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Nomenclatural novelties: D. Bojantchev, J.F. Ammirati, S.D. Adams, N. Siegel, K. Liimatainen, T. Niskanen, J.L. Frank, Torres Grant, D. Panayotova, L. Best, G. Prudhomme, M.W. Beug, R. Pastorino & D. Lyons

Phlegmacium californicum Bojantchev, Ammirati, S.D. Adams, N. Siegel, Liimat. & Niskanen, sp. nov.

IF 901525

Holotype: WTU F-078993

Etymology: named for the state of California, USA.

Diagnosis: pileus 50–110 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age; margin involute, undulating in age; coloration complex and very variable, blue, olive-blue, or brown blue initially, paling out to gray brown, typically lighter colored on the disk, more bluish on the margin, fading out to various shades of brown or yellow brown with olive and blue tinges at maturity, innately fibrillose with radial streaks and water marks in wet weather, occasionally with concentric watermarks near the margin, glutinous when wet. Lamellae crowded, blue or gray blue at first, then tan to brown as the spores mature. Stipe 30–100 mm long, 20–40 mm wide, clavate at first to subclavate to cylindric in taller specimens, typically with a large, rounded, or emarginated, cone shaped bulb, light blue at first, paling to whitish, often bluish at the apex, dull yellow brown at age. Universal veil white, often leaving patches on the pileus. Partial veil composed of pale-bluish cortina, leaving an annular zone on the stipe. Context whitish on the pileus, bluish on the stipe and yellow brown on the bulb. Odor earthy. Taste mild. Macrochemical Reactions 5% KOH orange brown on the pileus, yellow brown on the context. Basidiospores (7·0–) 7·5–8·1 (–8·7) × (4·5–) 4·8–5·1 (–5·3) µm (mean 7·7 × 5·0 µm), Qav = 1·54, ellipsoid to slightly amygdaliform, moderately, densely verrucose. Basidia 22–31 × 7–15 µm, 4-spored, cylindro-clavate, clamped. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis a moderately thick epicutis, composed of parallel to interwoven hyphae, 3–8 µm wide in a gelatinous matrix, hypodermium developed, hyphae 22-32 µm wide. Clamp connections common in all parts.

Ecology and distribution: common Phlegmacium species in the lower elevation oak and mixed tanoak/conifer forests of California. While ubiquitous within the state, its range into adjacent regions has not been confirmed.

Comments: the Pacific Coast area of North America has a great diversity of species in subg. Phlegmacium (Fr.) Wünsche, sect. Glaucopodes Konrad & Maubl. ex Moënne-Locc. & Reumaux. Phlegmacium californicum is the prevalent species of that section in California. Morphologically, the rich olive-blue coloration places it in the /magicus clade, position which is supported by phylogenetic analysis. The closest well known European relative is Phlegmacium magicum (Eichhorn) Niskanen & Liimat., which differs by 10-11 base pairs in the ITS1/2 marker. Phlegmacium glaucopus (Schaeff.) Wünsche differs by 15 base pairs in the ITS1/2 marker.

Collections examined: USA. California: Alameda County, Berkeley, Tilden Park, under Quercus agrifolia, Nov 23, 2009, DBB28166 (Holotype: WTU F-078993, Genbank: OR873460, iNaturalist: 192409066); Marin County, Lake Lagunitas, under Quercus agrifolia, Dec 16, 2012, DBB58839 (Genbank: OR873465); Mendocino County, Jackson State Forest, under Notholithocarpus densiflorus, 21 Nov, 2009, DBB27241 (Genbank: OR873458), DBB27298 (Genbank: OR873459), 16 Nov, 2014, DBB74275 (Genbank: OR873466); San Francisco County, MSSF Fair, 4 Dec, 2009, DBB28944 (Genbank: OR873461); San Luis Obispo County, Los Osos, under Quercus spp, NS24; San Mateo County, SF Watershed, under Quercus agrifolia, 4 Dec 2012, DBB57925 (Genbank: OR873463), DBB58600

(Genbank: OR873464); Santa Cruz County, UCSC Campus, under Quercus agrifolia, 9 Jan, 2009, DBB13222 (Genbank: OR873456), DBB13247 (Genbank: OR873457), 11 Dec, 2010, DBB40970 (Genbank: OR873462); Sonoma County, Salt Point State Park, under Notholithocarpus densiflorus, 23 Nov, 2007, DBB01412 (Genbank: OR873455).

Phlegmacium aurantioquercinum Bojantchev, S.D. Adams & N. Siegel, sp. nov.

IF 901526

Holotype: WTU F-078994

Etymology: (Latin) aurantio=orange quercinum=under oaks

Diagnosis: pileus 50–90 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age; margin involute, undulating in age; orange to yellow orange at first, then pale orange to pale yellow orange in age, innately fibrillose with radial streaks and water marks, glutinous when wet. Lamellae crowded, blue at first, then tan to brown as the spores mature. Stipe 50–80 mm long, 20–40 mm wide, clavate at first to subclavate to cylindric in taller specimens, typically with a cone shaped bulb, light blue at first, paling to whitish, remaining bluish at the apex. Universal veil white, leaving copious remnants on the pileus. Partial veil composed of pale-bluish fibrils, leaving an annular zone on the stipe. Context mottled whitish in the pileus, bluish in the stipe and yellow brown in the bulb. Odor earthy. Taste mild. Macrochemical Reactions 5% KOH orange brown on the pileus, yellow brown on the context. Basidiospores (6·4–) 7·4–8·3 (–9·5) × (4·2–) 4·5–5·1 (–5·5) µm (mean 7·8 × 4·8 µm), Qav = 1·64, ellipsoid to slightly amygdaliform, moderately, densely verrucose. Basidia 22–33 × 6–16 µm, 4-spored, cylindro-clavate, clamped. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis a moderately thick epicutis, composed of parallel to interwoven hyphae, 4–9 µm wide in a gelatinous matrix, hypodermium developed, hyphae 20–30 µm wide. Clamp connections common in all parts.

Ecology and distribution: infrequent, restricted to the xeric live oak habitat of California.

Comments: the Pacific areas of North America have a great diversity of species in subg. Phlegmacium (Fr.) Wünsche, sect. Glaucopodes Konrad & Maubl. ex Moënne-Locc. & Reumaux. This is one of the rarer members of the clade, which stands out with its orange pileus and association with oaks in the xeric habitat of California. Compared to the main representative of sect. Glaucopodes, Phlegmacium glaucopus (Schaeff.) Wünsche, this species differs by 14-15 base pairs in the ITS1/2 marker.

Collections examined: USA. California: Alameda County, Berkeley, Tilden Park, under Quercus agrifolia, Dec 3, 2008, DBB11400 (Holotype: WTU F-078994, Genbank: OR873450, iNaturalist: 192411147), Nov 15, 2009, DBB26403 (Genbank: OR873451), Nov 28, 2010, DBB40348 (Genbank: OR873452); San Luis Obispo County, Los Osos Park, NS11 (Genbank: OR873453); Marin County, Bon Tempe Reservoir, under Quercus agrifolia, Dec 8, 2014, SDAMO192987 (Genbank: OR873454).

Phlegmacium casparense Bojantchev, sp. nov.

IF 901527

Holotype: WTU F-078995

Etymology: from the town of Caspar, Mendocino County, California

Diagnosis: pileus 45–95 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age; margin involute, undulating in age; blue-purple at first, soon turning orange brown on the disk, remaining olive brown to pale cyan on the margin, dark orange brown at age, adorned with white patches of universal veil, usually concentrically positioned, persisting on the disk, often absent at maturity, innately fibrillose with radial dark streaks and water marks, glutinous when wet. Lamellae crowded, blue to bluish purple at first, then gray blue to tan, then brown as the spores mature. Stipe 50–110 mm long, 20–40 mm wide, clavate at first, subclavate to cylindrical at age, typically with a

small cone shaped bulb, light blue at first, paling to whitish, remaining bluish at the apex. Universal veil white, leaving copious remnants on the pileus. Partial veil composed of pale-bluish fibrils, leaving an annular zone on the stipe. Context mottled whitish on the pileus, bluish on the stipe and yellow brown on the bulb. Odor earthy. Taste mild. Macrochemical Reactions 5% KOH orange brown on the pileus, yellow brown on the context. Basidiospores (6·5–) 7·5–8·4 (–9·4) × (4·3–) 4·7–5·1 (–5·6) µm (mean 7·9 × 4·9 µm), Qav = 1·61, ellipsoid to slightly amygdaliform, moderately, densely verrucose. Basidia 21–34 × 5–18 µm, 4-spored, cylindro-clavate, clamped. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis a moderately thick epicutis, composed of parallel to interwoven hyphae, 3–10 µm wide in a gelatinous matrix, hypodermium developed, hyphae 22–33 µm wide. Clamp connections common in all parts. Ecology and distribution: this is an uncommon species, known only from the type location where it fruits regularly in calcareous soil and mixed wood habitat of Notholithocarpus densiflorus, Picea sitchensis, Tsuga heterophilla and Pseudotsuga menziesii.

