild. Macrochemical

Reactions 5% KOH negative. Basidiospores (7.0–) 7.5–8.0 (–9.5) × (5.0–) 5.5–6.0 (–6.5) μm (mean 7.9 × 6.2 μm), Qav = 1.3, subglobose, moderately verrucose. Basidia 25–35 × 6–10 μm, 4-spored, cylindro-clavate, clamped. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis a thick epicutis, composed of parallel to interwoven hyphae, 6–14 μm wide, Clamp connections common in all parts.

Ecology and distribution: this species has a broad distribution along the Pacific Coast of North America, from Washington to California. It has been collected from diverse conifer stands, commonly associated with *Pseudotsuga menziesii*, but is likely associated with other conifer hosts as well.

Comments: the fruitbodies of this species fit in a broad spectrum of statures most collections represent rather plump fruitbodies, but slender collections have also been observed. A key feature is the glutinous stipe and pileus. Its distinct coloration makes it one of the easier species to identify in the field. The closest European relative is *Cortinarius delibutus* s.s. from which differs it by more than 15 base pairs.

Collections examined: USA. California, Yuba County, New Bullard's Bar Reservoir, Elev. 2200ft., under *Notholithocarpus densiflorus*, *Pinus ponderosa* (Holotype UC 2060211; DBB49315, GenBank: OP874939, iNaturalist: 188426072), 10 Dec. 2011; Humboldt County, near Arcata: 2010/11/20, DBB39430 (Genbank: OP874937) 24 Nov. 2013, DBB64695 (Genbank: OP874941) 2019/10/25, SDA158 (Genbank: OR763335); Marin County, Bolinas Ridge: 8 Jan. 2016, DBBMO227375 (Genbank: OP874938); San Mateo County, San Francisco Watershed, 9 Dec. 2014, DBB75018 (Genbank: OP874940); Washington, Pierce County, Soda Springs CG, 25 Oct. 2019, SDA650 (Genbank: OR763334) NS3305 (Genbank: OR763336).

Phlegmacium affabile Bojantchev, sp. nov.

IF 901477

Holotype: UC 2060214

Etymology (Latin): *affabilis*=affable, nice.

Diagnosis: pileus 50–90 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age margin involute, undulating in maturity, pale bluish to darker purple bluish at first, fading out to brownish grey to pale brown in maturity, surface smooth, innately fibrillose, glutinous when wet. Lamellae crowded, pale cream at first, later brownish cream, then brown as the spores mature. Stipe 40–100 mm long, 20–55 mm wide, subclavate to clavate or subclavate bulbous, occasionally tapered below the bulb, white to pale bluish at first then dirty grey, discoloring brown were bruised. Universal veil white. Partial veil white, leaving a sparse annular zone on the stipe. Context white. Odor earthy. Taste mild. Macrochemical Reactions 5% KOH orange yellow on the pileus, yellow with orange halo on the context. Basidiospores (10.5–) 11.5–13.0 (14.0) × (5.5–) 6.0–6.5 (–7.5) μm (mean 11.8 × 6.2 μm), Qav = 1.95, amygdaliform to strangulated with an extended distal end, moderately verrucose. In some fruitbodies a population of spores had a bolletoid shape reaching 16–17 μm in length from 4 spored basidia. Basidia 22–36 × 7–12 μm, 4-spored, cylindro-clavate, clamped. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis a thick epicutis, composed of parallel to interwoven hyphae, 5–18 μm wide in a gelatinous matrix, hypodermium not observed. Clamp connections common in all parts.

Ecology and distribution: this relatively common species has been collected throughout Northern California by the author and is known primarily from habitats including oak and tanoak.

Comments: the overall coloration, stature, and strong KOH reaction indicate that this species belongs to sect. *Variocolores* Brandr. & Melot subsect. *Balteati* Brandrud & Melot. Locally, the closest related species to *Ph. affabile* is *Ph. badiolatum* M.M. Moser 1960. The two species are very similar in overall stature, particularly when young, but *Ph. badiolatum* lacks bluish coloration at any

period of its development. In addition, the habitat of the species does not overlap. *Phlegmacium badiolatum* is a broadly distributed species with range stretching from the European Alps throughout the boreal conifer zone of North America, locally known from abundant vernal and autumnal fruiting in the higher elevations of the Sierra Cascade Range, while *Ph. affabile* fruits autumnally in the lower elevations within the oak / tanoak habitat. The two species differ by 10 base pairs in the ITS1/2 marker.

