

Cortinarius in Sweden

Sixteenth revised edition

Introduction

Preface

This edition mainly reflects taxonomic and nomenclatural novelties, arising from ongoing phylogenetic research, but also reports results from new findings. As before, I have depicted *Cortinarii* that were never or rarely presented in colour. Taxa that are easily found in peer publications, notably in *Cortinarius* Flora Photographica [FLO] are not depicted. The set of *colour plates* now presents 118 species and varieties. The repertory of species includes 256 described taxa, while 145 additional taxa are discussed without a full description.

The text is split into two parts: a *schematic key* and a *descriptive part*. Also the descriptive part has the flavour of a key. Hence a reader, who knows approximately where a find is likely to be placed taxonomically, may go directly to the corresponding description, then narrow down the identity by following the main characters stated at the beginning of each chapter or group. Doing that, it is important to take the groups in order — never skip or go backward — since the distinguishing characters are not always repeated. The *list of localities* at the end will allow a visitor to glean some geographical information on where to retrieve the localities in the country.

To date this book is used by mycologists in 30 countries worldwide (over 630 copies shipped since the beginning). Proven useful to others, it is my hope it will assist you in your study, as well as stimulate your interest in this fascinating genus.

KARL SOOP

Mora, June 2018

Taxonomical Notes

Despite several major biomolecular studies (e.g., GAR1, GAR4, GAR6, GAR7, FRØ1, FRØ3, PEI5, KIA18), covering taxa from many continents, an infrageneric structure of *Cortinarius* supported by genetic markers has so far not been proposed. Consequently, this book continues to use a taxonomy based on morphological (and to some extent chemical) traits, in line with the traditional taxonomy espoused by several earlier works (e.g., FLO, MOS, ROUX).

Approximate section names are given for most groups, even though the groups were created primarily to facilitate navigation in the text (see above). As evidenced by genetic works (*loc. cit.*), many of these groups are polyphyletic, and hence do not necessarily reflect a natural relationship between species.

A number of "good" taxa: species, subspecies, and varieties, are discussed without descriptive prose other than deviations from the most recently described species. In these cases the epithet is printed in bold typeface. Epithets printed in normal typeface refer either to taxa described at some other place in the text, or to synonyms or doubtful taxa. Nomenclatural and taxonomical notes, including details about phylogenetic affinities, are enclosed in square brackets.

Descriptions

The evaluation of fungal characters in the genus, as well as the associated terminology, are assumed known to the reader. The following data are included in the descriptive part:

Name and author: Changes and re-interpretations of scientific names that have been proposed in the last few years by other authors have often been accepted; if not, the reason is normally given within square brackets in the text. There is no attempt to provide colloquial English names for the taxa.

Cap characters: size, colour, structure, aspect of the margin, veil remnants, shape. The colour is reported near the beginning, as it is usually significant when differentiating between neighbouring species. By a "rounded" shape is meant hemispherical. Hygrophanity, viscosity, and shape are included only when deviating from what is normal for the subgenus. Cap size refers to the diameter of mature specimens; it moreover provides an indication of the size of the fruit-body as a whole.

Gill colour, and edge colour, if different. The colour always pertains to *immature* individuals. Gill density and width have been reported only if differing from the normal: crowded/narrow in *Phlegmacium*, and more or less distant/broad in other subgenera. As a rule, fixation at the stipe is omitted, it being of little diagnostic value: most *Cortinariii* have adnate to narrowly free gills when young, that later gradually turn notched to emarginate during development. Reporting on serrated or crenulated gills is also omitted in most cases, as these characters vary significantly with age and moisture, as well as among different individuals of a collection.

Stipe characters: shape, colour, veil remnants, aspect of bulb. The shape, which is here an important character, pertains to mature individuals, unless stated otherwise. The term *fusoid* means that the stipe is thickest in the middle; *tapering* always implies attenuated toward the base. Stipe measurements have been omitted, as they depend too much on the manner of growth; adjectives, such as "robust" or "slender" are used instead to denote deviations from what is normal in the subgenus or group. By *apex* is meant the uppermost part of the stipe.

Veil colour and abundance. **Cortina** colour. It is usually a question of veil remnants on the stipe. The abundance of cortina has been omitted, as this character is seldom constant.

Flesh (*context*) colour, taste and odour. *Marbled* means that the flesh in the upper part of the stipe displays veins of a more saturated hue (like in marble). Where relevant, the consistency of the flesh is reported (compact, soft, brittle, tenacious, etc.). For certain species the colour of *exsiccata* (dried specimens) is also reported.

Taste and odour are reported only if not trivial. By "agaricoid" is meant a pleasant odour recalling *Agaricus campestris*. Most *Phlegmacia* possess, especially when mature or older, a characteristic smell of "hot peanuts" or "boiled beets", by many authors called "terreous" or "earthy", a parallel I have difficulty accepting. The *Phlegmacium* odour may vary considerably, even among individuals in a single collection, and its strength is hardly a reliable character, even though it is assiduously used by certain mycologists to differentiate species (e.g. *C. varicolor* or *C. meinhardii*) from related taxa. Species that are supposed to smell like "flour" (*farinaceous*) sometimes lack the odour, but the mealy flavour is then always apparent in the taste. — *Telamoniae* often exhale a faint odour of iodine ("iodoform", "hospital", "adhesive plaster") or *raphanoid* ("radish", "turnip"), or a mixture of both.

Ecology: Biotope, host plant, frequency, and (for rare or critical taxa) a few localities where the taxon has been collected in Sweden, expressed by code-words. See the **Localities List** at the end to resolve the coded references, and please note that the list merely gives my own observations and does not constitute a formal repertory of known locations.

As is well known, *Cortinariius* forms ecto-mycorrhiza with specific partners in the plant regnum, and the most frequently occurring host genus (or genera) is stated. Observe that on isolated occasions the fungus may grow also with other, unreported hosts. By "broad-leaf" tree is meant *Quercus*, *Fagus*, *Corylus*, and *Tilia*, but not *Betulaceae* and *Salicaceae*. If the fungus seems to prefer calcareous or acidic soil, this is also reported. The frequency spans a six-graded scale (very rare, rare, uncommon, fairly common, common, very common), and whenever a clear geographical gradient can be discerned, it is reported as well.

Cortinarii are terrestrial and most grow solitary or in small groups (*gregarious*). The manner of growth is reported only if it is typically different, e.g. clustered (*fasciculate*). Most species fruit in the autumn, and the fruition period is included only when different.

Reactions. Colour change with certain chemical substances is reported. If a report is missing, this does not mean that the reaction is unimportant, only that I have not tested it myself. By "trivial" is meant either none or a meaningless reaction. Unless stated otherwise, it is a question of the reaction in the context, usually in the upper part of the stipe, or in the cap, if fleshy.

- NaOH refers to a general alkaline reaction (c. 20% solution), and one may equally well use KOH instead. Ammonia is not included, as its reaction is usually identical or weaker. The alkaline reaction is significant mainly in *Phlegmacium* to distinguish subsection *Variecolores* and neighbouring groups, whose species react yellow to yellow-brown on flesh and stipital veil within half a minute. Most species in subgenus *Dermocybe*, sect. *Leprocyebe*, and sect. *Fulvi* react reddish on cap cuticle and gills (anthraquinone and flavomannine related pigments, respectively). The trivial reaction is grey to dirty brown or black; it holds for most species in subgenera *Myxacium* and *Telamonina*. The exception is the reaction on the veil of certain species in sect. *Armillati* and relatives (anthraquinone pigments). In this case the reddish veil remnants on the stipe turn violaceous. Absence of a reaction may then also be of interest, and is reported for certain other species with a red-toned veil.
- Acid FeCl₃ ("Høiland's reagent") is of interest for species in subgenus *Orellani* to indicate the presence of the toxin orellanine. One adds a small amount of hydrochloric acid to a solution of iron chloride. If the fungus contains the toxin, the context immediately acquires a blackish-blue tint. The trivial reaction yields the colour of the reagent itself, i.e. rusty yellow; this is reported only for a handful of similar species.
- Lugol is a solution of iodine and KI in diluted alcohol. (One may use the iodine solution from the pharmacy after diluting it 2-3 times with water, it is important that there is not too much iodine.) The reaction is of interest for species in sect. *Scauri* and *Purpurascetes*, where the context immediately stains dark lilac. The trivial reaction yields the colour of the reagent itself, i.e. rusty brown; this is reported for a couple of easily confused species. — Also a couple of species outside these sections react with lugol, and then other colours may occur.
- Formalin has a slow reaction; as a rule one must wait at least 5, sometimes up to 20 minutes. The reagent is useful primarily when distinguishing certain species within sect. *Anomali*, for which the context stains strongly lilac to reddish lilac. The trivial reaction is none or faintly rosy. — A handful of other species also react with formalin, and then other colours may occur.
- Guayac is a kind of resin, dissolved in alcohol. Most *Cortinarii* exhibit a blue-green to yellow-green reaction, which sometimes needs a few minutes to emerge. The trivial reaction is no colour change.
- AgNO₃ (silver nitrate) yields a colour change for certain species. As the solution is unstable, the salt should be dissolved in water before each test. The trivial reaction consists at most of a reduction of the silver, rendering the context slate-grey.
- FeSO₄ (iron sulphate) may be used for certain species. As the solution is unstable, the salt should be dissolved in water before each test. The trivial reaction yields the colour of the reagent itself, i.e. pale blue-green.
- Phenol is typically used in a 3% water solution. It commonly gives rise to a red-brown to reddish-lilac reaction after a couple of minutes for many *Cortinarii*. The trivial reaction is no colour change.
- Fluorescence is reported under Reactions for species within sect. *Leprocyebe* and for a couple of similar species. The test consists of irradiating the context with UV light in an otherwise dark room; a positive reaction is a yellow to yellow-green fluorescence. The reaction often works also on dried material, and may then be stronger. (One may refine the method by first leaving the material to marinate in diluted methanol [see ARN]. Then one may even observe a bluish fluorescence in the solution — not included in descriptions.)

Microscopy: Size, shape, ornamentation of *spores*. A handful of *Cortinarii* possess well differentiated *cheilocystidia*, which are then described (shape and size). Several species (e.g. in sect. *Obtusi*) have sterile *marginal elements* on the gill edge that are hardly differentiated by size, but do have a characteristic shape. Concerning remaining microscopic characters, see the referenced literature.

References: See the Reference section. Frequent species have many references, in which case only a selection is included, preferably of publications showing a representative colour picture of the fungus.

Abbreviations

frb	fruit-body
sp.	spores
<i>sp.</i>	species
<i>subsp.</i>	subspecies
<i>subgen.</i>	subgenus
f.	form
var.	variety
sect.	section
→	see
±	more or less
'	minutes
pp	partly
ined.	unpublished
s. X	according to X
nec X	not according to X
s. str	in a strict sense
s. lato	in a wide sense
s. auct	in other authors' sense

Schematic Key

Please notice that the key is not binary. There are, in other words, often more than two alternatives, and one should check all before making the choice. The key contains many references between the subgenera. For example, certain species that lead to *Myxacium* in the main key, are later referred to *Phlegmacium*.

Sometimes the stipe measurement is used to distinguish between slender and robust species. It is then a question of the diameter of the upper part of the stipe on most mature specimens in a collection.