Comments: the Pacific Coast of North America has a great diversity of species in subg. Phlegmacium (Fr.) Wünsche, sect. Glaucopodes Konrad & Maubl. ex Moënne-Locc. & Reumaux. This is one of the rarer members of the clade, which can be distinguished by its uniform pileus coloration of brown to dull orange brown with olive tinges. It can be distinguished from the far more common species in the region, Phlegmacium californicum Bojantchev, Ammirati, S.D. Adams, N. Siegel, Liimat., Niskanen nom. prov., by the absence of bluish and bluish gray tinges on the disk. The two species differ by 15 base pairs in the ITS1/2 marker. Compared to the main representative of sect. Glaucopodes, Phlegmacium glaucopus (Schaeff.) Wünsche, this species differs by 20 base pairs in the ITS1/2 marker.

Collections examined: USA. California: Mendocino County, Caspar, Caspar Cemetery, under Notholithocarpus densiflorus, Picea sitchensis, Tsuga heterophilla and Pseudotsuga menziesii, Nov 22, 2009, DBB28002 (Holotype: WTU F-078995, Genbank: OR873448, iNaturalist: 192411398), Nov 16, 2014, DBB74115 (Genbank: OR873449), Nov 27, 2020, DBB101345.

Thaxterogaster pacificus Bojantchev & Ammirati, sp. nov.

IF 901528

Holotype: WTU F-078996

Etymology: for the Pacific Ocean shores where this species is most common.

Diagnosis: pileus 50–100 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age; margin involute, undulating in age; various hues of orange, orange brown, gray orange, or dark orange brown, pale yellow brown at maturity, margins often bluish, innately fibrillose with radial streaks and water marks, glutinous when wet. Lamellae crowded, purple blue to gray blue at first, then tan to brown as the spores mature, bruising purplish. Stipe 50–80 mm long, 20–40 mm wide, subclavate to cylindric, often with a small rounded bulb, light blue to grayish blue at first, fadling to whitish, remaining bluish at the apex, sometimes with silky appearance, bruising purplish. Universal veil white, occasionally leaving remnants on the pileus. Partial veil composed of pale-bluish fibrils, leaving an annular zone on the stipe. Context whitish, bluish on the upper stipe, bruising purplish. Odor earthy. Taste mild. Macrochemical Reactions 5% KOH weak brownish reaction on the pileus, negative on the context. Basidiospores (7·2–) 7·7–8·4 (–8·8) × (4·2–) 4·7–5·3 (–5·6) µm (mean 8·0 × 5·0 µm), Qav = 1.60, ellipsoid to slightly amygdaliform, strongly verrucose. Basidia 21–32 × 7–18 µm, 4-spored, cylindro-clavate, clamped. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis a moderately thick epicutis, composed of parallel to interwoven hyphae, 4–9 µm wide in a gelatinous matrix, hypodermium weakly developed, hyphae 12–18 µm wide. Clamp connections common in all parts.

Ecology and distribution: common under mixed broadleaved and conifer woods in the Pacific Northwest and California.

Comments: Thaxterogaster sect. Purpurascentes (Kühner & Romagn. ex Brandrud & Melot) Niskanen & Liimat., contains some of the most distinct 'Cortinarius' species with purplish discoloration where bruised. This genus is well represented in Western North America with several interesting species, of which Thaxterogaster pacificus is the most common and widespread in the Pacific Coast region, as well as, the closest to the classic European Thaxterogaster purpurascens (Fr.) Niskanen & Liimat., from which it differs by 7 base pairs in the ITS1/2 marker.

Collections examined: USA. California: Del Norte County, Redwood NP, Wolf Creek Education Center, under mixed conifers, Nov 7, 2009, DBB23030 (Genbank: OR873440); Mendocino County, Jackson State Demonstration Forest, under mixed conifers, Nov 14, 2009, DBB25843 (Genbank: OR873441), Nov 24, 2012 DBB57463 (Genbank: OR873444), Jan 10, 2021, DBB88439 (Genbank: OR873447); Marin County, Point Reyes N.S., under mixed conifers, Jan 15, 2010, DBB30577 (Genbank: OR873443); San Francisco County, MSSF Fair, Dec 4, 2009, DBB28858 (Genbank: OR873442); San Mateo County, Huddart Park, under mixed conifers, Dec 4, 2012, DBB57873 (Genbank: OR873445); Sonoma County, SPSP, under mixed conifers, Nov 28, 2014, DBB74541 (Holotype: WTU F-078996, Genbank: OR873446, iNaturalist: 192412814).

Cortinarius infractipallidus Bojantchev, S. D. Adams & Ammirati sp. nov.

IF 901529

Holotype: WTU F-078997

Etymology: pale infractus.

Diagnosis: pileus 50–100 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age, occasionally broadly umbonate or slightly campanulate, margin involute then uplifted, undulating in age, mostly beige throughout the lifetime with orange brown hints on the disk, innately fibrillose, adorned with radial streaks and water marks, glutinous when wet. Lamellae crowded, beige to gray, then tan to brown as the spores mature. Stipe 50–80 mm long, 20–30 mm wide, subclavate to cylindric, white to beige with a hint of blue at the apex. Universal veil whitish, not leaving remnants on the pileus. Partial veil composed of pale-beige fibrils, leaving a sparse to absent annular zone on the stipe. Context whitish, occasionally slightly bluish on the apex, near the surface. Odor earthy. Taste bitter. Macrochemical Reactions 5% KOH gray on all parts. Basidiospores (5·6–) 6·7–7·5 (–8·2) × (5·0–) 5·3–5·7 (–6·1) µm (mean 7·1 × 5·5 µm), Qav = 1.29, subglobose to broadly ellipsoid, distinctly verrucose. Basidia 26–36 × 6–12 µm, 4-spored, cylindro-clavate, clamped. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis a moderately thick epicutis, composed of parallel to interwoven hyphae, 3–8 µm wide in a gelatinous matrix, hypodermium weakly developed, hyphae 11–19 µm wide. Clamp connections common in all parts.

Ecology and distribution: common under tanoak and deciduous oaks in Northern California and the PNW.

Comments: Cortinarius sect. Infracti Bidaud & Reumaux is well represented in the North American West with several species, two of which are most common in Northern California and the PNW. They can be divided as the pale and dark 'infractus'. The pale looking species, C. infractipallidus is described here. Closely related to the darker species, C. infractitenebricus Bojantchev & Ammirati nom. prov., with which they share habitat and often overlap, they are clearly morphologically distinct. Even the most faded forms of C. infractitenebricus have a darker and more saturated coloration with more bluish tinges and bluish radial streaks. That difference in color is preserved in the exsiccata as well. C. infractipallidus and C. infractitenebricus differ by 15 base pairs in the ITS1/2 marker.

Collections examined: USA. California: Mendocino County, Jackson State Demonstration Forest, under mixed conifers, Nov 23, 2008, DBB10122 (Genbank: OR873434), Jan 10, 2021, DBB88451 (Holotype: WTU F-078997, Genbank: OR873439, iNaturalist: 192412111); Sonoma County, Bohemian Preserve, Monte Rio, under Quercus agrifolia, Jan 15, 2023, SDA1258 (iNaturalist:146647457); Yuba

County, New Bullards Bar Reservoir, Nov 24, 2010, DBB39807 (Genbank: OR873437); WASHINGTON: Klickitat County, Beug Farm near Husum (45.80704, -121.51816), under Quercus garryana, Nov 18, 2023, SDA1542 (iNaturalist:191399013).

Cortinarius infractitenebricus Bojantchev & Ammirati, sp. nov.

IF 901530

Holotype: WTU F-078998

Etymology: (Latin) dark infractus.

Diagnosis: pileus 50–100 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age, margin involute then uplifted, undulating in age, sordid grey brown with bluish tinges, occasionally dark beige, paler on the margin, appressed fibrillose, adorned with radial streaks and water marks, glutinous when wet. Lamellae crowded, dark gray tan, then tan to brown as the spores mature. Stipe 50–80 mm long, 20–30 mm wide, subclavate to cylindric, white to pale brown, blue at the apex. Universal veil white, often leaving remnants on the pileal margin. Partial veil composed of whitish blue fibrils, leaving a sparse to absent annular zone on the stipe. Context whitish, mottled with bluish gray tinges, mostly in the upper stipe. Odor earthy. Taste bitter. Macrochemical Reactions 5% KOH gray on all parts. Basidiospores (6·8–) 7·5–8·0 (–8·4) × (5·2–) 5·6–5·1 (–6·4) µm (mean 7·7 × 5·8 µm), Qav = 1.33, subglobose to broadly ellipsoid, distinctly verrucose. Basidia 24–37 × 5–11 µm, 4-spored, cylindro-clavate, clamped. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis a moderately thick epicutis, composed of parallel to interwoven hyphae, 4–9 µm wide in a gelatinous matrix, hypodermium weakly developed, hyphae 12–21 µm wide. Clamp connections common in all parts.