Collections examined: USA. California, Contra Costa County, Kennedy Grove, elev. 100 ft, under *Quercus agrifolia*, 23 Jan. 2011, DBB42240 (Genbank: OR726397) Santa Cruz, UCSC Campus, elev. 600 ft, under *Quercus agrifolia*, 22 Dec. 2010, DBB13256 (Genbank: OR726396) Yuba County, New Bullard's Bar Reservoir, elev. 2200ft, under *Notholithocarpus densiflorus*, *Pinus ponderosa*, 18 Nov. 2007, DBB00540 (Genbank: OR726395) Yolo County, Putah Creek State Wildlife Reserve, Franklin Canyon under *Quercus agrifolia*, *Quercus wislizenii*, 5 Feb. 2011, DBB42300 (Holotype: UC2060214, Genbank: OR726398). iNaturalist: 18843776.

Phlegmacium albocalyptratum Bojantchev, sp. nov.

IF 901415

Holotype UC 2060199

Etymology (Latin): albo=white and calyptra=hood.

Diagnosis: pileus 60–110 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age margin involute purple with a bluish hint beneath the white veil, then purple, but with copious amounts of thick white veil remnants remaining into maturity, glutinous when wet. Lamellae crowded, light blue at first then grey blue to light clay to brown, as the spores mature, crenulate. Stipe 60–100 mm long, 10–25 mm wide, cylindrical to subclavate, with an emarginated bulb, light bluish to white. Universal veil white to light blue. Partial veil white to light bluish, leaving a distinct annular zone (cortina) on the stipe. Context white to light bluish with brown discoloration where bruised. Odor earthy. Taste mild. Macrochemical Reactions 5% KOH orangish-brown on all surfaces and context. Basidiospores (9.0–) 9.5–10.5 (–11) × (5.0–) 5.5–6.0 μm (mean 10.1 × 5.7 μm), Qav = 1.76, amygdaliform, some citriform, moderately verrucose. Basidia 24–38 × 6–12 μm, 4-spored, cylindro-clavate, clamped. Lamella edges fertile. Cystidia not observed. Pileipellis composed of parallel to interwoven hyphae in a dense gelatinous matrix 210–280 μm thick, made up of irregular hyphae 3–15 μm wide, lacking a hypodermium. Clamp connections common in all parts.

Ecology and distribution: this species is known from a single location where it fruits regularly. The habitat is a calcareous soil in a mixed stand of *Notholithocarpus densiflorus*, *Picea sitchensis* and *Pseudotsuga menziesii*. At the present time it is not possible to determine conclusively the exact host and other habitat factors that determine its distribution.

Comments: the outstanding feature of this species, which makes it easy to identify in the field, is the persistent white veil covering the pileus, even at maturity. There is a significant similarity to *Phlegmacium calyptratum* (A.H. Sm.) Niskanen & Liimat., which features the same persistent white universal veil, but *Ph. albocalyptratum* can be differentiated from the latter by its larger spores. The closest well known European relatives are *Phlegmacium caerulescens* (M.M. Moser) M.M. Moser and *Phlegmacium caesiocanescens* (Schaeff.) M.M. Moser from which *Phlegmacium albocalyptratum* differs by 11 and 15 base pairs respectively.

Collections examined: USA. California, Mendocino County, Caspar, Caspar Cemetery. (39°21'34.1"N 123°48'44.4"W), elev. 150 ft, under *Notholithocarpus densiflorus*, *Picea sitchensis*, *Pseudotsuga menziesii*, 18 Nov. 2009, DBB22644 (Holotype: UC2060199; Genbank: OR725136). iNaturalist: 188423482. USA. California, Mendocino County, Caspar, Caspar Cemetery: 24 Nov. 2007, DBB01541 (Genbank: OR725134) 22 Nov. 2008, DBB09476 (Genbank: OR725135) 14 Nov. 2009, DBB25816 22 Nov. 2009, DBB28900.

Phlegmacium amethysteum Bojantchev, Ammirati, Liimat. & Niskanen, sp. nov.

IF 901459

Holotype UC 2060208

Etymology (Latin): amethyst colour.

Diagnosis: pileus 40–80 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age margin involute, undulating in age uniformly pale amethyst, to bluish amethyst at first, then pale tan to sandy yellow on the disk, margins remain bluish in age, surface smooth, innately fibrillose, glutinous when wet, frequently with radial hygrophanous streaks. Lamellae crowded, light amethyst at first then cream to tan, then brown, as the spores mature. Stipe 40–120 mm long, 12–35 mm wide, cylindric to subclavate, pale lavender then pale tan, frequently with thick white mycelial strands. Universal veil pale ochraceous, leaving remnants on the pileus and stipe. Partial veil composed of pale lavender fibrils, leaving a sparse annular zone (cortina) on the stipe. Context pale lavender at the apex to pale ochraceous at the base. Odor earthy to slightly fruity. Taste mild. Macrochemical Reactions 5% KOH negative on all parts. Basidiospores (8·5–) 9·0–10·0 (–11·0) × (5·0–) 5·5–6·0 (–6·5) μm (mean 9·5 × 5·9 μm), Qav = 1·62, ellipsoid to amygdaliform, finely and densely verrucose. Basidia 20–33 × 6–14 μm, 4-spored, cylindro-clavate, clamped. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis a thick epicutis, composed of parallel to interwoven hyphae, 7–18 μm wide in a gelatinous matrix, hypodermium developed, hyphae 20–30 μm wide hyphae, with ochraceous pigment. Clamp connections common in all parts.