Main Classification

1	cap and stipe viscid	3
1*	cap viscid, stipe dry	2
1**	cap and stipe dry	4
2	gills yellow to citrinous (young gills; see <i>Descriptions</i> above)	<i>Phlegmacium C</i>
2*	gills bluish grey to violet, or with a violet edge	<i>Phlegmacium B</i>
2**	gills of a different colour	<i>Phlegmacium A</i>
3(1)	sp. subglobose, taste mild	<i>Delibuti</i>
3*	sp. different, or if subglobose, then taste bitter	<i>Myxacium</i>
4(1)	cap distinctly hygrophanous	5
4*	cap weakly or not hygrophanous	6
5	stipe slender (<8 mm; see introduction above)	<i>Telamonia C</i>
5*	stipe thicker	<i>Telamonia B</i>
6(4)	frb entirely dark violet, cap felty, tomentose	10
6*	frb different	7
7	gills with a grey, brown, or violaceous tinge	9
7*	gills with an olive, yellow, orange, or red tinge	8
8	stipe slender (<8 mm)	<i>Dermocybe</i>
8*	stipe thicker	Key A
9(7)	veil on stipe yellow to brown or reddish, sp. subglobose	<i>Anomali</i>
9*	veil differently coloured or invisible or sp. different	<i>Telamonia A</i>
10(6)	in deciduous wood, sp. >10 µm long	<i>violaceus</i>
10*	in coniferous forest, sp. shorter	<i>hercynicus</i>

Dermocybe

1	gill surface (not edge) orange	5
1*	gill surface rust to carmine red	25
1**	gill surface yellow to greyish yellow without a green tinge	10
1***	gill surface greenish yellow to olive	20
5(1)	flesh yellow to yellow-brown	6
5*	flesh olive brown to yellow-green	7
6	cap evenly yellow-brown, gills lively orange	<i>cinnamomeus</i>
6*	cap umber, often zoned, gills brownish orange	<i>sommerfeltii</i>
7	gill surface brick red to reddish orange → <i>fervidus</i>	31
7*	gill surface pure orange	<i>malicorius</i>
10(1)	cap wholly or partly brick red	11
10*	cap yellow to brown	13
11	in coniferous forest, stipe yellow-brown, often robust → <i>speciosissimus</i> (Key A)	

11*	in deciduous wood, stipe with red veil remnants, often slender	12
12	under <i>Salix</i> , stipe fibrillose	<i>uliginosus</i>
12*	under <i>Betula</i> or <i>Quercus</i> , stipe red squamulose → <i>bolaris</i> (Key A)	
13(10)	stipital base intensely reddish orange	<i>bataillei</i>
13*	stipital base of a different shade	14
14	stipe thin (<6 mm), with reddish veil remnants	16
14*	stipe more robust, often with brownish veil remnants	15
15	cap yellow-brown, in coniferous forest or with <i>Betula</i>	<i>croceus</i>
15*	cap yellow, under <i>Salix</i>	<i>cinnamomeoluteus</i>
16(14)	cap often pointed, veil remnants reddish, with <i>Picea</i>	<i>croceoconus</i>
16*	cap obtusely umbonate to plane, veil remnants more brown to orange, with other trees	17
17	veil red-brown, in alpine <i>Betula</i> forest, sp. elliptic <9.5 µm	<i>norvegicus</i>
17*	veil orange-brown, in sandy <i>Pinus</i> forest, sp. fusoid, longer	<i>aureifolius</i>
20(1)	in swampy ground	21
20*	habitat different	22
21	under <i>Pinus</i> , cap dark brown, alkaline reaction on gills brown to red-brown	<i>chrysolitus</i>
21*	under <i>Betula</i> , cap yellow-brown, alkaline reaction on gills black brown	<i>tubarius</i>
22(20)	stipe cylindrical, <8 mm	<i>olivaceofuscus</i>
22*	stipe clavate, more robust → <i>venetus</i> (Key A)	
25(1)	cap yellow-brown to date brown	<i>semisanguineus</i>
25*	cap orange-brown to copper brown	30
25**	young caps dark red without a brown tinge	26
26	in <i>Picea</i> forest, context reddish	<i>sanguineus</i>
26*	in broad-leaf forest, context pale with a violaceous tinge	<i>puniceus</i>
30(25)	stipe purplish brown, cap hygrophanous → <i>anthracinus</i> (<i>Telamonia</i> C)	
30*	stipe yellowish, cap not hygrophanous	31
31	gills dark red, stipe pale with red bands	<i>phæniceus</i>
31*	gills brick red, stipe golden yellow	<i>fervidus</i>

**Key A: medium sized, non-hygrophanous species with coloured (not violaceous) gills
(sect. *Leprocybe* et allies)**

1	cap olive yellow or greenish	5
1*	cap olive brown or brown without a red hue	10
1**	cap with a yellow, orange, or red hue	20
5(1)	cap glabrous, gills brown with a greenish edge	<i>colymbadinus</i>
5*	cap fibrillose, gills olive brown	6
6	stipe clavate, in broad-leaf forest	<i>cotoneus</i>
6*	stipe usually slender, in <i>Picea</i> or mixed forest	7
7	frb medium sized, stipe olive brown to red-brown	<i>venetus</i>
7*	frb small, stipe yellowish → <i>tubarius</i> , <i>olivaceofuscus</i> (<i>Dermocybe</i>)	
10(1)	gills with a green tinge → <i>colymbadinus</i> , <i>venetus</i>	5,7
10*	gills yellow or brownish without a green tinge	11
11	stipe with purple to blackish brown veil remnants	12
11*	stipe with brownish veil remnants → <i>raphanoides</i> , <i>ochrophyllus</i> (<i>Telamonia</i> A), <i>cinnamomeus</i> (<i>Dermocybe</i>)	
12	veil remnants blackish brown, odour of parsley, southerly	<i>melanotus</i>
12*	veil remnants purplish, odour different, northerly	<i>phrygianus</i>
20(1)	cap pale with reddish veil remnants	21
20*	cap predominantly yellow to orange-yellow	22
20**	cap predominantly red-brown to orange-brown	40
21	cap with red to reddish-lilac squamules	<i>bolaris</i>
21*	cap with red to reddish-orange fibrils	<i>rubicundulus</i>
22(20)	stipe-base fiery red	<i>caput-medusæ</i>

22*	stipe-base yellowish to brown	30
30(22)	gills conspicuously distant.....	42
30*	gills normally crowded	31
31	in <i>Fagus</i> forest.....	39
31*	in <i>Picea</i> forest.....	32
32	cap with copious veil remnants	<i>depexus</i>
32*	cap without conspicuous veil remnants	33
33	frb small, cap fibrillose → <i>croceus</i> (<i>Dermocybe</i>)	
33*	frb medium sized, cap finely innate fibrillose to glabrous	34
34	cap predominantly yellow, odour ± like stearine	35
34*	cap orange-yellow to brown-yellow, odour trivial.....	36
35	cap saturated yellow, disk often more brown-yellow, sp. >7 µm wide	<i>callisteus</i>
35*	cap uniformly pale yellow, sp. leaner	<i>infucatus</i>
36(34)	stipe with distinct, coloured veil remnants	37
36*	veil white, sparse	38
37	veil yellow, many sp. >7.5 µm long.....	<i>limonius</i>
37*	veil brownish, sp. shorter.....	<i>neocallisteus</i>
38(36)	stipe fusoid, usually tapering, in <i>Picea</i> forest.....	<i>vespertinus</i>
38*	stipe clavate, in <i>Pinus</i> forest.....	<i>pinophilus</i>
39(31)	cap and stipe squamulose, stipe tapering.....	<i>humicola</i>
39*	cap and stipe strongly fibrillose, stipe clavate.....	<i>tofaceous</i>
40(20)	cap ± hygrophanous, odour acidulous → <i>hinnuleoarmillatus</i> (<i>Telamonia</i> B)	
40*	cap not hygrophanous, odour faint, trivial.....	41
41	gills red to brick red → <i>fervidus</i> , <i>phaeniceus</i> (<i>Dermocybe</i>)	
41*	gills yellow to orange.....	42
42	cap often pointed, with <i>Picea</i>	<i>speciosissimus</i>
42*	cap obtusely umbonate or plane, in broad-leaf forest	<i>orellanus</i>

Anomali

1	cap strongly brown-fibrillose to squamulose → <i>pholideus</i> , <i>ochrophyllus</i> (<i>Telamonia</i> A)	
1*	cap granulose to matt or glabrous	2
2	gills with a violet tinge (sect. <i>Anomali</i>)	10
2*	gills devoid of violet	3
3	cap pale grey to ochraceous.....	4
3*	cap darker brown or olive → <i>raphanoides</i> , <i>valgus</i> , <i>paragaudis</i> (<i>Telamonia</i> A)	
3**	cap red-squamulose from veil → <i>bolaris</i> (Key A)	
4	veil sparse, pale yellowish → <i>tabularis</i>	14
4*	veil copious, cinnabar to blood red → <i>pinigaudis</i> , <i>craticius</i> (<i>Telamonia</i> A)	
10(2)	stipe with red to red-brown tufts or squamules	18
10*	veil yellow to brownish or very thin	11
11	in coniferous forest.....	12
11*	in deciduous forest or in pastures	13
12	stipe slender, with distinct, yellow veil girdles and tufts, under <i>Pinus</i>	<i>lepidopus</i>
12*	stipe robust, with a thin, grey-brown ring, under <i>Picea</i>	<i>caninus</i>
13(11)	cap pale grey to yellow	14
13*	cap pale violet to whitish	<i>albocyaneus</i>
13**	cap buff with a violaceous tinge.....	16
14	frb robust, in broad-leaf forest or with <i>Populus</i> , gills violet	15
14*	frb slender, with <i>Betula</i> , gills pale, sometimes violaceous.....	<i>tabularis</i>
15	cap pale yellow to ochraceous, sp. moderately verrucose	<i>xanthocephalus</i>
15*	cap greyish tan, sp. rather coarsely verrucose	<i>lebretonii</i>
16(13)	frb stout, stipe often >10 mm wide, sp. obtusely elliptic.....	<i>simulatus</i>
16*	frb ± slender, stipe normally leaner, sp. subglobose.....	17
17	in deciduous or mixed forests, often with <i>Betula</i> , sp. moderately verrucose.....	<i>anomalus</i>
17*	in pastures, often associated with small herbs, sp. coarsely verrucose.....	<i>pastoralis</i>
18(10)	in <i>Pinus</i> forest, frb dark purple brown	<i>anomalellus</i>

- 18* with *Picea* or *Betula*, frb paler *spilomeus*

Delibuti

- 1 taste bitter → *Myxacium*
 1* taste mild 2
 2 cap with violaceous to blue elements (occasionally partly yellow) 4
 2* cap yellowish without blue 3
 3 cap pale yellow to egg yellow or olive yellow, medium sized *delibutus*
 3* cap greyish yellow to buff 6
 4(2) cap frankly blue when young, stipe white to bluish *salor*
 4* cap and stipe saturated grey with a faint violaceous tinge *emunctus*
 4** cap greyish blue to olive brown, stipe pale 5
 5 frb small, cap greyish blue to greyish yellow, in *Betula* forest *betulinus*
 5* frb robust, cap olive brown with a violet margin, in *Picea* forest *transiens*
 6(3) cap pale tan, robust, in broad-leaf forest → *xanthocephalus* (*Anomali*)
 6* cap greyish yellow, usually <40 mm, with *Betula* → *betulinus* 5

Phlegmacium A

- 1 gills with an olive or green (not greenish yellow) tinge 2
 1* gills yellow, including greenish yellow → *Phlegmacium C*
 1** gills white, grey, or pale brown, without a violet tinge 10
 1*** gills darker brown, including grey-brown 6
 2 taste ± bitter, cap not hygrophanous, stipe equal to clavate 3
 2* taste mild, cap often with hygrophanous areas, stipe bulbous 4
 3 stipe yellowish, odour leathery, gills fairly distant *subtortus*
 3* stipe white to grey-brown, odour trivial, gills crowded *infractus*
 4 cap ochraceous, gills often with a blue tint *herpeticus*
 4* cap darker brown, gills greenish 5
 5 stipe often ± slender with a small or rounded bulb, sp. often >11 µm, mainly in the north
 *scaurus*
 5* stipe robust with a wide bulb, sp. shorter, southerly *polychrous*
 6(1) cap dark brown, in coniferous, swampy forest *sphagnophilus*
 6* cap yellowish, in broad-leaf forest → *fulvocitrinus* (*Phlegmacium C*)

Gills pale

- 10(1) stipe with a membranous collar *caperatus*
 10* stipe young with brownish veil remnants, no collar 11
 10** stipe young with white, violet, or no veil remnants 30
 11 stipe with a ± marginate bulb 12
 11* stipe cylindrical to clavate 13
 12 cap soon dark brown *dalecarlicus*
 12* cap red-brown → *napus* 54
 12** cap yellow to pale brown → *cæsiocortinatus*, *olidoamarus* (*Phlegmacium B*), *corrosus* 55
 13(11) veil remnants yellow to olive brown 14
 13* veil remnants yellow-brown to date brown 16
 13** veil remnants with a purple tinge *papulosus*
 14 stipe glutinous, sp. subglobose → *Delibuti*
 14* stipe dry or weakly viscid, sp. different 15
 15 in broad-leaf forest, sp. usually >9.5 µm *cliduchus*
 15* in *Picea* forest, most sp. shorter *ochraceobrunneus*
 16(13) with dwarf *Salix* in alpine heath *durus*
 16* in other deciduous forest, stipe with yellow to yellow-brown bands 17
 16** in *Picea* forest, stipe with yellow-brown to grey-brown bands or fibrils 18
 17 under *Betula* *triumphans*
 17* under *Populus tremula*, *populinus*
 17** under *Tilia* *tiliae*
 18(16) cap distinctly viscid, glabrous, warmly date brown *saginus*
 18* cap soon dry, ± fibrillose, grey-brown to ochraceous 19
 19 flesh brownish, sp. <10 µm *norrlandicus*