Ecology and distribution: common under conifers in Northern California and the PNW.

Comments: Cortinarius sect. Infracti Bidaud & Reumaux is well represented in the North American West with several species two of which are most common in Northern California and the PNW. They can be divided as the dark species, Cortinarius infractitenebricus, described here, and the pale one, C. infractitpallidus Bojantchev, S.D. Adams & Ammirati nom. prov. The ranges of both species overlap, but they are easy to distinguish in the field based on color and overall appearance, differences well preserved even in the exsiccata. Even the most faded forms of C. infractitenebricus, have a darker, more saturated coloration with more bluish tinges and bluish radial streaks. The spores of C. infractitenebricus are about 0.5µm larger on the average than those of C. infractipallidus and the two species differ by 15 base pairs in the ITS1/2 marker.

Collections examined: USA. California: Mendocino County, Jackson State Demonstration Forest, under mixed conifers, Nov 27, 2009, DBB30130 (Genbank: OR873435), Nov 13, 2010, DBB38854 (Genbank: OR873436); Casper Cemetery, Nov 27, 2009, DBB40081 (Holotype: WTU F-078998, Genbank: OR873438, iNaturalist: 192411716).

Cortinarius vernaliinornatus Bojantchev sp. nov.

IF 901718

Holotype: WTU F-079372

Etymology (Latin): vernal=spring and inornatus=unadorned.

Diagnosis: pileus 50–85 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age; broadly umbonate, margin involute, undulating in age, hygrophanous, uniformly brown when wet, paler brown to beige when dry, surface smooth, innately fibrillose, not glutinous when wet. Lamellae crowded, sand to light brown at first then brown as spores mature. Stipe 40–80 mm long, 20–35 mm wide, cylindric to subclavate, whitish. Universal veil white. Partial veil composed of white fibrils, leaving a sparse annular zone (cortina) on the stipe. Context whitish, mottled with beige streaks. Odor earthy. Taste mild. Macrochemical Reactions 5% KOH weak dark brown on surface

and context. Basidiospores (7·5–) 7·9–8·5 (–8·8) × (4·3–) 4·8–5·3 (–5·6) µm (mean 8·3 × 5·1 µm), Qav = 1.65, ellipsoid to amygdaliform, moderately verrucose. Basidia 22–34 × 9–13 µm, 4-spored, cylindro-clavate, clamped. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis a cutis, epicutis composed of thin parallel hyphae, 4–7 µm wide, walls smooth to very finely encrusted. Hypocutis not well differentiated, hyphae 6–16 µm wide, with thick hyaline walls. Hypodermium not observed. Clamp connections common in all parts.

Ecology and distribution: montane conifer forests of the Pacific Northwest, fruiting vernally, shortly after snowmelt.

Comments: This is one of the less common members in the Western American vernally fruiting Telamonia. Locally, it is most likely to be confused with C. eldoradoensis Bojantchev, although that the two species are not closely related. Unlike, C. eldoradoensis, this species does not develop cavities in the stipe. Phylogenetically, C. vernaliinornatus falls within a rather isolated clade and its closest European relative is Cortinarius mattiae Soop from which it differs by 15 base pairs.

Collections examined: USA. California: Tuolumne County, Pinecrest, off Hwy 108, elev. 5300 ft., under Pinus ponderosa, Pseudotsuga menziesii, Abies spp, 27 Apr 2013, DBB60282 (Holotype: WTU F-079372, Genbank: PP346176, iNaturalist: 199706064); Siskiyou County, East of Mt. Shasta, off Military Pass Rd. GPS (41°25.85', -122°04.62'), elev. 5,725 ft, under Abies magnifica var. shastensis, Abies concolor, Pseudotsuga menziesii and Pinus spp. 24 May 20020, DBB2020-17145 (Genbank: PP346177, iNaturalist: 199706549).

Cortinarius pacificovernus Bojantchev, Ammirati, S.D. Adams & Panayotova, sp. nov.

IF 901717

Holotype: WTU F-079370

Etymology (Latin): pacifico=Pacific Ocean and vernus=spring.

Diagnosis: pileus 20–50 mm diam., conical to convex to plano convex, uplifted in age, broadly umbonate, hygrophanous, margin involute, occasionally undulating, blackish brown to paler grey-brown towards the margin, surface silky fibrillose, not glutinous when wet, occasionally discoloring black when drying. Lamellae moderately crowded to distant, beige to light brown at first then brown as spores mature. Stipe 20–55 mm long, 4–10 mm wide, cylindric to narrowing at the base, white at first, surface silky striate at age, distinctly reddish brown towards the base. Universal veil white. Partial veil composed of white cortina, occasionally leaving a sparse annular zone on the stipe. Context white, reddish brown towards the base, often developing longitudinal cavity. Odor earthy. Taste mild. Macrochemical Reactions 5% KOH weak dark brown on surface and context. Basidiospores (6·4–) 7·7–8·3 (–8·7) x (4·5–) 5·2–5·7 (–6·2) µm (mean 8·0 × 5·5 µm), Qav = 1·47, ellipsoid to broadly ellipsoid, strongly verrucose to spinulose in the distal side. Basidia 20–35 × 8–12 µm, 4-spored, cylindro-clavate, clamped. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis a cutis, upper layer composed of thin parallel hyphae, 4–9 µm wide, walls smooth to very finely encrusted. Lower layer hyphae 5–14 µm wide, with thick hyaline walls. Hypodermium well developed. Clamp connections common in all parts.

Ecology and distribution: known from mixed woods in California and the Pacific Northwest. In California this species is seen mostly under oaks.

Comments: this species is in the clade around Cortinarius vernus H. Lindstr. & Melot from which it differs by 9 base pairs in the ITS2 marker. Locally it can be confused with Cortinarius montanovernus Bojantchev, Adams, Panayotova, Torres-Grant nom. prov., another member of the same clade, from which it differs by 6 base pairs in the ITS2 marker. The two species seem to have different habitats with C. montanovernus being seen in the mountainous areas. Micromorphologically, the average size of the spores of C. montanovernus are a little bit longer than those of C. pacificovernus by approximately 0.7 µm on average.

Collections examined: USA. California, Contra Costa County, Hercules, elev. 30 ft., under Quercus agrifolia, 25 Jan 2010, DBB30840 (Holotype: WTU F-079370, Genbank: PP346179, iNaturalist: 193280772); Santa Clara County, Bear Creek Redwoods Open Space Preserve, under Quercus spp. and Pinus radiata, 13 Feb 2020, DMP20200213 (Genbank: PP346180, iNaturalist: 38618726); Washington, Kittitas County, Swauk Forest Discovery Trail, off NF-9716, elev. 4120 ft, under conifers, 3 Jun 2023, SDA1269 (Genbank: PP346181, iNaturalist: 165420197).

Cortinarius montanovernus Bojantchev, S.D. Adams, Panayotova, Torres-Grant, Ammirati & Beug, sp. nov.

IF 901719

Holotype: WTU F-079371

Etymology (Latin): montano=mountain and vernus=spring.

Diagnosis: pileus 20–60 mm diam., conical to convex, broadly, or acutely umbonate, hygrophanous, margin involute, occasionally ribbed, blackish brown to paler grey-brown towards the margin, surface silky fibrillose, not glutinous when wet, occasionally discoloring black when drying. Lamellae moderately crowded to distant, light brown at first then brown as spores mature. Stipe 35–70 mm long, 5–12 mm wide, cylindric to narrowing at the base, white at first then whitish, surface silky striate at age, discoloring reddish brown towards the base. Universal veil grayish white. Partial veil composed of greyish cortina, occasionally leaving a sparse annular zone on the stipe. Context light brown, whitish towards the surface, bruising reddish brown towards the base, often developing longitudinal cavity. Odor earthy. Taste mild. Macrochemical Reactions 5% KOH weak dark brown on surface and context. Basidiospores (7·4–) 8·2–9·2 (–9·7) × (4·9–) 5·2–6·2 (–7·0) µm (mean 8·7 × 5·7 µm), Qav = 1·54, ellipsoid to broadly ellipsoid, strongly verrucose to spinulose in the distal side. Basidia 22–34 × 6–11 µm, 4-spored, cylindro-clavate, clamped. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis a cutis, upper layer composed of thin parallel hyphae, 3–10 µm wide, walls smooth to very finely encrusted. Lower layer hyphae 6–13 µm wide, with thick hyaline walls. Hypodermium well developed. Clamp connections common in all parts.

Ecology and distribution: known from the montane areas of California and the Pacific Northwest in association with conifers.

Comments: this species is in the clade around Cortinarius vernus H. Lindstr. & Melot from which it differs by 7 base pairs in the ITS2 marker. Locally it can be confused with Cortinarius pacificovernus Bojantchev, Ammirati, S.D. Adams & Panayotova nom. prov., another member of the same clade, from which it differs by 6 base pairs in the ITS2 marker. The two species seem to have different habitats with C. montanovernus being seen in the mountainous areas. Micromorphologically, the average size of the spores of C. montanovernus are a little bit longer than those of C. pacificovernus by approximately 0.7 µm.