Ecology and distribution: this species is known from mixed stands of *Notholithocarpus densiflorus* and *Picea sitchensis*, infrequent, but locally abundant in Mendocino County. Comments: the outstanding feature of this species is the distinct bluish amethyst colour and the pronounced mycelial strands. The closest well known European relative is *Phlegmacium coerulescentium* (Rob. Henry) Niskanen & Liimat from which this species differs by 13 base pairs.

Collections examined: USA. California, Mendocino County, Caspar, Caspar Cemetery. (39°21'34.1N 123°48'44.4W), elev. 150 ft, under *Notholithocarpus densiflorus*, *Picea sitchensis*, *Pseudotsuga menziesii*. 17 Nov. 2014, DBB74052 (Holotype: UC2060216, Genbank: OR725048), iNaturalist: 188431444; USA. California, Mendocino County, Jug Handle State Natural Preserve, elev. 550 ft, under *Notholithocarpus densiflorus*, *Picea sitchensis*, *Pseudotsuga menziesii*. 22 Nov. 2008, DBB09520 (Genbank: OR725046), 26 Nov. 2011, DBB48819 (Genbank: OR725047), 22 Nov. 2008, DBB09520 (Genbank: OR725046), 4 Dec. 2021, DBB74615 (Genbank: OR725049).

Phlegmacium aurantiohygrophanum Bojantchev, Liimat. & Niskanen, sp. nov.

IF 901400

Holotype UC 2060212

Etymology (Latin): orange and hygrophanous.

Diagnosis: Pileus 60–110 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age margin involute, undulating orange brown to orange or yellow-brown with distinct olive hues towards the margin when young, uniformly orange-brown at maturity glutinous when wet with hygrophanous appearance, dark spots where injured. Lamellae crowded, lavender grey to bluish purple at first, grey-brown to brown, as the spores mature. Stipe 60–150 mm long, 12–28 mm wide at apex, cylindric to subclavate, light bluish to white, sometimes with a silky appearance, thick white mycelial strands. Universal veil bluish white. Partial veil bluish white, leaving a moderate annular zone (cortina) on the stipe. Context bluish purple then white, remaining mostly bluish in the upper stipe. Odor earthy. Taste mild. Macrochemical Reactions: 5% KOH orangish on the surface of pileus and stipe, yellow-brown on the context. Basidiospores (9·5–) 10–11 (–11·5) × (5·0–) 5·5–6·0 (–6·5) μm (mean 10·4 × 5·9 μm), Qav = 1·79, amygdaliform, citriform, strongly verrucose. Basidia 25–

36 × 7–11 μm, 4-spored, cylindro-clavate, clamped. Gill edge fertile. Cystidia not observed. Pileipellis a thick epicutis, composed of parallel to interwoven hyphae, 5–17 μm wide, Clamp connections common in all parts.

Ecology and distribution: This species is known from a single location where it fruits regularly. It is calcareous soil with a mixed stand of *Notholithocarpus densiflorus*, *Picea sitchensis* and *Pseudotsuga menziesii*. At the present time it is not possible to determine conclusively the exact host and other habitat factors that determine its distribution.

Comments: The outstanding features that should aid field identification of this species are the distinct colouration, olive hues, hygrophanous appearance of the pileus and the presence of conspicuous rhizomorphs. The closest well-known European relative is *C. viridicoeruleus*, from which *C. aurantiohygrophanum* differs by 7–8 base pairs.

Collections examined: USA. California: Mendocino County, Caspar, Caspar Cemetery., elev. 150 ft, under *Notholithocarpus densiflorus*, *Picea sitchensis*, *Pseudotsuga menziesii*, 14 Nov. 2009, DBB25739 (GenBank: JF742658; iNaturalist: 188428773), Holotype UC 2060212. USA. California, Mendocino County, Caspar, Caspar Cemetery: 6 Nov. 2009, DBB22596 (Genbank: OR730873) 15 Nov. 2009, DBB25739 (Genbank: JF742658) 25 Nov. 2011, DBB48650 (Genbank: OP893541) 22 Nov. 2012, DBB57000 (Genbank: OP893540) 4 Dec. 2021, DBB74601 (Genbank: OP893542).