19*	flesh white, sp. longer	20
20	cap pale ochraceous, frb robust, precocious → <i>spadicellus</i> (<i>Phlegmacium</i> B)	
20*	cap dully grey-brown, frb medium sized, in autumn	<i>pseudonævosus</i>

>Veil pale or violaceous

30(10)	stipe with a ± marginate bulb	31
30*	stipe cylindrical to clavate	60
31	in deciduous wood	32
31*	in coniferous forest	50
32	cap pale yellow or whitish	33
32*	cap ochraceous to yellow-brown	35
33	flesh white with an odour of honey	34
33*	flesh marbled violet with a farinaceous odour	<i>aleuriosmus</i>
33**	flesh marbled violet, odour insignificant	<i>caroviolaceus</i>
34	frb slender, stipe with a ± rounded bulb, sp. > 9 µm	<i>pallidrimosus</i>
34*	stipe often with a marginate bulb, sp. shorter	<i>talus</i>
35(32)	odour strong, nauseating, ± like <i>Hebeloma sacchariolens</i>	<i>osmophorus</i>
35*	odour faint, trivial	36
36	cap ± bright yellow → <i>cæsiocortinatus</i> (<i>Phlegmacium</i> B)	
36*	cap honey yellow, often with white veil patches	<i>xanthoochraceus</i>
36**	cap brownish yellow to greyish yellow, veil sparser	37
37	cap distinctly hygrophanous	41
37*	cap not hygrophanous	38
38	cap glabrous, frb usually large	<i>saporatus</i>
38*	cap finely but distinctly radially striate, frb medium sized	39
39	in lowland broad-leaf forest	40
39*	in alpine <i>Betula</i> forest	<i>malachioides</i>
40	cap uniformly yellow-brown, sp. coarsely verrucose	<i>subdecolorans</i>
40*	cap pale ochraceous with coarse fibrils, sp. smoother	<i>balteatibulbosus</i>
41(37)	flesh usually with a brownish tinge → <i>camptoros</i> (<i>Phlegmacium</i> B)	
41*	flesh white	<i>gracilior</i>

>>In coniferous forest

50(31)	flesh brownish	<i>subrugulosus</i>
50*	flesh ± white	51
51	cap pale	55
51*	cap with yellow to red-brown tints	52
51**	cap grey-brown to dark brown → <i>elotoides</i> (<i>Phlegmacium</i> B)	
52	cap brownish yellow to apricot, glabrous to finely innate fibrillose	56
52*	cap brick-red to orange-brown, fibrillose	53
53	cap orange to orange-brown, sp. <10 µm	<i>rufoallutus</i>
53*	cap red-brown, most sp. longer	54
54	stipe and veil white on young frb	<i>napus</i>
54*	veil and often stipe violaceous	<i>pseudoarcuratorum</i>
55(51)	flesh bitter in cap → <i>amarescens</i> (<i>Phlegmacium</i> B)	
55*	taste mild	<i>corrosus</i>
56(52)	cap often hygrophanous, in acid or mesic forest, sp. <10 µm	<i>multiformis</i>
56*	cap not hygrophanous, in calcareous forest, many sp. longer	57
57	alkaline reaction cherry-red on cap, northerly with <i>Picea</i>	<i>kristinæ</i>
57*	alkaline reaction trivial, southerly, often with <i>Abies</i>	58
58	veil yellowish, sparse, sp. medium verrucose	<i>fulminoides</i>
58*	veil white, rather copious, sp. strongly verrucose	<i>armenicorius</i>

>>Stipe-bulb not marginate

60(30)	cap entirely blue to violet or greyish violet	<i>cumatilis</i>
60*	cap white, grey, or greyish yellow	70
60**	cap yellow to ochraceous	61
60***	cap brown to red-brown, occasionally partly violaceous	90
61	stipe tall, hard, with distinct, white girdles	<i>claricolor</i>
61*	stipe different, usually with sparse or no veil remnants	62

- 62 flesh white, cap viscid..... **turmalis**
 62* flesh yellowish, cap dry → *vespertinus*, *rubicundulus* (Key A)

>>>Cap pale

- 70(60) stipe fusoid, tenacious..... 71
 70* stipe equal or clavate, not tenacious 73
 71 stipe ± glabrous, under *Populus tremula* **argutus**
 71* stipe with a white sheath, in broad-leaf forest..... 72
 71** stipe fibrillose, in *Picea* forest → *fraudulosus*..... 75
 72 flesh rapidly staining yellow, with *Carpinus* or *Corylus* **pseudovulpinus**
 72* flesh not staining yellow, with *Fagus* **vulpinus**
 73(70) veil distinctly violet **borgsjæensis**
 73* veil white to pale ochraceous or evanescent 74
 74 frb small, in *Pinus* forest → *pinophilus* (Key A), *leucophanes* (*Phlegmacium* B)
 74* frb medium sized with a slender stipe, under *Betula* → *tabularis* (*Anomali*)
 74** frb robust with a clavate stipe, in coniferous forest..... 75
 75 sp. mostly >12 µm **fraudulosus**
 75* sp. shorter 76
 76 alkaline reaction intensely yellow..... 77
 76* alkaline reaction trivial **rosargutus**
 77 veil white 78
 77* veil soon darkening to brownish 19
 78 with *Betula* or broad-leaf trees, sp. mostly >9.5 µm 79
 78* with *Pinus*, sp. shorter **areni-silvæ**
 79 cap whitish, with *Betula* **balteatoalbus**
 79* cap pale ochraceous, mainly with *Fagus* → *balteatibulbosus* 40

>>>Cap brown

- 90(60) cap ± viscid, cap and/or stipe often with a violaceous to purple tinge, at least when young..... 94
 90* cap dry, frb without a trace of violet..... 91
 91 taste unpleasant, stipe soon brownish..... **russus**
 91* taste faint, pleasant, stipe pale..... 92
 92 cap buff to brick brown, cheilocystidia prominent **crassus**
 92* cap paler brown, cheilocystidia absent → *pseudonævosus* 20
 94(90) cap grey-brown, weakly viscid **balteatus**
 94* cap with warmer hues, distinctly viscid..... 95
 95 cap and stipe with copious veil remnants, cap-margin often sulcate..... 98
 95* veil remnants sparse, cap-margin smooth 96
 96 cap red-brown without a violaceous tinge..... **variegatus**
 96* cap date brown without a violaceous tinge **violaceomaculatus**
 96** cap buff to dark brown with a violet margin 97
 97 stipe robust, often bulbous, in deciduous wood **balteatocumatilis**
 97* stipe slender to clavate, in *Picea* forest **serarius**
 98(95) in broad-leaf forest, cap dark purple-brown..... **præstans**
 98* in subalpine *Betula* or *Picea* forest, cap lively red-brown **blattoi**

Phlegmacium B: Gills violaceous

- 1 stipe and veil viscid, sp. subglobose → *Delibuti*
 1* stipe and veil dry, sp. almost always differently shaped 2
 2 cap white to pale yellowish grey 3
 2* cap wholly or partly bluish grey to violet or purplish brown..... 20
 2** cap yellow to brownish or olivaceous without a violet tinge..... 50
 3 flesh ± bitter, at least in cuticle 4
 3* flesh mild 10
 4 in *Fagus* forest, odour usually strong, fruity **amænolens**
 4* in *Picea* forest, odour faint..... 5
 5 cap ± fibrillose, stipe at least partly violaceous **cæsiostramineus**
 5* cap glabrous, stipe whitish **amarescens**

10(3)	stipe clavate or with a rounded bulb	11
10*	stipe with a wide, marginate bulb	14
11	under <i>Betula</i> , stipe violet when bruised → <i>porphyropus</i>	22
11*	with conifers, stipe at most faintly yellow when bruised	12
12	sp. <5 µm wide, cap ivory white	13
12*	sp. wider, cap pale ochraceous	<i>pini</i>
13	frb. slender, odour trivial, with <i>Pinus</i>	<i>leucophanes</i>
13*	frb. medium size, odour farinaceous, with <i>Picea</i>	<i>lustratus</i>
14(10)	in <i>Picea</i> forest → <i>cæsiocinctus</i>	47
14*	in broad-leaf forest	15
15	cap grey to pale brown	<i>cærulescentium</i>
15*	cap creamy white, often with a faint violaceous shade	16
16	alkaline reaction distinctly red on cutis, frb often small	<i>platypus</i>
16*	alkaline reaction weak, frb fairly robust	17
17	gills violet, sp. <10 µm	<i>nymphicolor</i>
17*	gills often pale, sp. longer → <i>caroviolaceus</i> (<i>Phlegmacium</i> A)	

Cap with a violaceous tinge

20(2)	flesh blushes reddish when bruised	<i>cyanites</i>
20*	flesh and gills turn darker violaceous when bruised	21
20**	flesh and gills change but little when bruised	24
21	stipe clavate, cap argillaceous, occasionally with violet stains	22
21*	stipe with a bulb, cap darker brown with a purple tinge	23
22	tiny frb, sp. mostly >11 µm	<i>subporphyropus</i>
22*	middle-sized frb, sp. shorter	<i>porphyropus</i>
23(21)	in coniferous forest, bulb mostly marginate	<i>purpurascens</i>
23*	in broad-leaf forest, bulb rounded	<i>subpurpurascens</i>
24(20)	cap and stipe with copious veil remnants → <i>præstans</i> (<i>Phlegmacium</i> A)	
24*	veil sparse	25
25	stipe with a marginate bulb	40
25*	stipe clavate	26
26	cap centre young olivaceous → <i>prasinocyaneus</i>	88
26*	cap without olive tints	27
27	cap centre dark brown, with coniferous trees	<i>variecolor</i>
27*	cap centre pale blue to pale brown, with broad-leaf trees	28
28	cap and gills very pale violet to greyish	<i>daulnoyæ</i>
28*	cap and gills with a distinctly violet tinge	29
29	frb robust, cap often >70 mm	<i>largus</i>
29*	frb smaller	<i>eliæ</i>

>Stipe marginate bulbous

40(25)	cap saturated violet	45
40*	cap greyish violet to almost white	41
40**	cap dark red-brown with traces of violet	<i>ionodactylus</i>
40***	cap buff to incarnate	44
41	cap with dominating violaceous hue, fading to ochre or grey	42
41*	cap weakly violaceous, pale greyish to ochre	47
42	in <i>Picea</i> forest	<i>cæsiocanescens</i>
42*	in broad-leaf forest	43
43	odour strong, sweetish	<i>suaveolens</i>
43*	odour trivial or nil	<i>cærulescens</i>
44(40)	stipe intensely lilac, in coniferous forest	<i>dibaphus</i>
44*	stipe white with a lilac bulb-margin, in broad-leaf forest	<i>arcuatorum</i>
45(40)	stipe usually slender, alkaline reaction intensely red on cuticle	<i>sodagnitus</i>
45*	stipe robust, alkaline reaction trivial	46
46	sp. >9.5 µm	<i>eucæruleus</i>
46*	sp. shorter	<i>terpsichores</i>
47(41)	in broad-leaf forest → <i>amænolens</i> , <i>cærulescentium</i> , <i>nymphicolor</i>	4,15,17
47*	in coniferous forest	<i>cæsiocinctus</i>

Cap yellow/brownish/olive

50(2)	stipe with a distinctly marginate bulb	51
50*	stipe clavate or with a vaguely marginate bulb	80
51	cap with an olive tinge at least at margin	60
51*	cap without an olive tinge	52
52	cap red-brown to orange-brown, veil white to violaceous → <i>napus</i> , <i>rufoallutus</i> (<i>Phlegmacium</i> A)	
52*	cap yellowish, veil yellow-brown to olive yellow	53
53	cap brightly yellow, gills faintly violaceous, sp. subglobose.....	<i>cæsiocortinatus</i>
53*	cap pale yellow, gills usually distinctly violet, sp. different	60