Collections examined: USA. California, Sierra County, off Hwy 49, elev. 4300 ft. under Pinus ponderosa, Abies spp., 9 Jun 2011, DBB44030 (Holotype: WTU F-079371, Genbank: PP346182, iNaturalist: 198192489); Alameda County, Berkeley, elev. 1300 ft. under Pinus spp. 13 Apr 2012, DBB53002 (Genbank: PP346183); El Dorado County, PiPi Campground, elev. 4220 ft. under Pinus ponderosa, Abies spp., 9 Jun 2019, DMP20190501 (Genbank: PP346184, iNaturalist: 24342943); Washington, Kittitas County, off Teanaway Rd. North Fork, between road and Teanaway River, elev. 2410 ft, under conifers, 5 Jun 2018, SDA028 (Genbank: PP346185, iNaturalist: 9379975); Catherine Creek (45.718375 -121.369225), elev. 600 ft, under Quercus garryana, 03MWB040911 (WTU F-042893).

Phlegmacium pervariabile Bojantchev, Ammirati & Beug, sp. nov.

IF 901720

Holotype: UC 2060204

Etymology (Latin): per=very and variabile=variable.

Diagnosis: Coloration highly variable, a pale beige to light brown form and an overall blue form with a continuum of color forms in between. Pileus 50–125 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age; margin involute, undulating in age, hygrophanous, beige to brown on the disk with darker metallic blue hues on the margin or overall blue with lighter brown beige coloration on the disc. Lamellae crowded, either beige with bluish tints or blue with beige tints at first, then uniformly brown as the spores mature. Stipe 50–150 mm long, 22–35 mm wide, cylindric, often with an emarginated bulb, white to blue, typically with a longitudinally striate appearance with shades of beige or blue, basal mycelium white to yellowish discolored. Universal veil white, often leaving remnants on the pileus disc. Partial veil white, often leaving a moderate to copious annular zone on the stipe. Context white to pale bluish in the pale form and bluish in the blue form, paler in the pileus and base of stipe. Odor earthy. Taste mild. Macrochemical Reactions 5% KOH light orange on the pileus and weak, pale yellow on the context. Basidiospores (8·5–) 9·0–9·7 (–11·1) × (4·7–) 5·0–5·5 (–5·8) µm (mean 9·3 × 5v2 µm), Qav = 1·79, amygdaliform to citriform, densely verrucose. Basidia 22–36 × 7–15 µm, 4-spored, cylindro-clavate, clamped. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis duplex: a thick epicutis, composed of parallel to interwoven hyphae, 5–18 µm wide, in a gelatinous matrix, hypocutis well developed, hyphae 20-30 µm wide. Clamp connections common in all parts.

Ecology and distribution: infrequent but widespread, growing in association with oaks, along the Pacific Coast.

Comments: This is one of the most striking Phlegmacium species with the diversity of its coloration ranging from distinctly blue to beige and brown forms. Phylogenetically, this species is part of the clade around the European species Phlegmacium viridocoeruleum (Chevassut & Rob. Henry) Niskanen & Liimat., from which it differs by 15 base pairs of the ITS1/2 region. A closely related local species is Phlegmacium aurantiohygrophanum Bojantchev, Liimat., & Niskanen, but the two are not likely to be confused as latter is predominantly orange in color.

Collections examined: USA. California, Contra Costa County, Mt. Diablo State Park, (37°52’31”N 121°55’42”W), elev. 3000 ft, under Quercus agrifolia, DBB162404 (Genbank: PP346178); Berkeley, Tilden Park under Quercus agrifolia, Dec 13, 2007, DBB02546 (Holotype: UC 2060204, Genbank: OR726405, iNaturalist: 188435847); San Mateo County, San Francisco Watershed under Quercus agrifolia, Dec 6, 2014, DBB74873 (Genbank: OR726406), DBB74910 (Genbank: OR726407); Washington, Klickitat County. Rowland Lake, under Quercus garryana, Nov 27, 2008, JFA13302 (WTU).

Phlegmacium hyacinthinum Bojantchev, A. D. Parker, J. L. Frank, Liimat., Niskanen & Ammirati, sp. nov.

IF 901731

Holotype: WTU F-074632

Etymology: hyacinth blue.

Diagnosis: pileus 40–150 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age, margin involute then uplifted, undulating in age, lighter to daker lavender, often darker purplish blue on the disk, innately fibrillose, glutinous when wet. Lamellae moderately crowded, beige to bluish beige, then tan to brown as the spores mature. Stipe 50–140 mm long, 20–40 mm wide, cylindric to clavate, mostly white to faintly bluish grey at the apex, occasionally with a sub-marginate bulb of same color. Universal veil whitish grey, leaving copious patches on the pileus disk. Partial veil composed of whitish to pale-grey fibrils, leaving a copious annular zone on the stipe and often a band of metallic greyish patches on the pileus margin. Context whitish to pale yellowish towards the base. Odor earthy. Taste mild. Macrochemical Reactions 5% KOH pileus surface slowly

pale reddish brown, context negative or light brown. Basidiospores (7·6–) 8·1–8·7 (–9·3) × (4·8–) 5·1–5·5 (–5·8) µm (mean 8·4 × 5·3 µm), Qav = 1·58, amygdaloid to citriform with extended distal end, coarsely verrucose. Basidia 21–35 × 4–16 µm, 4-spored, cylindro-clavate, clamped. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis simplex, epicutis composed of parallel to interwoven hyphae, 4–11 µm wide in a gelatinous matrix, often with yellow refractive particles, hypocutis noncellular, pale yellowish, occasional hyphae containing yellow pigment. Clamp connections common in all parts.

Ecology and distribution: In mixed conifer or mixed conifer-broadleaf forests. Known from California, Oregon, and Washington, infrequent.

Comments: the species described here is a close relative of Phlegmacium volvatum (A.H. Sm.) M.M. Moser, from which it differs by 7bp. The two species are very similar in appearance and not easy to differentiate in the field. Phlegmacium volvatum has longer by spores by 0.5 – 0.6µm on average.

Collections examined: USA. California: Santa Cruz County, Simi Valley., under Notholithocarpus densiflorus, Pseudotsuga menziesii, Dec 15, 2012, TN12-337 (Genbank: PP425229, iNaturalist: 201218853); Oregon: Jackson County. Vesper Meadow Preserve in mixed conifer forest, elev. 4500', Oct 2019, JLF8243 (Genbank: MT477094, iNaturalist: 34215804); Washington: Pend Oreille County, North of Metaline Falls, off FR 175, under Pseudotsuga menziesii, Abies grandis, Pinus monticola, Nov 10, 2016, ADP161110-2 (Holotype: WTU F-074632, Genbank: PP425229, iNaturalist: 201218852).

Cortinarius infractiquercinus Bojantchev, L. Best, Torres-Grant, Liimat. & Niskanen, sp. nov.

IF 901871

Holotype: WTU F-079415

Etymology: the oak infractus.

Diagnosis: pileus 30–70 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age, occasionally broadly umbonate, margin involute then uplifted, undulating in age, golden brown, often darker olive brown to dark silver brown, often with a silver sheen, innately fibrillose, with pronounced radial or irregular streaks of dark fibrils, glutinous when wet. Lamellae crowded, dark bluish brown or grey brown, then dark tan to brown as the spores mature. Stipe 50–100 mm long, 20–40 mm wide, cylindric to subclavate, often tapering at the base, white to bluish grey at the apex, often with a metallic sheen with shades of bluish gray, discoloring light brown at age. Universal veil whitish grey. Partial veil composed of pale-grey fibrils, leaving a sparse to absent annular zone on the stipe. Context whitish to grayish with blue tinges mostly in the upper stipe, mottled longitudinally with grayish brown. Odor earthy. Taste bitter. Macrochemical Reactions 5% KOH green on the pileus, olive gray on the context. Basidiospores (6·7–) 7·1-7·9 (–8·8) × (4·7–) 5·2–6·0 (–6·5) µm (mean 7·7 × 5·6 µm), Qav = 1·33, broadly ellipsoid to subglobose, distinctly verrucose. Basidia 22–34 × 5–13 µm, 4-spored, cylindro-clavate, clamped. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis a moderately thick epicutis, composed of parallel to interwoven hyphae, 2–9 µm wide in a gelatinous matrix, hypodermium weakly developed, hyphae 10–169 µm wide. Clamp connections common in all parts.

Ecology and distribution: common under live oak in California.

Comments: Cortinarius sect. Infracti Bidaud & Reumaux is represented in the North American West with several species. The species described here is common in live oak stands, thus far known only from California.