Phlegmacium aureoarmillatum Bojantchev, Ammirati, Liimat. & Niskanen, sp. nov.

IF 901414

Holotype UC 2060216

Etymology (Latin): aureo=golden, armilla=bracelets on the stipe.

Diagnosis: Pileus 50–90 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age margin involute, undulating at age pale yellow to yellow, darker on the disk, orange yellow to orange brown to dark brown, smooth to scaly when dry, glutinous when wet. Lamellae crowded, light cream at first then cream to tan, then brown, as the spores mature. Stipe 60–100 mm long, 10–25 mm wide, cylindric to subclavate, white with golden ochraceous girdles of universal veil, prominently lacerated initially then flattened with age. Universal veil formed of two layers, outer layer yellow ochraceous, gelatinous when wet, leaving ochraceous girdles on the stipe, inner layer white, cottony. Partial veil white. Context white to cream white. Odor sometimes spicy fruity, other times none. Taste mild. Macrochemical Reactions 5% KOH olive on the pileus, negative elsewhere. Basidiospores (8.5–) 9.0–10.5 (–11.5) × (4.5–) 5.0–6.0 (–6.5) μm (mean 9.7 × 5.5 μm), Qav = 1.78, amygdaliform, moderately verrucose. Basidia 22–37 × 5–13 μm, 4-spored, cylindro-clavate, clamped. Lamella edges fertile. Cystidia not observed. Pileipellis a thin epicutis, composed of parallel to interwoven hyphae, 6–15 μm wide in a gelatinous matrix, hypodermium developed with 23–30 μm wide hyphae with ochraceous pigment. Clamp connections common in all parts.

Ecology and distribution: This species is known from several locations along the Pacific coast and can be locally abundant. It is particularly frequent in Salt Point State Park. It appears to be associated primarily with tanoak and occasionally with oak.

Comments: The outstanding feature of this species are the golden ochraceous girdles on the stipe, left by the universal veil. Frequently, when dry, it has a pleasant fruity odor, but this is not a reliable diagnostic characteristic. The closest European relatives are *Cortinarius subdecoloratus* Reumaux and *C. ochraceobrunneus* Rob. Henry ex Bidaud, Moëne-Loec. & Reumaux from which *Ph. aureoarmillatum* differs by 10 base pairs.

Collections examined: USA. CALIFORNIA: Sonoma County, Salt Point State Park, under *Notholithocarpus densiflorus*, *Pinus muricata*, and *Pseudotsuga menziesii*: 9 Dec. 2014, DBB74501 (GenBank: OR725044; iNaturalist: 188431099) Holotype UC 2060216. USA: California, Sonoma County, Salt Point State Park: 23 Nov. 2007, DBB01235 (Genbank: OR725042), DBB01247 (Genbank:

OR725043) under *Notholithocarpus densiflorus* 9 Jan. 2021, DBB88124 (Genbank: OR725045); Washington. King County. Seattle, Mt. Baker Blvd: 17 Dec. 2007, JFA13179 under *Quercus* spp.

Phlegmacium delectabile Bojantchev, Ammirati, Liimat. & Niskanen, sp. nov.

IF 901398

Holotype UC 2060201

Etymology (Latin): *delectabilis*=delectable, delicious.

Diagnosis: Pileus 60–140 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age margin involute brown to golden-brown, distinctly paler on the margin to bluish brown with appressed fibrillose scales in dry conditions with some darker fibrillose streaks near the margin, becoming copiously glutinous when wet. Lamellae crowded, pale bluish at first then tan, turning brown as the spores mature, distinctly lighter bluish near the margin. Stipe 50–180 mm long, 15–35 mm wide, cylindrical to subclavate, white, flocculose towards the apex, bulb absent, stipe context becoming distinctly hollow at age. Universal veil whitish to pale violaceous. Partial veil similar, leaving a moderately dense cortina on the stipe. Context white to pale bluish. Odor earthy. Taste mild, earthy. Macrochemical Reactions 5% KOH, distinct yellow to orange discoloration on the context, typical for the members of the clade, orangish-brown on the pileus. Basidiospores (10.5–) 11–13 (–14.0) × (5.5–) 6.0–6.5 (–7.5) μm (mean 12.0 × 6.4 μm), Qav = 1.88, amygdaliform, moderately verrucose. On two fruitbodies, a distinct population of elongated, somewhat strangulated spores was observed with lengths up to 17 μm and Qav up to 3.1, also noted on four-spored basidia. Basidia 26–36 × 7–9 μm, 4-spored, cylindro-clavate, clamped. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis a thick epicutis, composed of parallel to interwoven hyphae, 4–11 μm wide pileus trama composed of hyphae 4–32 μm wide, cylindrical to enlarged, colorless in lower portion, in some areas with reddish to yellowish refractive granules among hyphae. Clamp connections common in all parts.