>Stipe-bulb marginate

60(51)	cap glabrous to finely innate fibrillose	61
60*	cap fibrillose to radially striate	74
61	cap predominantly yellow	62
61*	cap greenish olivaceous	<i>ionochlorus</i>
61**	cap orange-brown to mahogany	<i>cæsiophylloides</i> , <i>cæsiolamellatus</i>
61***	cap grey-brown to olive brown	70
62	in coniferous forest	64
62*	in broad-leaf forest	63
63	cap pale yellow, veil white to brownish	<i>cisticola</i>
63*	cap and veil bright yellow	<i>calochrous</i>
64(62)	alkaline reaction red on cutis and bulb margin	65
64*	alkaline reaction trivial → <i>piceæ</i> (<i>Phlegmacium</i> A)	
65	gills and stipe whitish → <i>kristinae</i> (<i>Phlegmacium</i> A)	
65*	gills and stipe weakly violet, sp. up to 11.5 µm.....	<i>metarius</i>
65**	gills and stipe ± saturated violet, many sp. longer	<i>barbaricus</i>
70(61)	flesh when young predominantly violaceous	72
70*	flesh mainly pale or brownish	71
71	cap often slightly hygrophanous, veil greenish → <i>herpeticus</i> (<i>Phlegmacium</i>)	
71*	cap not hygrophanous, veil yellow to violaceous	<i>elotoides</i>
72(70)	in broad-leaf forest	73
72*	in coniferous forest → <i>pseudoarquatus</i>	86
73	cap not hygrophanous, alkaline reaction red on bulb margin	<i>luhmannii</i>
73*	cap hygrophanous, alkaline reaction trivial.....	<i>camptoros</i> , <i>viridocæruleus</i>
74(60)	alkaline reaction strongly red on cuticle.....	<i>aureopulverulentus</i>
74*	alkaline reaction weak	75
75	taste (and usually odour) distinct, farinaceous, sp. >9 µm	<i>dionysæ</i>
75*	taste trivial, sp. shorter.....	76
76	in broad-leaf woods	78
76*	in coniferous forest	77
77	cap predominantly orange-brown	<i>pansa</i>
77*	cap yellow-brown to olive-brown	<i>glaucopus</i>
78(76)	cap dark yellow-brown, gills distinctly violaceous.....	<i>magicus</i>
78*	cap paler, yellow-grey, gills almost greyish.....	<i>olidoamarus</i>

>Stipe-bulb not marginate

80(50)	stipe with white to pale-brown veil remnants	83
80*	stipe with yellow-brown to date-brown veil remnants	81
80**	stipe with violaceous or indistinct veil remnants	84
81	under <i>Betula</i> , gills fugaciously violet → <i>triumphans</i> (<i>Phlegmacium</i> A)	
81*	in broad-leaf forest, gills distinctly violet.....	<i>luteocingulatus</i>
83(80)	cap soon dry, stipe cylindrical to clavate.....	<i>patibilis</i>
83*	cap distinctly viscid, stipe usually tapering → <i>vulpinus</i> , <i>claricolor</i> var. <i>immissus</i> (<i>Phlegmacium</i> A)	
84(80)	cap warmly yellow-brown, flesh white to slightly violaceous.....	87
84*	cap differently coloured, flesh predominantly violaceous when young.....	85
85	veil and stipe-bulb violet on young frb, many sp. >12 µm	86

85*	veil yellow-brown to olive-brown, sp. shorter	<i>anomalochrascens</i>
86	in broad-leaf forest or with <i>Betula</i> , cap greyish to tan	<i>argenteolilacinus</i> var. <i>dovrensis</i>
86*	in coniferous forest, cap more vividly coloured, often orange	<i>pseudoarquatus</i>
87(84)	cap golden yellow-brown, stipe pure white	89
87*	cap darker, stipe often with violaceous tones	88
88	cap without olive tint, stipe faintly violaceous, in coniferous forest	<i>spadicellus</i>
88*	cap young ± olive brown, stipe strongly violaceous, in broad-leaf forest	<i>prasinocyanus</i>
89(87)	gills saturated violet, at least on edge	<i>varius</i>
89*	gills pale greyish, possibly with a violet tinge	<i>decolorans</i>

***Phlegmacium* C: Gills yellowish**

1	stipe with a marginate bulb	10
1*	stipe cylindrical to clavate	2
2	odour ± of banana or apple, in broad-leaf forest	<i>nanceiensis</i>
2*	odour strong, different, in calcareous <i>Picea</i> forest	3
3	odour pleasant of "lemon cake", veil olive brown	<i>percomis</i>
3*	odour of "boiled beets", veil soon purplish brown	<i>mussivus</i>

Stipe-bulb marginate

10(1)	cap-centre orange or red-brown to copper brown when mature	11
10*	cap-centre yellow, yellow-brown, greenish, or violet without a reddish tinge	20
11	odour of aniseed	<i>odorifer</i>
11*	odour different or nil	12
12	cap copper red when mature	13
12*	cap predominantly orange	14
13	in coniferous forest, alkaline reaction green at first, then red-brown	<i>orichalceus</i>
13*	in broad-leaf forest, alkaline reaction yellowish	<i>rufolivaceus</i>
14(12)	cap-margin orange-brown	<i>olearioides</i>
14*	cap-margin yellow to citrinous	15
15	in coniferous forest	<i>aureofulvus</i>
15*	in broad-leaf forest	16
16	cap and bulb-margin with a green shade	<i>prasinus</i>
16*	frb without green tints	17
17	flesh marbled violaceous, sp. <11 µm	<i>bergeronii</i>
17*	flesh usually devoid of violet tints, sp. longer	<i>elegantissimus</i>

>Cap without a reddish tinge

20(10)	flesh intensely yellow to greenish yellow	30
20*	flesh pale, white to greyish yellow, occasionally with a faint citrinous tone	21
21	odour and taste trivial	22
21*	odour and/or taste well-defined, distinct	23
22	in broad-leaf forest	<i>quercilicis</i>
22*	in coniferous forest	<i>elegantior</i>
23(21)	odour spicy, like incense or parsley, in coniferous forest	<i>sulfurinus</i>
23*	odour of "lemon-cake" or "grass", in broad-leaf forest	<i>majoranae</i>
23**	odour and/or taste farinaceous, in broad-leaf forest	<i>flavovirens</i>

>>Flesh yellow

30(20)	cap violaceous, at least at margin	<i>xanthophyllus</i>
30*	cap yellow to yellow-brown	36
30**	cap with a green tinge	32
32	cap yellowish green to olive, in <i>Quercus</i> or <i>Fagus</i> forest	33
32*	cap dark green, in coniferous forest	<i>atrovirens</i>
33	odour strong, sweetish	<i>odoratus</i>
33*	odour trivial or nil	34
34	gills olive yellow, cap dull olivaceous	35
34*	gills saturated brown, cap brighter, more yellow	<i>fulvocitrinus</i>
35	frb robust, cap often >80 mm, sp. >11 µm, under <i>Quercus</i>	<i>xanthochlorus</i>
35*	frb smaller, sp. shorter, under <i>Fagus</i>	<i>citrinus</i>
36(30)	alkaline reaction intensely red on cuticle	38

36*	alkaline reaction trivial	37
37	in <i>Picea</i> forest, frb usually robust, odour often strong, phlegmacioid	<i>meinhardii</i>
37*	in broad-leaf forest, frb slender, odour trivial	<i>splendens</i>
38(36)	stipe and flesh saturated yellow, usually in <i>Quercus</i> or <i>Corylus</i> forest	<i>majusculus</i>
38*	stipe and flesh paler yellow, under <i>Fagus</i>	<i>claroflavus</i>

Myxacium

1	taste bitter, at least in cuticle	2
1*	taste mild	10
2	stipe glutinous	3
2*	stipe tacky to weakly viscid	4
3	cap apricot yellow to apricot brown, flesh pale	<i>vibratilis</i>
3*	cap and flesh saturated yellow	<i>pluvius</i>
4(2)	cap with blue elements	<i>croceocæruleus</i>
4*	cap white or pale red-brown	5
4**	cap yellow-brown to darker brown	7
5	cap white frosty, later pale red-brown, only cuticle bitter	<i>galeobdolon</i>
5*	cap white, flesh bitter	<i>barbatus</i>
7(4)	flesh almost mild, hygrophanous → <i>microspermus</i> (<i>Telamonia</i> A)	
7*	flesh distinctly bitter, not or weakly hygrophanous	8
8	frb small, cap <30 mm, grey-brown to dark brown	<i>pluviorum</i>
8*	frb medium sized, cap differently coloured	9
9	cap lively orange-brown to yellow-orange, in coniferous forest	<i>duramarus</i>
9*	cap buff to greyish yellow, under deciduous trees	<i>emollitus</i>
9**	cap with olive tints → <i>subtortus</i> (<i>Phlegmacium</i> A)	

Taste mild

10(1)	cap with violaceous to blue elements → <i>salor</i> , <i>transiens</i> (<i>Delibuti</i>)	
10*	cap yellowish without blue → <i>delibutus</i> , <i>betulinus</i> (<i>Delibuti</i>), <i>ochraceobrunneus</i> (<i>Phlegmacium</i> A)	
10**	cap greenish → <i>atrovirens</i> (<i>Phlegmacium</i> C)	
10***	cap brownish without blue	30
30(10)	stipe clavate, odour of "freshly-cut grass" → <i>papulosus</i> (<i>Phlegmacium</i> A)	
30*	stipe ± cylindrical or tapering, odour none or different	31
31	stipe with thick, brownish girdles or meshes	<i>trivialis</i>
31*	stipe smooth or with thin bands	32
32	stipe at least partly with a violet tinge	33
32*	stipe entirely white to pale brown	40
33	cap orange to red-brown, odour trivial	34
33*	cap grey-brown, date brown, or olive brown, odour of honey in stipital context	35
34	in <i>Picea</i> forest	<i>collinitus</i>
34*	in alpine <i>Betula</i> forest → <i>fennoscandicus</i>	43
35(33)	in broad-leaf forest, stipe typically bisected violet/white	36
35*	in coniferous forest, stipe ± evenly violet-toned, sometimes faintly	<i>stillatitius</i>
36	frb small, cap grey-brown	<i>pumilus</i>
36*	frb robust, cap dark brown to olive brown	<i>elator</i>

>Stipe not violet

40(32)	cap grey-brown, stipital flesh with odour of honey	<i>mucifluus</i>
40*	cap brighter coloured or dark brown, odour trivial	41
41	cap orange to red-brown	42
41*	cap yellow-brown, often with an olive tinge	43
41**	cap dark brown	<i>alpinus</i>
42	in <i>Pinus</i> forest	<i>mucosus</i>
42*	in alpine <i>Betula</i> forest	<i>septentrionalis</i>
43(41)	cap not hygrophanous, in the lowlands	<i>grallipes</i>
43*	cap somewhat hygrophanous, in alpine <i>Betula</i> forest	<i>fennoscandicus</i>

***Telamonia* A: medium sized to large, non-hygrophaneous species**

1	stipe with a membranous collar → <i>caperatus</i> (<i>Phlegmacium</i> A)	
1*	veil remnants fibrillose or invisible on stipe	2
2	cap with a violet, blue or purplish brown tinge or with violaceous veil remnants	40
2*	cap without traces of violet or purple	3
3	cap with red veil remnants	4
3*	cap white, or pale with a grey, pink, or yellow tinge	10
3**	cap brownish, incl. yellow-brown	70
4	cap pale yellowish with abundant red fibrils or squamules → <i>bolaris</i> , <i>rubicundulus</i> (Key A), <i>spilomeus</i> (<i>Anomali</i>)	
4*	cap yellow-brown with sparse red remnants	100

Cap pale without violet

10(3)	cap silky white when young	11
10*	cap yellowish white to greyish yellow	30
11	gills with a violaceous tinge	12
11*	gills grey to brown	15
11**	gills white → <i>argutus</i> , <i>balteatoalbus</i> (<i>Phlegmacium</i> A)	
12	cap buff to pink when older, dry → <i>lucorum</i>	54
12*	cap grey-brown when older, often somewhat viscid → <i>borgsjæensis</i> (<i>Phlegmacium</i> A), <i>tabularis</i> (<i>Anomali</i>), <i>alboviolaceus</i>	51
15(11)	odour acidulous (like <i>C. traganus</i>)	16
15*	odour distinctive, different	<i>diosmus</i>
15**	odour trivial	20
16	gills cinnamon, occurring in summer	17
16*	gills yellow-brown, occurring in autumn	<i>traganus</i> f. <i>ochraceus</i>
17	with <i>Populus tremula</i> , sp. <9 µm	<i>niveoglobosus</i>
17*	with <i>Betula</i> , sp. longer	<i>niveotraganus</i>
20(15)	veil soon grey-brown → <i>canabarpa</i>	124
20*	veil at most flavescent	21
21	flesh white (occasionally marbled violet)	22
21*	flesh brownish (occasionally marbled violet)	23
22	stipe fusoid, in <i>Fagus</i> forest	<i>turgidus</i>
22*	stipe clavate, in <i>Betula</i> forest	<i>argenteopileatus</i>
23(21)	in coniferous forest	<i>suberi</i>
23*	in deciduous wood	24
24	stipe with a distinct bulb	<i>chevassutii</i>
24*	stipe clavate to cylindrical	25
25	with <i>Salix</i> or <i>Betula</i> , sp. typically <9 × 5.5 µm	<i>urbicus</i>
25*	in broad-leaf forest, sp. typically larger	<i>arvalis</i>
30(10)	gills yellow to brown, cap dry	31
30*	gills pale, cap often viscid → <i>tabularis</i> (<i>Anomali</i>), <i>argutus</i> (<i>Phlegmacium</i> A)	
31	gills brick-brown to reddish	32
31*	gills grey-brown to cinnamon	23
31**	gills yellowish	33
32	sp. very lean (<4.5 µm), veil flushing creamy or pale yellow	<i>alborufescens</i>
32*	sp. wider, veil immutably white	<i>mattiae</i>
33(31)	cap strongly fibrillose, stipe slender → <i>ochrophyllus</i>	96
33*	cap ± glabrous, stipe fusoid to clavate → <i>vespertinus</i> , <i>pinophilus</i> (Key A)	