Collections examined: USA. California: San Luis Obispo County, Avila beach, off Lupine Canyon Road, elev. 240ft, under Quercus agrifolia, Jan 6, 2024, DBB100695 (Holotype: WTU F-079415, Genbank: PP411006, iNaturalist: 198193759), DBB100696 (Genbank: PP411007, iNaturalist: 197442940), DBB100697 (Genbank: PP411008, iNaturalist: 197442938), Jan 4, 2019, MTG-201967 (iNaturalist: 19434554); Los Osos, elev. 200ft, under Quercus agrifolia, Jan 2024, LB202401 (Genbank: PP411010,

iNaturalist: 196805637); San Mateo County, San Francisco Watershed, off Cañada Rd. (N37°28’58” W122°19’46”), elev. 298ft, under Quercus agrifolia, Dec 15, 2023, DBB100323 (Genbank: PP411005, iNaturalist: 195200007); Santa Cruz County, Wilder Ranch State Park, elev. 490ft, under Quercus agrifolia, Jan 23, 2024, DBBDIETEL (Genbank: PP411009, iNaturalist: 197437909); Scotts Valley, Big Basin, NAMA 2012, Dec 13, 2012, TN12-294.

Calonarius magnificus Bojantchev, Liimat. & Niskanen, sp. nov.

IF 902684

Holotype: WTU F-079876

Etymology (Latin): magnificus=magnificent.

Diagnosis: pileus 70–140 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age; margin involute, undulating in age; purplish pink to pale purplish gray, fading to pinkish beige with bluish tints, often with fuscous colored remnants of the UV, smooth, glutinous when wet. Lamellae crowded, purplish pink then pale purple, turning red brown as the spores mature, slightly crenulate. Stipe 60–140 mm long, 20–30 mm wide, subclavate to cylindric with a large emarginated bulb, light purple at first, paling to blue whitish, smothered with yellow brown streaks of partial veil remnants. Universal veil pale purplish or white, turning ochraceous at age, often leaving copious remnants on the pileus. Partial veil composed of pale purplish cortina, leaving copious amounts of irregularly shaped zones of fibrils on the stipe, turning reddish brown as the spores drop. Context whitish, pale purplish on the edges. Odor earthy. Taste mild. Macrochemical Reactions 5% KOH orange brown on the pileus and bulb, pale yellow brown on the context. Basidiospores (10·6–) 11·7–12·7 (–14·0) × (5·9–) 7·0–7·6 (–8·8) µm (mean 12·2 × 7·3 µm), Qav = 1·67, ellipsoid to slightly amygdaliform, coarsely verrucose. Basidia 24–30 × 6–16 µm, 4-spored, cylindro-clavate, clamped. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis a moderately thick epicutis, composed of parallel to interwoven hyphae, 4–9 µm wide in a gelatinous matrix, hypodermium not observed, hyphae 20–34 µm wide. Clamp connections present in all parts.

Ecology and distribution: this distinctive species is known only from the coastal forests of Mendocino County where it fruits infrequently in the habitat of Picea sitchensis, Pseudotsuga menziesii, Tsuga heterophylla and Notholithocarpus densiflorus.

Comments: This species belongs to a clade around Calonarius pseudoglaucopus (Jul. Schäff. ex M.M. Moser) Niskanen & Liimat. which includes the close Western American relatives Ca. elotoides (M.M. Moser & McKnight) Niskanen & Liimat. and Ca. flavaurora (M.M. Moser & McKnight) Niskanen & Liimat. Calonarius magnificus stands out with its significantly different coloration, which is the brightest in the clade and differs from the nearest relative, C. elotoides, by 2 base pairs in the ITS1/2 marker.

Collections examined: USA. California: Mendocino County, Caspar Cemetery, under Picea sitchensis, Pseudotsuga menziesii, Tsuga heterophilla, and Notholithocarpus densiflorus, Nov 22, 2008, DBB09434 (Holotype: WTU F-079876, Genbank: JF273634, iNaturalist: 199427254); Nov 23, 2008, DBB09552 (Genbank: HQ997909); Nov 11, 2009, DBB25828 (Genbank: PP580407, iNaturalist: 199427257); Nov 21, 2009, DBB27249 (Genbank: JF273635, iNaturalist: 199427256); Nov 22, 2009, DBB27797 (Genbank: PP580408, iNaturalist: 199427260); Caspar, off the crossing of Hwy 408 and Hwy 409, under Picea sitchensis, Pseudotsuga menziesii, Tsuga heterophilla, and Notholithocarpus densiflorus, Nov 23, 2012, TN12-137 (Genbank: PP580409); Nov 25, 2012, TN12-266 (Genbank: PP580410)

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

IF 902550

Holotype: WTU F-079882

Etymology (Latin): supremus=supreme.

Diagnosis: pileus 50–100 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age; margin involute, undulating in age; pale greenish yellow, uniformly, or slightly paler towards the margin, occasionally with reddish brown zones, discoloring fuscous where bruised, smooth, glutinous when wet. Lamellae crowded, grayish to greenish yellow with olive tinges, turning brown as the spores mature, slightly crenulate. Stipe 60–110 mm long, 20–33 mm wide, subclavate to cylindric with an emarginated bulb, white to pale yellow, occasionally distinctly bluish at the apex. Universal veil white to pale yellow green, typically not leaving remnants on the pileus. Partial veil white, leaving a sparse annular ring turning brown due to spores drop. Context white, occasionally bluish at the apex of stipe or base of lamellae, bruising yellow brown at age. Odor earthy. Taste mild. Macrochemical Reactions 5% KOH on the pileus, light purplish brown, on the context, negative to slightly yellowish in older fruitbodies. Basidiospores (9·2–) 10·0–11·0 (–11·5) × (5·2–) 5·5–5·9 (–6·2) µm (mean 10·6 × 5·7 µm), Qav = 1.86, ellipsoid to slightly amygdaliform, distinctly verrucose. Basidia 26–32 × 7–18 µm, 4-spored, cylindro-clavate, clamped. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis a moderately thick epicutis, composed of parallel to interwoven hyphae, 3–10 µm wide in a gelatinous matrix, hypodermium not developed, hyphae 22–36 µm wide with slight purplish intercellular discoloration in KOH. Clamp connections present in all parts.

Ecology and distribution: this species is found under oaks and occasionally tanoak along the California coast.

Comments: Phylogenetically, it belongs to section Humolentes Niskanen & Liimat. and resembles other members of that section. The closest related species is Ca. humolens (Brandrud) Niskanen & Liimat. from which it differs by more than 15 base pairs. While not in the same section, Ca. xanthodryophilus (Bojantchev & R.M. Davis) Niskanen & Liimat. is the closest California relative, both phylogenetically and morphologically. The two species are very similar in stature and coloration, they share habitat and often fruit together, thus presenting a challenge to be separated in the field. The main difference is in the KOH reaction – light purplish brown vs. red brown in Ca. supremus and Ca. xanthodryophilus, respectively. Microscopically, separation is easier as Ca. xanthodryophilus has significantly larger spores.

Collections examined: USA. California: Humboldt County, Six Rivers National Forest, Boise Creek Campground, under Quercus agrifolia, Nov 22, 2012, NS8 (Genbank: PP580415); Nov 11, 2023, DBB99956 (Genbank: PP580413, iNaturalist: 201417192); San Mateo County, Huddart Park, under Quercus agrifolia, Dec 6, 2013, DBB74996 (Genbank: PP580412); San Francisco Watershed, under Quercus agrifolia, Dec 15, 2023, DBB100278 (Holotype: WTU F-079882, Genbank: PP580414, iNaturalist: 195200040); Sonoma County, SPSP, under Notholithocarpus densiflorus, Nov 24, 2011, DBB57430 (Genbank: PP580411);

Phlegmacium exemplare Bojantchev, sp. nov.

IF 902551

Holotype: WTU F-079894

Etymology (Latin): exemplare=exemplary.

Diagnosis: pileus 45–105 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age; margin involute, undulating in age; bluish brown at first then various shades brown, pale tan on the margin to darker orange brown on the disk, surface innately fibrillose, often radially wrinkled, glutinous when wet. Lamellae crowded, pale blue at first then yellow brown, turning brown as the spores mature, edges smooth. Stipe 50–100 mm long, 15–27 mm wide, very variable in shape, subclavate to cylindric with a bulb, often semi-emarginated, very variable in size, whitish to pale tan, occasionally with brown longitudinal streaks. Universal veil white to pale blue, rarely leaving remnants on the pileus. Partial veil white to pale blue, leaving a sparse annular ring, turning brown due to spore

drop. Context mostly whitish in maturity, mottled blue when young, bruising tan at age. Odor earthy. Taste mild. Macrochemical Reactions 5% KOH reaction variable at age, on young material, pale tan on the pileus and negative on the context, on mature specimens, dark red on the pileus and yellow brown on the context. Basidiospores (6·8–) 7·8–8·4 (–9·8) × (4·4–) 4·6–5·2 (–5·5) µm (mean 8·1 × 4·9 µm), Qav = 1.64, ellipsoid to slightly amygdaliform, moderately verrucose. Basidia 20–34 × 8–14 µm, 4-spored, cylindro-clavate, clamped. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis duplex: a thick epicutis, composed of parallel to interwoven hyphae, 4–20 µm wide, in a gelatinous matrix, hypocutis well developed, hyphae 20–30 µm wide. Clamp connections present in all parts.