Ecology and distribution: The common host of all collections was tanoak (*Notholithocarpus densiflorus*), which typically forms mixed stands with conifers. This host association is consistent with the deciduous habitat of its closely related species like *Cortinarius largus*. This is one of the most frequent species in the forests along the California Pacific coast.

Comments: This species has distinctive features with its stature and distinct, paler coloration towards the margin of the pileus and lamellae, which make it easy to identify in the field. The closest well known European relative is *Cortinarius largus* which differs by 6–7 base pairs.

Collections examined: USA. California: Mendocino County, Mendocino, Jackson State Demonstration Forest, off Thompson Gulch Trail., elev. 600 ft, under *Notholithocarpus densiflorus*, *Pseudotsuga menziesii*, *Tsuga heterophylla*: 23 Nov. 2008, DBB10146 (Holotype UC 2060201; GenBank OP874930; iNaturalist 1884254730), Humboldt County, Redwood National State Park: 7 Nov. 2009, DBB23046 (Genbank: OP874933), Humboldt County, near Whitethorn: 21 Nov. 2010, DBB39600 (Genbank: OP874934), Mendocino County, Jackson State Demonstration Forest: 21 Nov. 2009, DBB27370 (Genbank: OP874931) 16 Nov. 2014, DBB74206 (Genbank: OP874935), Sonoma County, Salt Point State Park: 20 Nov. 2009, DBB26976 (Genbank: OP874932) 17 Nov. 2014 DBB74647 (Genbank: OP874936).

Phlegmacium flavoinornatum Bojantchev, sp. nov.

IF 901416

Holotype UC 2060213

Etymology (Latin): *flavo*=yellow and *inornatum*=inornate. Diagnosis: pileus 60–100 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age margin involute initially cream, turning to yellow in broad irregular patches with distinct brown-orange streaks, generally

paler on the margin, remaining cream color, glutinous when wet. Lamellae crowded, white at first then gray-cream to darker gray cream to tan, turning brown as the spores mature. Stipe 50–110 mm long, 15–30 mm wide, clavate to subclavate, occasionally bulbous, white with pronounced, thick white mycelial strands. Universal veil cream white. Partial veil cream-white at first, leaving a moderate annular zone (cortina) on the stipe. Context white, remaining mostly uniformly whitish. Odor earthy. Taste mild. Macrochemical Reactions 5% KOH slightly orangish on the pileus, negative on all other parts. Basidiospores (9.5–) 10.5–11.5 (–12.0) × (5.5–) 6.0–6.5 (–7.5) μm (mean 10.8 × 6.5 μm), Qav = 1.68, amygdaliform, strongly verrucose. Basidia 25–35 × 6–10 μm, 4-spored, cylindro-clavate, clamped. Lamella edges fertile. Cystidia not observed. Pileipellis a thick epicutis with a gelatinous layer, composed of parallel to interwoven hyphae, 6–16 μm wide. Clamp connections common in all parts.

Ecology and distribution: this species is known from locations along the California Pacific coast where oaks and tanoak are present which are the likely host trees, consistent with the habitat of its closest European relative, *Cortinarius langei* Rob. Henry, known from Fagaceae hosts.

Comments: this species is rather infrequent, known only to the author, but collected in several different locations. The outstanding features that should aid field identification are the coloration of the pileus and the presence of conspicuous rhizomorphs. The closest well known European relative is *C. langei* from which *C. flavoinornatum* differs by 7–8 base pairs.

Collections examined: USA. California, San Mateo County, Huddart Park. (39°21'34.1"N 123°48'44.4"W), elev. 150 ft, under *Quercus agrifolia*, *Notholithocarpus densiflorus*, *Pseudotsuga menziesii* and *Sequoia sempervirens*, 18 Dec. 2008, DBB12064 (Holotype: UC 2060213 Genbank: OP861651). iNaturalist: 188427983. California, San Mateo County, San Francisco Watershed: 2 Dec. 2012, DBB49284 (Genbank: OP861652) Huddart Park: 15 Dec. 2012, DBB58730 (Genbank: OP861653). Sonoma County, Salt Point State Park: 12 Dec. 2012, DBB58349 (Genbank: OP861650).

Phlegmacium lividofragrans Bojantchev, sp. nov.

IF 901478

Holotype: UC 2060206

Etymology (Latin): *lividus* for the dark blue color and *fragrans* for the strong fragrance.