Cap at least partly violaceous

40(2)	odour strong, often unpleasant	41
40*	odour nil or trivial	50
41	flesh with violaceous areas	42
41*	flesh brownish without violet	43
42	odour acetylene-like, stipe without a distinct collar	<i>camphoratus</i>
42*	odour acidulous (like <i>C. traganus</i>), stipe often with a collar → <i>agathosmus</i> (<i>Telamonia</i> B)	

43(41)	cap violet when young.....	<i>traganus</i>
43*	cap predominantly cinnamon, even when young.....	<i>calopus</i>
50(40)	stipe with distinct, white to grey veil remnants, sp. usually oblong.....	51
50*	stipe with yellowish, reddish to brownish or no veil remnants, sp. ± subglobose.....	60
51	cap shiny white to violet, often somewhat viscid, under <i>Betula</i>	<i>alboviolaceus</i>
51*	cap predominantly grey-brown, dry, host tree different.....	52
52	stipe often bulbous, gills crowded, under <i>Pinus</i>	<i>quarciticus</i>
52*	stipe clavate to equal, gills not conspicuously crowded, host tree different	53
53	cap grey-brown with a faint violaceous tinge, veil white.....	54
53*	cap dark brown to purplish brown, veil greyish.....	<i>franchii</i>
54	under <i>Populus tremula</i>	<i>lucorum</i>
54*	under <i>Betula</i> or conifers	55
55	cap dry, sp. <11 µm	56
55*	cap slightly viscid, sp. longer → <i>borgsjæensis</i> (<i>Phlegmacium</i> A)	
56	with <i>Picea</i> , sp. >8.5 µm.....	<i>malachius</i>
56*	with <i>Betula</i> or <i>Pinus</i> , sp. shorter → <i>simulatus</i> (<i>Anomali</i>)	
60(50)	flesh blushes when bruised → <i>cyanites</i> (<i>Phlegmacium</i> A)	
60*	flesh darkens to brownish black during development	76
60**	flesh neither blushes nor blackens → <i>Anomali</i>	

Cap brown

70(3)	stipe with distinct veil remnants.....	90
70*	stipe with hazy or no veil remnants	71
71	stipe slender	72
71*	stipe robust, clavate (base occasionally pointed).....	73
72	cap dark brown, occasionally with an olive tinge, in <i>Picea</i> forest	<i>valgus</i>
72*	cap pale brown to yellowish grey, in <i>Betula</i> forest → <i>tabularis</i> , <i>anomalus</i> (<i>Anomali</i>)	
73(71)	frb darkening during development.....	74
73*	frb not conspicuously dark when mature.....	78
74	in coniferous forest, sp. <8 µm	75
74*	in broad-leaf forest, sp. longer	77
75	frb and veil blacken (recalls <i>C. brunneus</i>).....	<i>ectypus</i>
75*	frb turns dark brown to grey, veil remains white	76
76	cap soon dark brown, not hygrophanous	<i>procax</i>
76*	cap red-brown, hygrophanous → <i>pseudorubricosus</i> (<i>Telamonia</i> B)	
77(74)	cap hazel brown with greyish-white fibrils	<i>aprinus</i>
77*	cap dark chocolate brown, ± glabrous	<i>sordescens</i>
78(73)	gills with a violaceous to purple tinge → <i>caninus</i> (<i>Anomali</i>)	
78*	gills without a violet tinge	79
79	cap fibrillose, grey-brown to pale red-brown.....	80
79*	cap ± glabrous, yellow-brown → <i>vespertinus</i> , <i>pinophilus</i> (Key A)	
80	sp. subglobose, <7 µm	<i>suillus</i>
80*	sp. differently shaped, longer → <i>crassus</i> , <i>russus</i> , <i>norrlandicus</i> (<i>Phlegmacium</i> A)	

>Veil distinct

90(70)	veil at least partly violaceous	91
90*	veil white	110
90**	veil differently coloured	93
91	gills ochraceous, odour distinct, acidulous → <i>calopus</i>	43
91*	gills saturated brown to red-brown, odour faint	98
93(90)	veil with a red tint	100
93*	veil yellow to yellow-brown	94
93**	veil olive brown.....	<i>raphanoides</i>
93***	veil with a different brown colour	120
94	odour distinct, acidulous, stipe with a membranous collar → <i>ionophyllus</i> (<i>Telamonia</i> B)	
94*	odour trivial, stipital veil fibrillose	95
95	cap and gills grey-brown to ochraceous, occasionally with an olive tinge	96
95*	cap mahogany brown to umber, gills violet → <i>lepidopus</i> (<i>Anomali</i>)	
96	gills ochraceous yellow, in <i>Picea</i> forest	<i>ochrophyllus</i>

96*	gills grey-brown, in <i>Pinus</i> forest	97
97	sp. <8 µm	<i>panellus</i>
97*	sp. longer.....	<i>fillionii</i>
98(91)	sp. up to 11 µm, context red-brown	<i>solis-occusus</i>
98*	sp. shorter, context paler	<i>solis-amicus</i>

>>Veil reddish

100(93)	flesh white to pale buff, occasionally with a rosy or violaceous tinge	101
100*	flesh yellow to brown.....	102
101	stipital veil as red to red-brown squamules or tufts → <i>spilomeus</i> (<i>Anomali</i>)	
101*	stipital veil as a carmine to fiery red, thin coating	<i>craticius</i>
102(100)	stipital veil as cinnabar girdles, under <i>Betula</i>	106
102*	stipital veil as orange to orange-red bands, under <i>Quercus</i> → <i>hinnuleoarmillatus</i> (<i>Telamonina</i> B)	
102**	stipital veil as pink to brownish-red ± distinct girdles, with conifers	103
103	sp. >8 µm, elliptical, cap ± smooth	105
103*	sp. shorter, subglobose, cap fibrillose	104
104	most sp. >5 µm wide, alkaline reaction brown on stipital veil.....	<i>paragaudis</i>
104*	sp. leaner, alkaline reaction lilac on stipital veil	<i>pinigaudis</i>
105(103)	young gills and context with a blue to purple shade	<i>subænochelis</i>
105*	gills and context grey or brown	<i>luteornatus</i>
106(102)	sp. >10 µm, veil colour distinct	<i>armillatus</i>
106*	sp. shorter , veil colour often diluted	<i>roseoarmillatus</i>

>>Veil white

110(90)	gills with a violaceous tinge	114
110*	gills cinnamon to grey-brown, possibly with a purple tinge	115
110**	gills brick red to pale brown	111
111	cap creamy-white when young → <i>alborufescens</i>	32
111*	with <i>Picea</i> , cap partly covered by white veil remnants when young	112
111**	with <i>Betula</i> , cap ± glabrous → <i>bivelus</i> (<i>Telamonina</i> B)	
112	cap predominantly brick-red, many sp. >8.5 µm	<i>laniger</i>
112*	cap greyish, possibly with a pink flush, sp. shorter → <i>mattiæ</i>	32
114(110)	cap centre yellow-ochraceous when mature, sp. <8.5 µm	<i>poppyzon</i>
114*	cap centre duller coloured, sp. longer → <i>malachius</i>	56
115(110)	sp. lean, mostly <4.5 µm, veil thin → <i>procax</i>	76
115*	sp. wider, veil fairly copious	116
116	cap young coated white, many sp. >7.5 µm, mostly with <i>Pinus</i> → <i>suberi</i>	23
116*	cap ± naked, sp. shorter, with <i>Picea</i>	<i>albogaudis</i>

>>Veil brown to brownish grey

120(93)	stipe with brownish squamules.....	121
120*	velar remnants different	122
121	cap covered by brownish squamules	<i>pholideus</i>
121*	cap glabrous or innate-fibrillose → <i>spilomeus</i> (<i>Anomali</i>)	
122(120)	veil vinaceous to red-brown	103
122*	veil brownish with an olive tinge → <i>raphanoides</i>	93
122**	veil brown without a trace of red or olive.....	123
123	veil dark brownish grey, sp. >10 µm, coarsely verrucose	<i>fuscoperonatus</i>
123*	veil pale at first, sp. mostly shorter, moderately to strongly verrucose	124
124	cap ± glabrous, often hygrophaneous, veil at first pale yellow-brown.....	<i>bovinus</i>
124*	cap shaggy, not hygrophaneous, veil at first greyish	<i>canabarba</i>

***Telamonina* B: medium sized, hygrophaneous species**

1	stipital context wholly or partly violet to brownish violaceous	2
1*	stipital context with a frankly yellow to rusty yellow or buff tinge.....	20
1**	stipital context brownish, grey, or white (without violet or yellow, but possibly blushing).....	25
2	stipital context predominantly violet (young specimens).....	3
2*	stipital context brownish with violaceous or purple areas.....	10

3	odour acidulous or spicy	5
3*	odour faint or raphanoid	4
4	stipe tapering, sp. mostly >9.5 µm long	<i>evernius</i>
4*	stipe cylindrical, sp. mostly shorter but >8.5 µm long	<i>cinnamoviola</i>
4**	stipe clavate, sp. shorter → <i>quarciticus</i> (<i>Telamonia</i> A), <i>carneinatus</i>	16
5(3)	odour ± like resin or <i>Fomitopsis pinicola</i> , cap and veil soon yellow-brown	<i>ionophyllus</i>
5*	odour acidulous (like <i>C. traganus</i>), cap and veil greyish violet	<i>agathosmus</i>

Flesh brownish with violaceous zones

10(2)	odour acidulous (± like ethyl acetate), under deciduous trees	<i>torvus</i>
10*	odour strongly of fermented fruit, in <i>Picea</i> forest → <i>agathosmus</i>	5
10**	odour trivial	11
11	frb merely weakly hygrophanous → <i>malachius</i> , etc. (<i>Telamonia</i> A)	
11*	frb distinctly hygrophanous	12
12	in coniferous forest	16
12*	under deciduous trees	13
13	under <i>Salix</i> , cap dark brown, stipe often with white veil remnants	14
13*	under <i>Betula</i> or <i>Quercus</i> (possibly <i>Picea</i>), cap paler, stipe ± glabrous	<i>cagei</i>
14	cap <50 mm, in alpine heaths, stipe white peronate	<i>subtorvus</i>
14*	cap often >50 mm, in the lowlands, stipe with white zones or bands	<i>saturninus</i>
16(12)	gills saturated red-brown	<i>tortuosus</i>
16*	gills violet	<i>carneinatus</i>
16**	gills purplish brown to cinnamon	17
17	stipe slender, cap drying greyish white → <i>cagei</i>	13
17*	stipe medium thick, cap drying yellow-brown	<i>biformis</i>

Flesh yellowish

20(1)	under deciduous trees, odour distinct, gills conspicuously distant	21
20*	in <i>Picea</i> forest, odour trivial, gills normally distant	22
21	stipe with yellow to orange-red veil remnants, odour acidulous or none	<i>hinnuleoarmillatus</i>
21*	stipe with white to brown veil remnants, odour distinct, different	23
22(20)	odour of "sour kitchen cloth", most sp. <9 µm	<i>hinnuleus</i>
22*	odour raphanoid, sp. longer	<i>roseonudipes</i>
23(21)	stipe without a trace of veil	<i>renidens</i>
22*	veil remnants white (possibly scant) → <i>microspermus</i> , <i>melleopallens</i>	61,74
22**	veil remnants yellow	24
23	frb weakly hygrophanous, stipe fairly robust → <i>limonius</i> (Key A)	
23*	frb frankly hygrophanous, stipe slender	<i>gentilis</i>