Ecology and distribution: this species is found, somewhat infrequently, under oaks along the California coast.

Comments: this species belongs to subgen. Bulbopodium (Earle) Niskanen & Liimat. where it has an isolated position with no close, well-known, European relatives. The only close relative is another undescribed species, also found in California, which differs by 5 base pairs in the ITS1/2 marker.

Collections examined: USA. California: San Mateo County, Huddart Park, under Quercus agrifolia, Dec 15, 2012, DBB58700 (Genbank: PP580418); San Francisco Watershed, under Quercus agrifolia, Dec 2, 2011, DBB49234 (Genbank: PP580416); Dec 15, 2023, DBB100311 (Holotype: WTU F-079894, Genbank: PP580417, iNaturalist: 195200008); Santa Cruz County, UCSC Campus, under Quercus agrifolia, Jan 5, 2024, DBB141320 (Genbank: PP580419, iNaturalist: 196958057).

Phlegmacium hygrophanum Bojantchev & D. Lyons, sp. nov.

IF 902553

Holotype: WTU F-079898

Etymology (Latin): hygrophanum=hygrophanous.

Diagnosis: pileus 50–120 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age; margin involute, undulating in age; distinctly hygrophanous, charcoal brown where wet, paling out to olive brown where dry, surface innately fibrillose, often radially wrinkled, glutinous when wet. Lamellae crowded, pale gray blue at first then gray clay, turning brown as the spores mature, edges slightly crenulate. Stipe 50–100 mm long, 14–28 mm wide, subclavate to cylindric with a moderately emarginated bulb, whitish to pale tan at age. Universal veil white to pale olive, rarely leaving remnants on the pileus. Partial veil white to pale blue, leaving a sparse annular ring, discoloring brown due to spore drop. Context mostly whitish with blue hues near the surface of the stipe, often pale yellow on the bulb and pileus. Odor earthy. Taste mild. Macrochemical Reactions 5% KOH brownish on the pileus and pale yellow brown on context. Basidiospores (8·9–) 9·5–10 (–10·5) × (4·9–) 5·2–5·6 (–5·9) µm (mean 9·8 × 5·4 µm), Qav = 1·81, amygdaliform, mostly citriform due to an extended distal end, distinctly verrucose. Basidia 22–36 × 7–15 µm, 4-spored, cylindro-clavate, clamped. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis duplex: a thick epicutis, composed of parallel to interwoven hyphae, 6–18 µm wide, in a gelatinous matrix, hypocutis well developed, hyphae 16–32 µm wide. Clamp connections present in all parts.

Ecology and distribution: this infrequent species is found under oaks and tanoak along the California coast.

Comments: this distinctive species belongs to a clade around Cortinarius viridocoeruleus Chevassut & Rob. Henry, which consists of species with distinctly hygrophanous pilei. The closest related species, Phlegmacium aurantiohygrophanum Bojantchev, Liimat. & Niskanen, also occurs in California, but has very different, predominantly orange, coloration and differs by 5 base pairs in the ITS1/2 marker.

Collections examined: USA. California: Mendocino County, Caspar Cemetery, under Notholithocarpus densiflorus, Nov 24, 2012, DBB57650 (Holotype: WTU F-079898, Genbank: PP580420, iNaturalist: 205198402); San Mateo County, San Francisco Watershed, under Quercus agrifolia, Dec 15, 2023, DBB100344 (Genbank: PP580421, iNaturalist: 195200000).

Phlegmacium dignum Bojantchev, Liimat., Niskanen & J.L. Frank sp. nov.

IF 902554

Holotype: WTU F-079893

Etymology (Latin): dignum=honorable, meritorious, dignified.

Diagnosis: pileus 50–120 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age; margin involute, undulating in age; towards the margin, purple brown to dark brown or olive gray, towards the disk, paler yellow brown to orange tan, often with white membranous patches from the universal veil, surface smooth fibrillose, glutinous when wet. Lamellae crowded, pale purple at first then beige, turning brown as the spores mature, edges smooth. Stipe 50–120 mm long, 12–25 mm wide, subclavate to cylindric with or without a bulb. Bulb often emarginated. Whitish to pale bluish on the apex, often with a silky appearance, discoloring pale brown at age. Universal veil white to pale blue, leaving remnants on the pileus. Partial veil white to pale blue, leaving an annular ring, discoloring brown due to spore drop. Context pale white to yellowish with blue hues near the surface of the stipe, often yellow on the bulb and pileus. Odor earthy. Taste mild. Macrochemical Reactions 5% KOH brownish on the pileus and context. Basidiospores (10·5–) 11·0– 11·8 (–12·6) × (5·6–) 6·0–6·6 (–7.3) µm (mean 11.4 × 6.3 µm), Qav = 1.81, amygdaliform, often citriform due to an extended distal end, distinctly verrucose. Basidia 20–34 × 6–16 µm, 4-spored, cylindro-clavate, clamped. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis duplex: a thick epicutis, composed of parallel to interwoven hyphae, 5–20 µm wide, in a gelatinous matrix, hypocutis well developed, hyphae 15–30 µm wide. Clamp connections present in all parts.

Ecology and distribution: this rather infrequent species has been collected under conifers in California and Oregon but its range likely is much broader.

Comments: this distinctive species belongs to sect. Taura Niskanen & Liimat where it stands quite isolated from all other members, differing by a minimum of 12 base pairs of the ITS1/2 marker. The closest, well known related species are Phlegmacium luhmannii (Münzmay, Saar & B. Oertel) Niskanen & Liimat. from Europe and Ph. calyptratum (A.H. Sm.) Niskanen & Liimat. from the Western American states. Compared to Ph. dignum, Ph. calyptratum has significantly more prominent white calyptra and smaller spores.

Collections examined: USA. California: Mendocino County, Caspar Cemetery, under Pseudotsuga menziesii, Picea sitchensis and Notholithocarpus densiflorus, Nov 28, 2014, DBB74580 (Holotype: WTU F-079893, Genbank: PP581335, iNaturalist: 205203746); Gualala, under Pseudotsuga menziesii, Nov 26, 2010, DBB40045 (Genbank: PP581334, iNaturalist: 205203745); Jackson State Demonstration Forest, under Pseudotsuga menziesii, Tsuga heterophylla and Notholithocarpus densiflorus, Nov 2012, TN12-100 (Genbank: PP581336), TN12-105 (Genbank: PP581337); Oregon: Jackson County, Howard Prairie Lake, Oct 3, 2019, JLF8195 (Genbank: MT477091, iNaturalist: 34171541).

Phlegmacium altum Bojantchev & Ammirati, sp. nov.

IF 902555

Holotype: WTU F-074626

Etymology (Latin): altum=high, tall.

Diagnosis: pileus 50–120 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age; margin involute, undulating in age; yellow tan on the margin, becoming progressively darker inwards, brown to orange brown to purple brown on the disk, more uniform red brown in age, smooth to finely scaly when dry, glutinous when wet. Lamellae crowded, pale grayish blue at first, turning brown as the spores mature, edges finely crenulate. Stipe 55–130 mm long, 10–23 mm wide, mostly cylindric without a bulb; whitish to pale yellow, discoloring pale brown at age. Universal veil reddish to purplish brown, often leaving ochraceous girdles on the stipe. Partial veil white, leaving a

sparse annular ring of fibrils on the upper stipe, turning brown due to spore accumulation. Context pale white to yellowish, uniform, bruising pale brownish at age. Odor faint smell of fresh corn. Taste mild. Macrochemical Reactions 5% KOH olive to purplish brown on the pileus, almost negative to faint yellow on the context. Basidiospores (8·5–) 8·8–9·4 (–10·1) × (4·6–) 5·0–5·6 (–5·9) µm (mean 9·1 × 5·3 µm), Qav = 1.73, ellipsoid to slightly amygdaliform, finely verrucose. Basidia 18–40 × 6–16 µm, 4-spored, cylindro-clavate. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis a thick epicutis, composed of parallel to interwoven hyphae, 4–19 µm wide, in a gelatinous matrix, hypodermium developed, hyphae 15–30 µm wide. Clamp connections present in all parts.

Ecology and distribution: thus far this species has been collected in Montana and Oregon, under mixed conifers, but it is expected to have a broader distribution throughout the PNW, as well, as the Northernmost conifer zone of California.