Diagnosis: pileus 50–90 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age margin involute, undulating in maturity, various shades of dark blue to purplish blue, discoloring in irregular patches to dark brown in maturity, innately fibrillose, glutinous when wet. Lamellae crowded, purple blue, transitioning to grey blue, grey brown to brown as the spores mature. Stipe 60–100 mm long, 20–35 mm wide, subclavate to subclavate bulbous, bluish at apex, whitish at the base, discoloring brown were bruised. Universal veil white. Partial veil blue, leaving a sparse annular zone (cortina) on the stipe. Context bluish at the apex, greyish white at the base. Odor fragrant of muscat grapes. Taste mild. Macrochemical Reactions 5% KOH orange yellow on the pileus, yellow with orange halo on the context. Basidiospores (9.5–) 10.0–11.0 (–12.0) × (5.0–) 5.5–6.0 (–6.5) μm (mean 10.3 × 5.8 μm), Qav = 1.79, amygdaliform to citriform with an extended distal end, moderately verrucose. Basidia 21–35 × 7–12 μm, 4-spored, cylindro-clavate, clamped. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis a thick epicutis, composed of parallel to interwoven hyphae, 4–22 μm wide in a gelatinous matrix, hypodermium not observed. Clamp connections common in all parts.

Ecology and distribution: all collections of this species are from oak habitat.

Comments: the most prominent feature of this species is the combination of deep blue color combined with the strong sweetish smell of muscat grapes. *Phlegmacium lividofragrans* has no close European relatives, and its entire clade is composed mostly of Western American taxa, except for *Cortinarius luhmannii* Münzmay, Saar & B. Oertel. Closely related Western American taxa are

Phlegmacium glaucocephalus (M.M. Moser, Ammirati & Halling) Niskanen & Liimat. and *Phlegmacium pastorinoi* Bojantchev nom. prov., with which they share habitat.

Collections examined: USA. California, Alameda County, Tilden Park, elev. 100 ft, under *Quercus agrifolia*, 28 Nov. 2007, DBB01998 (Genbank: OR726399), 13 Dec. 2007, DBB02579 (Genbank: OR726400) Santa Cruz, UCSC Campus, elev. 600 ft, under *Quercus agrifolia*, 4 Dec. 2010, DBB28993 (Holotype: UC2060206, Genbank: OR726401). iNaturalist: 188434735, 22 Dec 2010, DBB28849 (Genbank: OR726402).

Phlegmacium melleum Bojantchev, S.D. Adams & Ammirati, sp. nov.

IF 901461

Holotype UC 2060215

Etymology (Latin): melleus=honey colored.

Diagnosis: pileus 40–80 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age margin involute, pinkish buff initially, developing a reddish orange disk, pale yellow at maturity, smooth, glutinous when wet. Lamellae crowded, beige at first then greyish tan, then brown, as the spores mature. Stipe 40–150 mm long, 15–45 mm wide, cylindric to subclavate, white with brown discoloration where bruised, occasionally with protruding mycelial strands. Universal veil white. Partial veil composed of white fibrils, leaving a sparse annular zone (cortina) on the stipe. Context white, bruising pale ochraceous. Odor earthy to indistinct. Taste mild. Macrochemical Reactions 5% KOH negative on all parts. Basidiospores (10.5–) 11.0–12.0 (–12.5) × (6.0–) 6.5–7.0 μm (mean 11.4 × 6.4 μm), Qav = 1.78, amygdaliform, finely verrucose. Basidia 17–33 × 11–15 μm, 4-spored, cylindro-clavate, clamped. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis a thick epicutis, composed of parallel to interwoven hyphae, 3–15 μm wide, in a gelatinous matrix, hypodermium developed, hyphae 8–22 μm wide. Clamp connections common in all parts.

Ecology and distribution: this species has a broad distribution in the Pacific Northwest in conifer dominated habitats. In California it is only known from the northern-most counties with spruce, where it is frequently collected.

Comments: the overall pinkish buff coloration with a reddish orange disk offer significant diagnostic information in the field. This species is somewhat isolated phylogenetically and its closest well-known relative is *Phlegmacium serarium* (Fr.) Niskanen & Liimat. with which it shares morphological features including coloration and stature. The basidiospores have similar size, form, and ornamentation, while the two species differing by more than 12 base pairs in the ITS1/2 marker.