Flesh pale to brownish

25(1)	stipital context distinctly brown-tinted (young specimens)	26
25*	stipital context white, grey, or paler (often watery) brown	50
26	veil yellow → <i>fillionii</i> (<i>Telamonia</i> A), <i>gentilis</i>	23
26*	veil pink to vinaceous → <i>paragaudis</i> (<i>Telamonia</i> A)	
26**	veil different	27
27	veil grey-brown to olive brown, frb not darkening → <i>raphanoides</i> , <i>valgus</i> (<i>Telamonia</i> A)	
27*	veil white, grey, pale brown, or invisible, frb ± darkening	28
28	odour unpleasant (occasionally faint), gills conspicuously distant	<i>sordidus</i>
28*	odour trivial, gills normally distant	30

>Flesh frankly brown

30(28)	frb robust, stipe often >10 mm thick	31
30*	frb more slender, stipe leaner	40
31	cap red-brown to orange-brown	37
31*	cap of a different brown colour	32
32	cap umber, veil remnants darkening or very sparse	33
32*	cap grey-brown with a ± red-brown centre, veil remnants white	35
33	in <i>Picea</i> forest, stipe usually with dirty-white to ochraceous bands	34

33*	in <i>Pinus</i> forest, veil remnants sparse.....	<i>clarobrunneus</i>
34	cap and gills often with a purple or violet tinge.....	<i>cæsiobrunneus</i>
34*	cap and gills brownish without purple.....	<i>brunneus</i>
35(32)	frb weakly hygrophanous, sp. <9 µm → <i>albogaudis</i> , <i>suberi</i> (<i>Telamonia</i> A)	
35*	frb distinctly hygrophanous, sp. longer.....	36
36	in deciduous forest, veil rather sparse.....	<i>disjungendus</i>
36*	in coniferous forest, veil copious.....	<i>fuscobovinus</i>
37(31)	in broad-leaf forest.....	<i>semudaphilus</i>
37*	with <i>Pinus</i>	38
37**	with <i>Picea</i>	<i>sordidemaculatus</i>
38	cap saturated red-brown to orange-brown, many sp. >4.5 µm wide.....	<i>neofurvolæsus</i>
38*	cap dark red-brown to umber, sp. leaner.....	<i>pseudorubricosus</i>
40(30)	cap < 40 mm, stipe with white girdles.....	<i>flos-paludis</i>
40*	cap often larger, veil sparse.....	41
41	frb grey-brown to olive yellow, strongly blackening.....	44
41*	frb red-brown to umber, somewhat darkening.....	42
41**	frb incarnate brown, blushing → <i>erubescens</i>	70
42	gills umber.....	<i>glandicolor</i>
42*	gills paler, grey-brown.....	43
43	in <i>Picea</i> forest, sp. lean, <4 µm.....	<i>depressus</i>
43*	in <i>Quercus</i> or <i>Corylus</i> forest, sp. wider.....	<i>nolanæformis</i>
44(41)	in <i>Picea</i> forest, cap and stipe dark brown, often with a green tinge.....	<i>uraceus</i>
44*	in <i>Quercus</i> or <i>Corylus</i> forest, cap and stipe olive yellow-brown.....	<i>rigidipes</i>

>Flesh white to pale brown

50(25)	stipe tenacious, fusoid, often radicans, glabrous.....	51
50*	stipe not conspicuously tenacious, not radicans, often fibrillose.....	54
51	in coniferous forest.....	53
51*	under deciduous trees.....	52
52	taste mild, gills thick, waxy, often anastomosed.....	<i>acetosus</i>
52*	taste somewhat bitter, gills not conspicuously thick.....	<i>damascenus</i>
53(51)	cap ochraceous, usually pale.....	<i>duracinus</i>
53*	cap chocolate brown.....	<i>dolabratus</i>
54(50)	cap distinctly hygrophanous.....	60
54*	cap weakly hygrophanous → <i>suillus</i> (<i>Telamonia</i> A), <i>bivelus</i> , <i>subferrugineus</i>	73,82

>>Stipe not radicans

60(54)	stipital context white without brown elements.....	61
60*	stipital context dirty brown to white, flushing or marbled brown or red.....	63
61	cap dry, sp. >6 µm long.....	62
61*	cap weakly viscid to waxy, sp. shorter.....	<i>microspermus</i>
62	cap apricot yellow to red-brown, frb medium sized.....	<i>armeniacus</i>
62*	cap date brown, frb medium sized.....	<i>cæsiarmeniacus</i>
62**	cap pale greyish yellow, frb slender → <i>poppyzon</i> f. (<i>Telamonia</i> A)	
63(60)	cap conspicuously saturated red-brown to brick.....	64
63*	cap grey-brown, yellow-brown, or tan.....	70
64	stipe ± red-brown, under <i>Betula</i>	65
64*	stipe paler, in coniferous forest.....	66
65	cap fibrillose, often weakly hygrophanous, sp. subglobose.....	<i>balaustinus</i>
65*	cap ± smooth, strongly hygrophanous, sp. oblong.....	<i>subbalaustinus</i>
66(64)	gills saturated red-brown to brick.....	<i>testaceofolius</i>
66*	gills cinnamon.....	67
67	stipe often robust, bulbous, sp. elliptic.....	69
67*	stipe fairly slender, sp. subglobose.....	68
68	cap-margin brownish pink, stipe with often hazy, vinaceous bands.....	<i>badiovinaceus</i>
68*	cap-margin white, stipe dirty white to pale brown.....	<i>illuminus</i>
69(67)	in <i>Picea</i> forest, sp. >9 µm.....	<i>bulbosus</i>
69*	in <i>Pinus</i> forest, sp. shorter → <i>neofurvolæsus</i>	37

70(63)	stipe with distinct reddish veil remnants	90
70*	stipe with distinct brown to blackish veil remnants	95
70**	stipe blushing red or vinaceous, with sparse veil remnants	<i>erubescens</i>
70***	stipe without a red tinge, veil remnants white or absent	71
71	cap honey yellow, ochraceous, or orange-brown	72
71*	cap dull brown or grey-brown	80
72	in <i>Betula</i> forest	73
72*	in coniferous forest	74
73	cap and gills orange-brown to ochraceous, most sp. >8.5 µm	<i>bivelus</i>
73*	cap and gills pale ochraceous, sp. shorter	<i>biveloides</i>
74(72)	cap and gills greyish yellow, possibly with an olive tinge	<i>melleopallens</i>
74*	cap and gills warmly yellow-brown	75
75	frb medium sized, cap often >40 mm, uniformly coloured, with <i>Picea</i>	77
75*	frb smaller, cap soon pale reddish to umber on disk, with <i>Pinus</i>	76
76	cap centre conspicuously dark umber, sp. >8 µm	<i>redactus</i>
76*	cap centre paler, sp. shorter	<i>melitosarx</i>
77(75)	cap yellow to brownish yellow	<i>triformis</i>
77*	cap orange brown to brick brown	<i>castaneopallens</i>
80(71)	odour of <i>Viola</i> , frb slender	<i>ionosmus</i>
80*	odour of aniseed, frb medium sized	<i>anisatus</i>
80**	odour trivial, frb medium sized	81
81	sp. subglobose, frb without violet	85
81*	sp. obtusely elliptic, stipital apex often violaceous → <i>biformis</i>	17
81**	sp. oblong, frb without violet	82
82	in <i>Picea</i> forest, frb strongly hygrophanous	83
82*	in broad-leaf forest, frb weakly hygrophanous	<i>subferrugineus</i>
83	sp. up to 9.5 µm	<i>privignus</i>
83*	many sp. longer	84
84	cap dark brown to umber, sp. finely verrucose → <i>fuscobovinus</i>	36
84*	cap yellow-brown to grey-brown, sp. rather coarsely verrucose	<i>oulankaënsis</i>
85(81)	cap grey to pale grey-brown	<i>privignatus</i>
85*	cap ± red-brown → <i>illuminus</i>	68

>>Veil reddish or brown

90(70)	veil fiery or carmine red	91
90*	veil red-brown to vinaceous	92
91	in broad-leaf forest, distinctly hygrophanous	<i>bulliardii</i>
91*	with <i>Betula</i> or <i>Populus</i> , weakly hygrophanous → <i>craticius</i> (<i>Telamonia</i> A)	
92(90)	veil ochraceous, later reddish, under <i>Betula</i>	<i>heterocyclus</i>
92*	veil ± immutable, in coniferous forest	93
93	veil vinaceous, sp. subglobose → <i>badiovinaceus</i>	68
93*	veil red to brownish red, sp. oblong	<i>fulvescens</i>
95(70)	frb weakly hygrophanous → <i>bovinus</i> , <i>fuscoperonatus</i> (<i>Telamonia</i> A)	
95*	frb frankly hygrophanous	<i>fuscovelatus</i>

Telamonia C: small species

1	stipe with distinct yellow, red, or brown veil remnants	2
1*	stipe with distinct white to grey (occasionally faintly violaceous) veil remnants	30
1**	stipe with sparse or no veil remnants	50
2	frb distinctly hygrophanous	3
2*	frb weakly or not hygrophanous → <i>anomalellus</i> (<i>Anomali</i>), <i>Dermocybe</i>	

Veil coloured

3	veil red or red-brown to vinaceous (mature frb)	6
3*	veil orange to reddish orange	4
3**	veil yellow to yellow-brown	20
4	cap purplish brown to umber, under <i>Quercus</i>	<i>anthracinus</i>
4*	cap ochraceous, in coniferous forest	5

4**	cap yellow-brown, under <i>Betula</i> → <i>saniosus</i>	21
4***	cap red-brown to date brown, in coniferous forest	<i>aurantiomarginatus</i>
5	alkaline reaction lilac on stipital veil, most sp. >4.5 µm wide	<i>aureovelatus</i>
5*	alkaline reaction trivial, sp. leaner	<i>colus</i>
6(3)	frb entirely cinnabar red	<i>cinnabarinus</i>
6*	frb ± brownish	7
7(5)	veil of a different colour at first	8
7*	veil ± immutable	10
8	cap pale red-brown, stipe with white, later red fibrils	<i>miraculosus</i>
8*	cap darker, stipe with brownish, later red girdles → <i>heterocyclus</i> (<i>Telamonia</i> B), <i>coleoptera</i> ...	67
10(7)	sp. subglobose	<i>depauperatus</i>
10*	sp. elliptic → <i>fulvescens</i> , <i>fillionii</i> (<i>Telamonia</i> B)	

>Veil yellowish

20(3)	cap brightly yellow-brown to orange, veil yellow	21
20*	cap grey-brown to umber, veil darker	24
21	in coniferous forest, stipe with yellow girdles	22
21*	under deciduous trees, stipe with yellow to orange fibrils or girdles	<i>saniosus</i>
22	cap <40 mm, stipe pale yellow	23
22*	cap often larger, stipe dark yellow to brown → <i>gentilis</i> (<i>Telamonia</i> B)	
23	stipital veil greyish yellow to pink	<i>bayeri</i>
23*	stipital veil saturated yellow	<i>detonsus</i>
24(20)	cap squamulose	25
24*	cap fibrillose to glabrous	26
25	in <i>Alnus</i> swamp	<i>helvelloides</i>
25*	in coniferous forest	<i>angelesianus</i>
25**	with broad-leaf trees, in woods or parks	<i>psammocephalus</i>
26(24)	under <i>Alnus</i>	27
26*	under broad-leaf trees or <i>Salix</i>	<i>helobius</i>
26**	in coniferous forest	28
27	sp. <9 µm	<i>bavaricus</i>
27*	sp. longer	<i>badiovestitus</i>
28(26)	with <i>Picea</i> , most sp. >4 µm wide	<i>fusisporus</i>
28*	with <i>Pinus</i> , sp. leaner → <i>lux-nymphæ</i>	38

Veil white

30(1)	cap with white squamules	31
30*	cap with sparse or no veil remnants	37
31	odour of <i>Pelargonium</i>	32
31*	odour trivial	35
32	in coniferous forest, cap often dark brown to purple brown	33
32*	in broad-leaf forest, cap brighter	<i>diasemospermus</i>
33	with <i>Picea</i> or <i>Pinus</i> (rarely <i>Betula</i>), most sp. <9 µm	34
33*	with <i>Pinus</i> , sp. longer	<i>violilamellatus</i>
34	frb small, cap mostly <40 mm, young cap wholly squamulose	<i>flexipes</i>
34*	cap often larger, young cap squamulose near margin	<i>flabellus</i>
35(31)	under <i>Betula</i>	<i>hemitrichus</i>
35*	in coniferous forest	36
36	sp. subglobose	39
36*	sp. elliptic	<i>pilatii</i>
37(30)	cap violet → <i>bibulus</i>	51
37*	cap red-brown to yellow-brown	38
37**	cap grey-brown to dark brown	40
38	odour usually strong of leather	<i>parvannulatus</i>
38*	odour (often faint), different	57
38**	odour trivial or nil	<i>lux-nymphæ</i>
39(36)	sp. >6 µm in diameter	<i>comptulus</i>
39*	sp. smaller → <i>trossingenensis</i>	66
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Veil sparse

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>Cap dark brown

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>>Stipe with a violaceous tinge

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1. Subgenus *Cortinarius*

This subgenus is conceived in the traditional sense as composed by taxa around the type of the genus, *C. violaceus*, characterised by a dark, violaceous, tomentose fruitbody, and conspicuous cystidia in the hymenium. [Most of the species form a monophyletic group, section *Cortinarius*. Four of them are known in the Northern Hemisphere, and about nine have been described from the South Pacific (see HARR1, HARR2).]