Comments: Phlegmacium altum belongs to sect. Elastica (Fr.) Niskanen & Liimat., where the members typically have colored girdles on the stipe. The best known European species in that section is Phlegmacium papulosum (Fr.) Ricken from which Ph. altum differs by 15 base pairs in the ITS1/2 marker. Phlegmacium castaneicolor (A.H. Sm.) Niskanen & Liimat. is another similar Western American species, which occurs within the same range under conifers and is not easy to distinguish in the field, except for the somewhat smaller stature and more bluish lamellae. Phlegmacium aureoarmillatum Bojantchev, Ammirati, Liimat., Niskanen is a similar member of sect. Elastica from California but occurs mostly under tanoak. Phylogenetically, the closest species in the region is Phlegmacium agnostum Bojantchev & J. L. Frank nom. prov., which is strictly vernally fruiting and differs by 5 base pairs in the ITS/2 marker.

Collections examined: USA. Montana: Lincoln County, Salish Mountains GPS (Lat: 48.204547, Lon: -115.516563), under mixed conifers, Oct 2, 2010, DBB37665(Genbank: PP593477, iNaturalist: 205209569); Oregon: Wasco County, Clear Creek Crossing Campground, under Abies spp. Picea spp. and Pseudotsuga menziesii, Collected by Joe Ammirati, Oct 25, 1995, JFA11621 (iNaturalist: 205250816), JFA11622 (Holotype: WTU F-074626, Genbank: PP593479, iNaturalist: 205250817), JFA11628.

Phlegmacium agnostum Bojantchev & J.L. Frank, sp. nov.

IF 902560

Holotype: WTU F-079900

Etymology (Greek): agnostos=unknown.

Diagnosis: pileus 50–100 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age; margin involute, undulating in age; yellow tan on the margin, becoming progressively darker inwards, pale brown to darker brown on the disk, smooth to finely scaly when dry, glutinous when wet. Lamellae crowded, pale gray tan at first, turning brown as the spores mature, edges finely crenulate at age. Stipe 50–80 mm long, 10–23 mm wide, subclavate to cylindric, rarely with a bulb, whitish to pale yellow, discoloring pale brown at age, often with ochraceous girdles. Universal veil reddish brown, often leaving ochraceous girdles on the stipe. Partial veil white, leaving a sparse annular ring of fibrils on the upper stipe. Context uniformly whitish to pale yellow. Odor earthy, or with a faint smell of fresh corn. Taste mild. Macrochemical Reactions 5% KOH weak olive to gray brown on the pileus, almost negative, variable from faint grayish to very pale yellowish on the context. Basidiospores (8·7–) 9·7–10·5 (–11·3) × (4·9–) 5·1–5·7 (–6·1) µm (mean 10·1 × 5·4 µm), Qav = 1·88, amygdaliform, finely verrucose. Basidia 20–28 × 5–17 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 developed, hyphae 14–28 µm wide. Clamp connections present in all parts.

Ecology and distribution: this uncommon species fruits in the spring under mixed conifers, thus far has been collected in Northern California and Oregon, but probably has a much broader distribution throughout the PNW.

Comments: Phlegmacium agnostum belongs to sect. Elastica (Fr.) Niskanen & Liimat., where its members typically have colored girdles on the stipe. The best-known European species in that section is Phlegmacium papulosum (Fr.) Ricken from which Ph. agnostum differs by 16 base pairs in the ITS1/2 marker. Phlegmacium castaneicolor (A.H. Sm.) Niskanen & Liimat. is a similar Western American species, which occurs within the same range under conifers but fruits in the fall. Phlegmacium aureoarmillatum Bojantchev, Ammirati, Liimat., Niskanen is a similar member of sect. Elastica from California but fruits in the fall under tanoak. Phylogenetically, the closest species in the PNW is Phlegmacium altum Bojantchev & Ammirati nom. prov., an autumnally fruiting species, which differs by 5 base pairs in the ITS/2 marker.

Collections examined: USA. California: El Dorado County, near the Ice House Reservoir GPS (38.857212, -120.374685), under Pinus ponderosa, Abies spp. and Pseudotsuga menziesii, May 25, 2011, DBB44001 (Holotype: WTU F-079900, Genbank: PP593478, iNaturalist: 205597635); Oregon: Jackson County, Cascade-Siskiyou National Monument GPS (42.2545555556, -122.3986194444), under mixed conifers, May 20, 2020, collected by Jonathan Frank, JLF8585 (Genbank: MW341308, iNaturalist: 62089997); Klamath County, Pacific Crest Trail GPS (42.2964717841, -122.2734720722), under mixed conifers, Jun 14, 2021, collected by Jonathan Frank, JLF9410 (Genbank: OQ847705, iNaturalist: 87890802).

Phlegmacium geniale Bojantchev, sp. nov.

IF 902647

Holotype: WTU F-079897

Etymology (Latin): genialis=festive, merry, genial.

Diagnosis: pileus 45–95 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age; margin involute, undulating in age; tan to light brown, deeper brown on the disk with somewhat irregular color zones, innately fibrillose, glutinous when wet. Lamellae crowded, pinkish beige at first, turning olive yellow then brown as the spores mature, edges smooth. Stipe 50–80 mm long, 15–35 mm wide, subclavate to cylindric, often rooting, without a bulb, whitish to pale yellow, discoloring pale brown at age. Universal veil white, not leaving patches on the pileus. Partial veil white, leaving a sparse annular ring of fibrils on the upper stipe. Context uniformly whitish. Odor earthy. Taste mild. Macrochemical Reactions 5% KOH, as typical for the section, hallowed yellow on all parts. Basidiospores (9·6–) 10·4–11·2 (–12·0) × (5·3–) 6·1–6·5 (–6·8) µm (mean 10·8 × 6·3 µm), Qav = 1·72, amygdaliform, strongly verrucose. Basidia 24 – 32 × 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, 6–18 µm wide, in a gelatinous matrix, hypodermium developed, hyphae 12–26 µm wide. Clamp connections present in all parts.

Ecology and distribution: this infrequently encountered species fruits in the fall and winter under oaks and tanoak in coastal Northern California.

Comments: Phlegmacium geniale belongs to sect. Phlegmacioida (Fr.) Niskanen & Liimat. with two other species, which also occur in Northern California. Phlegmacium affabile Bojantchev, shares the same oak habitat but can be separated morphologically by its bluish coloration and the consistently longer spores on average (± 1 µm). They also differ by 7 base pairs in the ITS/2 marker. The other species from that section, which occurs in California, Ph. badiolatum M.M. Moser has a very different habitat. Ph. badiolatum has a broad circumboreal distribution and locally fruits in the montane conifer zone, both vernally and autumnally. They also differ by 7 base pairs in the ITS/2 marker.

Collections examined: USA. California: Mendocino County, Caspar Cemetery, under Notholithocarpus densiflorus, Nov. 27, 2010, DBB40190 (Genbank: PP593482, iNaturalist: 205251881); Marin County, Lake Lagunitas, under Quercus agrifolia, Dec. 24, 2023, DBB100560 (Holotype: WTU F-079897, Genbank: PP593483, iNaturalist: 195151975), Dec. 30, 2023, DBB100777.

Calonarius compsus Bojantchev, sp. nov.

IF 902699

Holotype: WTU F-079877

Etymology (Greek): kompsos (κομψός) = elegant.

Diagnosis: pileus 60–105 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age; margin involute, undulating in age; various shades of golden brown, darker brown on the disk, with scaly patches of universal veil towards the disk when dry, innately fibrillose, glutinous when wet. Lamellae crowded, greenish yellow to golden yellow, turning brown yellow as the spores mature, slightly crenulate. Stipe 60–110 mm long, 20–33 mm wide, subclavate to cylindric with an emarginated bulb, yellowish, bruising brown at age. Universal veil golden brown, often leaving scaly patches on the pileus when dry. Partial veil pale yellow, leaving a prominent annular ring turning brown due to spores drop. Context pale yellowish, bruising yellow brown at age. Odor earthy. Taste mild. Macrochemical Reactions 5% KOH intense red on the pileus and other surfaces, varying intensity of red on the context. Basidiospores (11·6–) 12·2–13·0 (–13·8) × (6·4–) 6·8–7·4 (–8·1) µm (mean 12·6 × 7·1 µm), Qav = 1·78, amygdaliform, coarsely verrucose. Basidia 28–36 × 8–24 µm, 4-spored, cylindro-clavate, clamped. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis a moderately thick epicutis, composed of parallel to interwoven hyphae, 4–12 µm wide in a gelatinous matrix, hypodermium not developed, hyphae 20–40 µm wide. Clamp connections present in all parts.

Ecology and distribution: this species is common on calcareous soils in the mixed redwood forests of the Pacific coast of California around Mendocino County. Along with the typical constants of that habitat, the presence of Abies spp. Tsuga heterophylla and Picea sitchensis probably hold the key to its host associations because it is not known outside of that range.