Collections examined: USA. California, Humboldt County, Willow Creek, under *Picea sitchensis*, *Pseudotsuga menziesii*, *Abies* spp., 14 Dec. 2011, DBB39200 (Holotype: UC2060215, Genbank: OR726388). iNaturalist: 188433424; California, Humboldt County, Eureka, HBMS Fair, 19 Nov. 2011, DBB58083 (Genbank: OR726387) 22 Nov. 2013, DBB63968 Oregon, Mt. Hood, Timothy Lake, under *Abies* spp, *Tsuga heterophylla*, *Pseudotsuga menziesii*, *Pinus ponderosa*, 19 Oct. 2019, SDA618 (Genbank: OR726386) Washington, Chelan County, Table Mountain, mixed conifers, *Abies*, *Larix*, *Pinus*, *Pseudotsuga*, *Picea*, 31 Aug. 2008, JFA13219 (WTU), JFA13220(WTU).

Phlegmacium pastorinoi Bojantchev, sp. nov.

IF 901479

Holotype: UC 2060207

Etymology: honoring Ron Pastorino for his contribution to the knowledge of *Cortinarius* on the Pacific Coast

Diagnosis: pileus 50–80 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age margin involute, undulating in age uniformly saturated blue purple, remaining so in maturity, discoloring to grayish purple with radial streaks, surface smooth, innately fibrillose,

glutinous when wet. Lamellae crowded, light blue at first then beige to brown, as the spores mature. Stipe 40–100 mm long, 20–35 mm wide, cylindrical to subclavate, occasionally with an emarginated bulb, white with pale bluish streaks. Universal veil white, frequently leaving remnants on the pileus. Partial veil composed of pale white to light blue fibrils, leaving a sparse annular zone on the stipe. Context yellowish white, bluish at the apex. Odor earthy. Taste mild. Macrochemical Reactions 5% KOH light brown on the pileus, orange brown in the context. Basidiospores (7.5–) 8.0–9.0 (–9.5) × (4.5–) 5.0 (–5.5) μm (mean 8.6 × 5.2 μm), $Q_{av} = 1.67$, amygdaliform to citriform, due to an extended distal end, moderately verrucose. Basidia 20–35 × 8–14 μm, 4-spored, cylindro-clavate, clamped. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis a thick epicutis, composed of parallel to interwoven hyphae, 6–17 μm wide in a gelatinous matrix, hypodermium present, hyphae 22–32 μm wide. Clamp connections common in all parts.

Ecology and distribution: this infrequent species is known only from areas along the Pacific coast where *Notholithocarpus densiflorus* is present.

Comments: the saturated bluish-purple pileus, persisting in maturity, in combination with the soft beige lamellae color allow for a reliable identification in the field. *Phlegmacium pastorinoi* and its clade are somewhat isolated from well-known European species, with the closest relative being the Pacific coast species *Ph. glaucocephalus* (M.M. Moser, Ammirati & Halling) Niskanen & Liimat. with which it differs by 10 base pairs in the ITS1/2 marker. The habitat of those two species overlaps with *Ph. glaucocephalus* differing morphologically by the color of the lamellae, being more bluish grey versus beige.

Collections examined: USA. California, Marin County, off Bolinas Ridge Road, elev. 1130 ft. under *Notholithocarpus densiflorus*, 27 Nov. 2012, DBB57002 (Genbank: OR726404). Mendocino County, Jackson State Demonstration Forest under *Notholithocarpus densiflorus*. 3 Dec. 2009, DBB27510 (Holotype: UC 2060207, Genbank: OR726403), iNaturalist: 188435163.

Phlegmacium variocracens Bojantchev, S.D. Adams, Ammirati, Liimat. & Niskanen, sp. nov.

IF 901460

Holotype UC 2060210

Etymology (Latin): slender varius.

Diagnosis: pileus 40–70 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age margin involute, undulating in age, orange, darker on the disk to red orange or brown-orange, paler on the margin to peach or yellow orange, smooth, glutinous when wet. Lamellae crowded, light bluish at first then cream to greyish tan, then brown, as the spores mature. Stipe 40–160 mm long, 12–35 mm wide, cylindrical to subclavate, white with brown discoloration at age. Universal veil white. Partial veil composed of white fibrils, leaving a sparse annular zone (cortina) on the stipe. Context white, bruising pale ochraceous. Odor earthy to indistinct. Taste mild. Macrochemical Reactions 5% KOH pale orange on the pileus, yellow orange on the context. Basidiospores (7.5–) 8.0–8.5 (–9.0) × (4.5–) 5.0–5.5 (–6.0) μm (mean 8.4 × 5.4 μm), $Q_{av} = 1.55$, ellipsoid to amygdaliform, moderately verrucose. Basidia 18–32 × 10–14 μm, 4-spored, cylindro-clavate, clamped. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis a thick epicutis, composed of parallel to interwoven hyphae, 4–12 μm wide in a gelatinous matrix, hypodermium developed, with hyphae 18–28 μm wide. Clamp connections common in all parts.