C. violaceus (L. :Fr.) Gray

Cap 50-90 mm, not hygrophanous; dark blue-violet; finely tomentose to granulate from dense, soft, minute tufts; rounded, often obtusely, later convex, margin long involute.

Gills violaceous-black; fairly distant; edge dark red-violet.

Stipe clavate or bulbous; violet to greyish violet, young zoned blackish lilac, later greyish pink with black fibrils.

Veil blackish violet, copious; cortina violet.

Flesh violet, marbled black, in cap greyish violet, somewhat blushing after cut (10'); odour leathery.

Reactions: NaOH brick-red throughout; guayac intensely blue-green; phenol, lugol trivial.

Spores: 10.5-13 × 6.5-7.5 µm, elliptic, coarsely verrucose; cheilo- and pleurocystidia lance-shaped, protruding 30-50 µm.

Under *Betula* or *Populus tremula*, uncommon.

Ref.: MAR7, BRA3, BON, FLO.

This curiously beautiful species is almost unique within the genus by being dark violet everywhere, including flesh and gills, and from its peculiar cystidia. Under a lens the cap colour shows up as a combination of blackish-violet tufts against a reddish-lilac background. The reddish-lilac colour also sometimes shines through on old specimens. The smell evokes leather or cedar wood ("pencils").

C. hercynicus (Pers.) Moser is macroscopically identical, but possesses wider spores (7.5-9.5 µm) and grows in *Picea* forests. It has sometimes been considered a subspecies of *C. violaceus* (see DÄH, FLO). Cf. *C. camphoratus* (*Telamonia*), and *C. cyanites* (*Phlegmacium*).

2. Subgenus *Dermocybe* (Fr.) Trog

Fruit-bodies are smallish, dry, fibrillose, non-hygrophanous. The stipe is slender and more or less cylindrical. The veil is coloured but never violaceous, and blue hues occur nowhere on the fruitbody. Taste and smell are insignificant. Gills, as well as cuticle, almost always react red with alkaline solutions. These fungi are considered important for the growth of young trees, and one will consequently often find them in spruce plantations, preferably on mossy or swampy soil.

Grouping is based on gill colour. This is usually distinct and characteristic, never frankly brown, grey or violaceous on young specimens. We speak here about the colour of the *gill surface*, not the edge which is often differently coloured. Observing the young fungus from below, one is therefore easily confused, and it is advisable to always cut it axially for correct determination.

[The subgenus, as circumscribed here, includes all species from the Northern Hemisphere, and has been shown to be monophyletic (HØI8, PEI5, CHA1). It is characterised mainly by predominantly primitive, anthraquinonic pigments (HØI). In the South Pacific region (KS44, KS-NZ, GAS6) a number of dermocyboid taxa are viscid and/or hygrophanous; these form sister groups to sect. *Dermocybe*.]

GROUP 1: GILLS ORANGE

(sect. *Dermocybe* pp)

If the gills are yellow to brownish yellow or brick red, see subsequent groups.

C. cinnamomeus (L.: Fr.) Fr.

Cap 20-50 mm; yellow-brown to date brown with a yellow margin; matt, innately fibrillose; rounded, later convex to plane.

Gills pure orange.

Stipe golden with brownish fibrils, somewhat zoned; base brownish yellow.

Veil yellow-brown; cortina pale yellow.

Flesh yellow, greyish yellow in cap.

Reactions: NaOH vinaceous on gills and cap; formalin, AgNO₃ nil.

Spores: 6.5-8 × 3.5-5 µm, elliptic, moderately verrucose.

In *Picea* forests, but also with *Pinus*; fairly common.

Ref.: HOL, HØI, FLO, DÄH.

Found in most types of coniferous forests. Exceptionally one encounters a robust form (cap up to 100 mm), with beautifully golden hues and a red-brown veil (var. *conformis* Fr.; Hammerdal). Another form with an olive tinge on the cap occurs in calcareous pine forests.

C. sommerfeltii Høiland

Cap 20-50 mm; date brown to umber, matt with thin fibres or tiny squamules; often with faint concentric zones; broadly umbonate.

Gills orange-brown, soon golden-brown; edge sometimes yellow.

Stipe brownish yellow, zoned reddish brown.

Veil orange-brown, cortina citrinous to greyish yellow.

Flesh yellow-brown, orange near stipe cortex.

Reactions: NaOH red on gills, black on cap; formalin nil.

Spores: 6-7 × 4-5 µm, elliptic, moderately verrucose.

In moist, usually young *Picea* forests; uncommon.

Ref.: HØI, KS3, FLO, and cf. *C. cinnamomeobadius* in PHI, DÄH.

Differs from the preceding species mainly by the dark cap, whose concentric pattern sometimes evokes the year-rings in a tree trunk. The fungus can be quite robust with a cap up to 80 mm. The gills often exhibit a brown tinge, which lends to confusion with *Telamonia*. [The species is identical to *C. cinnamomeobadius* Henry s. Moser]

***C. malicorius* Fr.**

Cap 25-60 mm; dark yellow-brown, young orange-brown, with persistent orange fibrils and an orange margin; obtusely conical, later convex to plane.

Gills bright orange, sometimes reddish orange; edge yellow.

Stipe cylindrical, yellow with orange to brownish fibrils.

Veil dark yellow to orange, fairly sparse; cortina citrinous.

Flesh yellow to olive-grey with a greenish tinge in centre, darkening to grey in stipe-base; odour raphanoid.

Reactions: NaOH blood red on gills and stipital veil, blackish red on cap, red-brown in context; guayac greyish green; acid FeCl₃ greyish black.

Spores: 5-7 × 3.5-4.5 µm, obtusely elliptic, moderately verrucose.

In *Picea* forests; uncommon.

Ref.: HØI, MAR7, HOL, LAN, FLO.

Differs from *C. cinnamomeus* (above) by the orange cap margin and greenish zones in the context, which may be indistinct, however. The species is easily confused with *C. fervidus*, which has brick-red gills and larger spores. In fact, the small spore-size is the best differentiating character of *C. malicorius*.

GROUP 2: GILLS YELLOW, with CONIFERS**(sect. *Dermocybe* pp)**

The gills can occasionally be mustard, but hardly olive-tinted. If they exhibit a red or green component, or if the fungus grows in a deciduous wood, see subsequent groups.

***C. croceus* (Schaeff.) Gray**

Cap 20-50 mm; brownish yellow, sometimes with an olive tinge, centre often reddish brown; densely covered by adpressed fibrils and tufts; young margin yellow to citrinous; obtusely conical, later convex to plane.

Gills yellow to brownish yellow; edge paler with an olive tinge.

Stipe pale to olive-yellow, fibrous or zoned yellow-brown, base brown.

Veil yellow-brown to purple-brown, rather copious; cortina citrinous.

Flesh golden to citrinous, paler in cap, saturated yellow in stipe-base; faint odour of radish.

Reactions: NaOH blood red on gills and stipital veil, red-brown on cap; acid FeCl₃ dark green.

Spores: 7-9 × 4.5-6 µm, obtusely elliptic, moderately verrucose.

In acid, poor, coniferous and deciduous forests; common.

Ref.: HØI, MAR7, LAN, HEN1, FLO.

This commonest of *Dermocybe* is highly variable, in particular as regards the cap colour. The gills often look mustard-yellow when observed from below. In one form [*C. fucatophyllus* (Lasch) Fr.] these acquire small reddish spots.

C. norvegicus Høiland, sometimes regarded as a subspecies, grows in alpine *Betula* forests. This has warmer red-brown to date brown colours (see FLO; Rönäs, Hamrafjäll). — Likewise with *Betula* grows the rare *C. sylvæ-norvegicæ* Høiland, which is paler and more robust (see HØI5).

C. aureifolius Peck is a very rare species growing in sandy *Pinus* forests (see JAC3, JEC2A). It differs from *C. croceus* by its by its orange-coloured veil, as well as by the long, lean, smooth spores (10-13 × 2.5-3.5 µm), very unusual in *Cortinarius*. [Phylogenetic analysis has shown that the taxon is positioned outside *Dermocybe*.]

***C. croceoconus* Fr.**

Cap 10-40 mm; yellow-brown to red-brown, more orange towards the margin; obtusely conical, later bonnet-shaped with an acute umbo; coarsely innate-fibrillose to minutely scaly.

Gills citrinous to yellow, sometimes mustard-yellow with a pale-yellow edge.

Stipe slender, often tall; yellow, zoned brownish red to lilac or with reddish fibrils, apex citrinous, sometimes darkening olive-brown from base.

Veil red-brown to red; cortina pale yellow.

Flesh golden to saffron yellow, sometimes with an olive tinge; odour reminiscent of "hospital".

Reactions: NaOH red on gills, brownish red on cap.

Spores: $8-10 \times 4.5-6 \mu\text{m}$, elliptic to subamygdaloid, moderately verrucose.

In poor *Picea* forests, often in *Sphagnum*; uncommon. Åtorp, Arvselen, Gesunda, Björnrike, Hamrafjäll.

Ref.: HØI, SVL2, FLO.

Differs from *C. croceus* (above) mainly by its red-brown tinge — especially the reddish stipital girdles — but also by its pointed cap.

C. bataillei (Favre ex. Moser) Høiland

Cap 15-50 mm; saturated yellow-brown, \pm covered by brown to purple-brown fibrils or squamules on a yellow background, sometimes darker, almost date brown; margin slightly paler; obtusely conical, later convex with an obtuse umbo.

Gills mustard to saffron yellow, sometimes rather dark; edge often paler.

Stipe bright to saffron yellow; thinly fibrillose or sparsely zoned grey-brown to red-brown; base usually bright red-orange up to 1/3 of length.

Veil grey-brown to wine-brown, fairly copious; cortina pale yellow to white.

Flesh sulphur yellow, sometimes darker butter yellow, orange-yellow towards the stipe-base; odour faintly of "hospital".

Reactions: NaOH red on gills, red-brown to black on cap, blood red on orange part of stipe; acid FeCl_3 greenish black.

Spores: $8-9.5 \times 5-6 \mu\text{m}$, elliptic, moderately verrucose.

In *Pinus* forests, also with *Picea* and in alpine *Betula* habitat; fairly common, more common in the North.

Ref.: HØI, FLO.

The fungus resembles *C. croceus* above, but is usually more fibrous and has a characteristic, beautifully red flush at the stipital base. One form is darker and more squamulose with an umber cap and a trifle larger spores.

GROUP 3: GILLS YELLOW, under *SALIX*

(sect. *Dermocybe* pp)

If the fungus grows with *Betula*, cf. notes in the preceding group.

C. cinnamomeoluteus Orton

Cap 10-40 mm; yellow, sometimes with an olive tinge; young with darker olive-brown fibrils; conical, later campanulate with a tiny pointed umbo.

Gills greyish yellow to weakly citrinous.

Stipe slender, often tall; golden-yellow, apex citrinous.

Veil brown-yellow to red-brown, sparse; cortina yellow.

Flesh golden-yellow at the centre, elsewhere citrinous.

Reactions: NaOH red-brown on gills, blood red on cap and on stipital veil.

Spores: $8-9.5 \times 5-6 \mu\text{m}$, elliptic, moderately verrucose.

Near *Salix*, uncommon. Kråkeboberget, Rude, Hellasgården, Vinäsgraven, Långå Skans.

Ref.: FLO, BON, and *D. saligna* in MAR7.