Comments: Calonarius compsus belongs to the /elegantior clade in subgen. Fulvi Niskanen & Liimat. and shares resemblance to the other members of that clade. It is the only member of that clade encountered in Northern California and remains a bit distant phylogenetically from the other prominent clade members, differing respectively from Ca. elegantior (Fr.) Niskanen & Liimat. by 10 base pairs of the ITS1/2 marker; Ca. elegantio-occidentalis (Garnica & Ammirati) Niskanen & Liimat. by 13 base pairs of the ITS1/2 marker; Ca. elegantiomontanus (Garnica & Ammirati) Niskanen & Liimat. by 15 base pairs of the ITS1/2 marker; and Cortinarius parafulmineus Rob. Henry by more than 20 base pairs of the ITS1/2 marker.

Collections examined: USA. California: Mendocino County, Caspar Cemetery, under mixed conifers and tanoak, Nov. 4, 2007, DBB00088 (Genbank: PP581345, iNaturalist: 205206874), Nov. 20, 2009, DBB25879 (Holotype: WTU F-079877, Genbank: PP581347, iNaturalist: 205206877); Jackson Demonstration State Forest, under mixed conifers and tanoak, Nov. 4, 2007, DBB00267 (Genbank: PP581346, iNaturalist: 205206876), Nov 21, 2009, DBB27764 (Genbank: PP581348, iNaturalist: 205343584).

Calonarius sublimis Bojantchev, Ammirati & G. Prudhomme sp. nov.

IF 902701

Holotype: WTU F-074628

Etymology (Latin): sublimis=exalted, noble.

Diagnosis: pileus 55–110 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age; margin involute, undulating in age; light purple brown, often yellow green on the

margin, turning dark red brown on the disk due to oxidation, innately fibrillose, glutinous when wet. Lamellae crowded, pink beige to gold beige, purplish where crushed, turning yellow brown to brown as the spores mature, slightly crenulate. Stipe 60–110 mm long, 20–33 mm wide, subclavate to cylindric with an emarginated bulb, yellowish, bluish to purplish at the apex. Universal veil golden yellow, leaving remnants on the edge of bulb. Partial veil pale yellow, leaving a prominent annular ring turning brown due to spores drop. Context pale yellowish, purplish along the stipe. Odor earthy. Taste mild. Macrochemical Reactions 5% KOH intense purplish red on the surfaces, varying intensity of purplish on the context, mostly in the bulb and pileus. Basidiospores (10·9–) 12·2–13·2 (–14·0) × (7·3–) 7·8–8·5 (–9·0) µm (mean 12·7 × 8·1 µm), Qav = 1·57, amygdaliform, occasionally citriform, coarsely verrucose. Basidia 27–35 × 7–25 µm, 4-spored, cylindro-clavate. 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 not developed, hyphae 22-42 µm wide with epimembranal granular pigment which reacts purple in KOH. Clamp connections present in all parts.

Ecology and distribution: this infrequent species is found in mixed woods in Northern California, both along the coast and the Sierra Nevada foothills. No common host seems to be present in all locations where collected.

Comments: Calonarius sublimus belongs to the /elegantissimus clade in subgen. Calonarius Niskanen & Liimat., sect. Rufoolivacei (Brandrud & Melot) Niskanen & Liimat., but is quite isolated phylogenetically, differing by more than 30 base pairs of the ITS1/2 marker from other species. The only member of that clade in California is Calonarius adonis (Bojantchev & Ammirati) Niskanen & Liimat., which is an oak associate and lacks any purple hues in its coloration.

Collections examined: USA. California: Del Norte County, Patrick's Creek Campground, under Pseudotsuga menziesii, Notholithocarpus densiflorus, Nov. 17, 1995, JFA11767 (Holotype: WTU F-074628, Genbank: EU057038, iNaturalist: 205249587); Nevada County, Grass Valley, mixed woods, Dec. 18, 2023, GP82738 (Genbank: PP593481, iNaturalist: 194316961); Santa Cruz County, UCSC Campus, Pseudotsuga menziesii, Notholithocarpus densiflorus, Dec. 16, 2012, DBB58702 (Genbank: PP593480, iNaturalist: 205248939).

Calonarius shastensis Bojantchev, sp. nov.

IF 902702

Holotype: WTU F-079880

Etymology (Geography): for the Mount Shasta region.

Diagnosis: pileus 50–95 mm diam., hemispherical to convex when young, plano-convex to plano-concave in age; margin involute, undulating in age; pale yellow to orange yellow, discoloring orange-brown where bruised or oxidized, surface smooth, innately fibrillose, glutinous when wet. Lamellae crowded, pale purple gray or gray blue to gray brown to brown as the spores mature, slightly crenulate. Stipe 60–85 mm long, 15–28 mm wide, subclavate to cylindric with an emarginated bulb, whitish with pale yellowish discolorations. Universal veil golden yellow, leaving remnants on the edge of bulb. Partial veil pale yellow, leaving a prominent annular ring turning brown due to spores drop. Context uniform whitish. Odor earthy. Taste mild. Macrochemical Reactions 5% KOH reddish brown on the pileus, weak yellow grayish on the context. Basidiospores (9·5–) 9·8–10·2 (–10·5) × (5·2–) 5·6–6·2 (–6·5) µm (mean 10·1 × 5·9 µm), Qav = 1·72, amygdaliform, strongly verrucose. Basidia 24–36 × 6–24 µm, 4-spored, cylindro-clavate, clamped. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis a thick epicutis, composed of parallel to interwoven hyphae, 5–17 µm wide in a gelatinous matrix, hypodermium not developed, hyphae 20–40 µm wide. Clamp connections present in all parts.

Ecology and distribution: this species is common in the Shasta-Trinity National Forest, but no collections from other areas have been recorded. One possible explanation is that it is associated with Abies magnifica var. shastensis.

Comments: Calonarius shastensis belongs to subgen. Calochroi Niskanen & Liimat., where it is quite isolated phylogenetically from its neighbors.

Collections examined: USA. California: Siskiyou County, Shasta-Trinity National Forest, under Abies magnifica var. shastensis and other conifers, GPS (Lat: 41.36839, Lon: -121.912333), Oct. 21, 2011, DBB00057 (Holotype: WTU F-079880, Genbank: PP593475, iNaturalist: 205208577); GPS (Lat: 41.366979, Lon: -121.910971), Oct. 22, 2011, DBB47047 (Genbank: PP593476, iNaturalist: 205208578); GPS (Lat: 41.384219, -121.916249), Oct. 25, 2017, DBB78777.

Phlegmacium favorabile Bojantchev, sp. nov.

IF 902827

Holotype: WTU F-079895

Etymology (Latin): favorabile = favorable

Diagnosis: pileus 50–100 mm diam., hemispherical to convex, plano-convex to plano-concave in age, margin involute, yellow to amber then orange brown overall, more saturated towards the disk due to oxidation, appressed fibrillose with a slightly scaly appearance, often with darker radial fibrils, glutinous when wet. Lamellae crowded, attachment sinuate, pale grayish to bluish at first, turning gold yellow, later brownish as the spores mature, edges slightly crenulate. Stipe: 50–90 mm long, 20–40 mm wide, subclavate to cylindrical with a rounded or slightly emarginated bulb, whitish to pale yellow, bruising darker ochre at age. Universal veil: pale yellow. Partial veil: grayish white, leaving an annular zone on the upper stipe. Context: whitish to pale yellow, bruising pale ochre. Odor earthy. Taste mild. Macrochemical Reactions: 5% KOH reaction variable at age, on young material, brownish on the pileus and slight yellow to negative on the context, on mature specimens, dark red on the pileus and yellow brown on the context. Basidiospores (9·8–) 10·5–11·1 (–12·1) × (6·5–) 6·8–7·4 (–8·3) µm (mean 10·8 × 7·1 µm), Qav = 1·52, ellipsoid to slightly amygdaliform, densely verrucose. Basidia 23–33 × 7–17 µm, 4-spored, cylindro-clavate, clamped. Lamella edges sparsely fertile. Cystidia not observed. Pileipellis a thick epicutis, composed of parallel to interwoven hyphae, 5–23 µm wide, in a gelatinous matrix, hypodermium developed, hyphae 15–28 µm wide. Clamp connections present in all parts.

Ecology and distribution: known from California under live oak.

Comments: Phlegmacium favorabile belongs to subgen. Bulbopodium (Earle) Niskanen & Liimat., sect. Caesiocortinata (Frøslev & T.S. Jeppesen) Niskanen & Liimat. where it remains very isolated phylogenetically with no close relatives.

Collections examined: USA. California. Humboldt County, Six Rivers National Forest, Boise Creek Campground, under Quercus agrifolia, Nov. 12, 2023, DBB99967 (iNaturalist: 198182947); San Luis Obispo County, Los Osos Oaks State Reserve, under Quercus agrifolia, Jan. 6, 2024, DBB111305 (Genbank: PP658419, iNaturalist: 196953830); San Mateo County, San Francisco Watershed, under Quercus agrifolia, Dec. 4, 2010, DBB40840 (Holotype: WTU F-079895, Genbank: PP658418, iNaturalist: 205248412), Nov. 30, 2011, DBB57685 (Genbank: PP658417, iNaturalist: 205248414).