Ecology and distribution: this species has a broad distribution in the American West and is known from spruce dominated habitat in several states. Comments: the overall coloration and stature clearly show relation to the /varius clade. This species can be confused in the field with the similarly appearing, related species, *Cortinarius variosimilis* M.M. Moser & Ammirati. Microscopic examination of the basidiospores clearly sets them apart, as *C. variosimilis* has about 15% (>1.2 μm)

larger spores on average and the shape is more amygdaliform. The two species differ by 7 base pairs in the ITS1/2 marker.

Collections examined: USA. California, Mendocino County, Mendocino County, Jackson State Demonstration Forest, under *Notholithocarpus densiflorus*, *Picea sitchensis*, *Tsuga heterophylla*. 22 Nov. 2011, DBB57185 (Holotype: UC 2060210, Genbank: OR725052). iNaturalist: 188432410; Montana, Lincoln County, Cabinet Mountains, off NF-278 Road, under *Picea sitchensis*, *Picea engelmannii*, *Pseudotsuga menziesii*, *Tsuga mertensiana*, 2 Oct. 2010, DBB37550 (Genbank: OR725051) Oregon, Lane County, Willamette National Forest, 12 Oct. 2007, under *Picea sitchensis*, *Picea engelmannii*, *Pseudotsuga menziesii*, DBB00254 (Genbank: OR725050) Washington, Clallum County, Olympic Discovery Trail, 9 Oct. 2016, under *Picea sitchensis*, *Tsuga heterophylla* and *Pseudotsuga menziesii*, SDA008 (Genbank: OR730872) Pierce County, Buck Creek Campground, 20 Oct. 2018, under *Abies* spp, *Tsuga heterophylla* and *Pseudotsuga menziesii*, SDA409.

Phlegmacium vernalidistinctum Bojantchev, Ammirati & N.H. Nguyen, sp. nov.

IF 901462

Holotype UC 2060203

Etymology (Latin): distinct spring species.

Diagnosis: pileus 50–90 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age margin involute, undulating at age, light blue to olive tan, remaining bluer on the margin with a subtle, but distinct light greenish tint, not well captured on photographs, then pale tan in maturity, yellow ochraceous where bruised, smooth, innately fibrillose, frequently with radial hygrophanous steaks, glutinous when wet. Lamellae crowded, light blue to beige at first then greyish brown to brown, as the spores mature. Stipe 40–110 mm long, 25–45 mm wide, cylindric to subclavate, white to light grayish blue with distinct vertical streaks, discoloring ochraceous where bruised. Universal veil bluish white. Partial veil composed of pale bluish fibrils, leaving a sparse annular zone (cortina) on the stipe. Context white to olive, vertically mottled, bruising pale ochraceous. Odor earthy. Taste mild. Macrochemical Reactions 5% KOH pale orange on pileus and context. Basidiospores (8.5–) 9.0–10.5 (–12.0) × (4.5–) 5.0–5.5 (–6.0) μm (mean 10.0 × 5.4 μm), Qav = 1.85, amygdaliform, ~30% citriform, due to an extended distal end, moderately verrucose. Basidia 20–30 × 10–15 μm, 4-spored, cylindro-clavate, clamped. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis a thick epicutis, composed of parallel to interwoven hyphae, 4–17 μm wide in a gelatinous matrix, hypodermium developed, hyphae 9–21 μm wide hyphae. Clamp connections common in all parts.

Ecology and distribution: this vernaly fruiting species appears shortly after the snowpack has retreated in the montane conifer habitat of the Pacific Northwest.

Comments: this is one of the most distinct *Phlegmacium* species with its vernal fruiting habit and unique coloration. It is a sister species of *Phlegmacium subolivascens* (A.H. Sm.) Niskanen & Liimat. from which it differs by 6 indels in the ITS1/2 marker, one of which is 6 base pairs long. The two species are not easily distinguishable in the field and the spores have comparable size and shape, but *Ph. vernalidistinctum* tends to be a bit paler in overall color.

Collections examined: USA, California, El Dorado County, Crystal Basin Wilderness under *Pinus ponderosa*, *Abies concolor*, *Abies magnifica*, *Pseudotsuga menziesii*, 22 May 2009, DBB15350 (Holotype: UC 2060203, Genbank: OR726409). iNaturalist: 188436463. USA. California, Nevada County, North of Truckee, off Highway 89, elev. 6200 ft, under *Pinus jeffreyi*, 12 Jun. 2010, DBB 33300 (Genbank: OR726410) Siskiyou County, East of Mt. Shasta, off Military Pass Rd, elev. 5,725 ft, under *Abies magnifica* var. *shastensis*, *A. concolor*, *Pseudotsuga menziesii* 28 May 2008, DBB 00417 (Genbank: OR726408).