This species is best recognised by its yellowish colours throughout, though the cap may be darker, more yellow-brown.

***C. uliginosus* Berk.**

Cap 20-60 mm; red to brick-red, when undeveloped more wine-red, with thin, reddish fibrils, later orange-brown with adpressed tufts and squamules; margin densely fibrillose; \pm rounded with an acute umbo, later campanulate.

Gills honey-yellow to dark yellow, sometimes with a grey tinge.

Stipe pale yellow, young coated red, later with red fibrils turning brown \pm forming zigzag bands; base red-brown; apex pale yellow.

Veil red, brick-red to wine-red, fairly sparse; cortina yellow.

Flesh bright yellow, paler in cap; taste and odour faintly raphanoid.

Reactions: NaOH blood red everywhere, sometimes more blackish brown on cap.

Spores: 8-10 \times 5-6 μ m, elliptic, weakly to moderately verrucose.

Near *Salix*, rarely with *Alnus*, often in moist areas; uncommon.

Ref.: HØI, PHI, LAN, FLO, BREI5.

A handsome fungus when young with characteristic yellow and red colours. It may recall one of the brightly flushed species in subgenus *Orellani* and related groups, especially as the cap exceptionally becomes quite large (up to 90 mm). It also exists a form (*luteus*) with a more or less yellow cap.

GROUP 4: GILLS OLIVE-coloured**(sect. *Dermocybe* pp)**

Members of this group are very similar, and the host tree provides the best clue for separation.

***C. tubarius* Ammirati & A.H. Sm.**

Cap 20-50 mm; pale olive-brown, later darker yellow-brown; margin more olive-yellow; fibrillose to minutely scaly; rounded with an acute umbo, later obtusely umbonate.

Gills yellowish green to olive-yellow.

Stipe yellow with an olive tinge, later grey-brown, zoned brown; fibrillose

Veil olive-yellow to grey-brown; cortina pale yellow.

Flesh olive-yellow to greenish.

Reactions: NaOH dark brown to black on gills; formalin, AgNO₃ trivial.

Spores: 8-10 \times 5-6 μ m, oblong elliptic to amygdaloid, moderately verrucose; basidia hyaline.

Under *Betula* in swampy grounds among *Sphagnum* (with *Betula nana* in alpine heaths); fairly common.

Ref.: FLO, and *C. sphagneti* in HØI, BON; *D. sphagnogena* in MAR7.

A characteristic species with *Betula* near swamp borders. It is somewhat brighter coloured than the following species. [*C. sphagneti* Orton, is a synonym.]

***C. chrysolitus* Kauffm.**

Cap 20-50 mm; umber to dark grey-brown, margin faintly greenish; minutely scaly; rounded, later convex with an acute umbo to \pm plane.

Gills dark greyish green.

Stipe greyish yellow with a green tinge, distantly zoned grey-brown with a green base, fibrous.

Veil grey-brown; cortina citrinous.

Flesh dark greyish green.

Reactions: NaOH red-brown on gills.

Spores: 6-8 \times 4.5-5 μ m, elliptic to cylindrical, moderately verrucose; basidia with yellow contents.

With *Pinus* in poor, swampy grounds among *Sphagnum*; uncommon. Njupesjär, Selja, Bonäsheden, Harsa, Sörviken.

Ref.: FLO; *C. huronensis* in BREI5, and *C. palustris* in HØI, DÄH, MAR7, MOS12, BON.

A fungus with a sombre aspect, almost exclusively growing in pine swamps. It is difficult to separate from *C. tubarius* (above), but is slightly darker, the gill reaction is reddish, and the basidia contain a yellowish pigment. [Molecular evidence indicates that *C. huronensis* Ammirati & A.H. Sm. in a segregate species. The commonly used synonym *C. palustris* Moser is invalid.]

C. olivaceofuscus Kühner

Cap 20-45 mm; olive-brown with a darker centre; finely innately fibrillose; margin olive-yellow; conical, later campanulate to expanded with a narrow umbo.

Gills olive-yellow to olive-brown.

Stipe greyish to olive-yellow with grey-brown fibrils; young with grey-brown tufts.

Veil grey-brown, sparse; cortina greyish green.

Flesh pale greyish green to greenish buff; taste a trifle acerbic.

Reactions: NaOH dark red on gills and on cap; guayac weak; phenol nil.

Spores: 6.5-7.5 × 4.5-5.5 µm, elliptic, moderately verrucose.

In calcareous broad-leaf forests; rare. Anga, Halla, Vickelby, Hammersta, Hellasgården.

Ref.: BON, HØI, KUH, MAR7, DAH, FLO.

A dully coloured *Dermocybe*, mainly growing in oak and beech forests but also reported from calcareous *Picea* habitat. It is slightly more robust than the other species in the group. [The species belongs to the predominantly southern section *Pauperæ*.]

Cf. *C. venetus* and other olive-coloured species in Ch. 3, as well as *C. raphanoides* (*Telamonia*).

GROUP 5: GILLS RED, CAP BROWNISH

(sect. *Sanguinei* pp)

The gill surface is brownish red to saturated dark red. If the cap has a predominantly red to purple hue, see the next group.

C. semisanguineus (Fr.:Fr.) Gill.

Cap 20-60 mm; yellow-brown, sometimes with a faint olive tinge; matt, thinly fibrous; rounded, later convex to plane.

Gills dark red to purple-red, long remaining so.

Stipe pale yellow with brown fibrils, often zoned brown, base rosy, apex almost white.

Veil yellow-brown; cortina greyish yellow.

Flesh yellowish white to greyish yellow, grey-brown in stipe-base; odour faint of radish.

Reactions: NaOH black on cutis; formalin, AgNO₃, FeSO₄ trivial; acid FeCl₃ greyish black.

Spores: 5-7.5 × 3.5-4.5 µm, elliptic, moderately verrucose.

In poor *Picea* and *Pinus* forests; common.

Ref.: HØI, DÄH, MAR7, HOL, FLO.

The fungus is hardly remarkable when seen from above, but turning it over one is struck by the elegantly deep-red gills. The combination makes it hard to confuse the species with others. In the north it is one of the most common *Cortinarius*, popular for dyeing wool.

C. fervidus Orton

Cap 20-60 mm; brownish orange, later copper-red with a conspicuous, orange margin; finely fibrillose; obtusely rounded, later convex, sometimes with an umbo.

Gills dark brick-red; edge often yellowish.

Stipe golden-yellow, apex paler, base orange-brown to intensely copper-red; fibrillose and flushed reddish brown.

Veil orange-brown to reddish, sparse; cortina pale yellow; mycelium reddish.

Flesh greyish yellow to olive-brown, orange near cuticle.

Reactions: NaOH blood red on gills, black on cutis; acid FeCl₃ black.

Spores: 6-7.5 × 4.5-5 µm, elliptic, moderately verrucose.

In calcareous *Picea* forests; fairly common.

Ref.: HØI, KS3, FLO.

A spectacular and intriguing species, mainly recognised by the beautifully golden-yellow stipe and the saturated brick-red gills. Notice that these look orange-tinted when seen from below, so the fungus is often confused with *C. malicorius*. The cap can become quite robust (up to 90 mm).

GROUP 6: GILLS RED, CAP with a RED or PURPLE tinge (sect. *Sanguinei* pp)***C. sanguineus*** (Wulf.: Fr.) Fr.

Cap 10-30 mm; saturated dark red to brown-red; covered by tiny squamules and tufts; obtusely conical, later convex.

Gills dark red.

Stipe blood red, more yellowish red towards base; zoned with a silky sheen.

Veil blood red; cortina brick-red.

Flesh red to pink or rosy, darker in stipe; dripping from a red juice.

Reactions: NaOH blackish red in cap flesh, blood red on stipe-base; acid FeCl₃ black.

Spores: 6.5-7.5 × 4-5 µm, elliptic, moderately to rather weakly verrucose.

In acidic *Picea* forests; fairly common.

Ref.: HØI, MAR7, BON, FLO.

This beautiful little fungus is deep red throughout and always incites attention. It is very popular for dyeing wool.

C. puniceus Orton [Plate 1], found in calcareous *Quercus* and *Tilia* forests, is quite similar and differs by a dark-brown cap and a greyish context with violet marbling (see ORT4, KIA10; Vickelby).

C. phaeniceus (Bull. ex Vent.) Maire

Cap 30-80 mm; red-brown to orange-red with a copper tinge; smooth, finely felty to squamulose; rounded, later convex.

Gills saturated dark red to purplish red, edge stronger red.

Stipe fairly robust; pale greyish yellow, coated or zoned purplish red on lower half, young sometimes with a thin collar; apex greyish.

Veil red to purplish red, fairly copious; cortina greyish yellow.

Flesh greyish yellow, pink near cutis, yellow-brown in stipe-base.

Reactions: NaOH blackish on cutis and stipital veil, blood red on gills; phenol reddish violet; formalin, guayac nil.

Spores: 6-7 × 3.5-4.5 µm, elliptic to subamygdaloid, weakly to moderately verrucose.

In *Picea* and mixed forests, also with *Pinus*; uncommon.

Ref.: MAR7, PHI, HØI, BON, and *C. purpureus* in FLO, BREI5.

A beautiful and striking species that occurs in both poor and rich *Picea* forests. It resembles *C. semisanguineus*, but is significantly more robust and displays red stripes on the stipe as well as a copper-brown cap. [The species has also been interpreted as *C. purpureus* (Bull. ex Pers.:Fr.) Fuckel.]

3. Subgenus *Orellani* (Moser) Gasparini & related groups

The species in this chapter are dry, most are medium sized and not hygrophanous. The fruit-bodies, especially veil and gills, are coloured yellowish to ochraceous, sometimes with a reddish or olivaceous component. Many of the species exhibit a red alkaline reaction, and several fluoresce in ultraviolet light.

Grouping is based on cap and veil colour. Observe the veil, which often settles as irregular stripes or fibres on the stipe, and sometimes also on the cap.

GROUP 1: CAP ORANGE-BROWN, FIBRILLOSE, VEIL YELLOW

(subgen. *Orellani*)

If the cap is glabrous or more yellow to olivaceous tinted, see the following groups. Cf. also *C. rubicundulus*, as well as sect. *Hinnulei* (*Telamonina*).

[Beside two European species in subgen. *Orellani*, three have been described from the Southern Hemisphere (GAS8). The subgenus, presumed but not yet proven monophyletic, is characterised by the presence of orellanine, a deadly toxic metabolite.]

***C. speciosissimus* Kühner & Romagn.**

Cap 30-80 mm, not hygrophanous; saturated orange to orange-brown with a darker disc; finely squamulose and radially fibrillose; conical, later convex, often with an acute umbo.

Gills brilliantly brownish orange; distant, rather thick; edge often yellow.

Stipe cylindrical; brown-orange; fibrillose; flushed by \pm pale-yellow to greyish yellow bands.

Veil yellow to greyish yellow, fairly copious; cortina pale yellow to white.

Flesh yellow, yellow-brown in stipe-base; odour faintly raphanoid.

Reactions: NaOH, phenol, AgNO₃ trivial; guayac weakly green; acid FeCl₃ intensely bluish black; fluorescence weak.

Spores: 8.5-11 \times 6.5-8.2 μ m, ovoid to subglobose, moderately verrucose.

In acidic *Picea* forests; fairly common.

Ref.: DÄH, MAR7, PHI, SMF5, HOL, HEN4, BON, and *C. rubellus* in FLO.

One of the commonest of our deadly poisonous species (WIND5, HØI9) and fresh a spectacularly beautiful fungus, resembling a large *Dermocybe*. It seems to prefer poor, acidic spruce forests with blueberry, where one can find it among mosses. It appears well distributed in the country, but is not common every year. The reaction with acid ferrous chloride can be used to show the presence of the toxin orellanine (cf. the next group, where it is absent).

[The fungus is often named *C. rubellus* Cooke. But this was described by its author as a *Telamonia* with reddish veil girdles and leaner spores, and is most certainly a different species (see GAS13, and cf. *C. hinnuleoarmillatus* in *Telamonia*). *C. orellanoides* Henry, in deciduous forests, is a synonym.]

***C. orellanus* Fr.**

Cap 30-80 mm, not hygrophanous; warmly orange-brown, darkening; innate-fibrillose to minutely squamulose; usually convex without an acute umbo.

Gills brilliantly brownish orange; conspicuously distant; wide; edge often yellow.

Stipe cylindrical, warmly yellow with reddish brown fibres but without distinct bands, darkening to red-brown; apex saturated yellow.

Veil yellowish, sparse.

Flesh pale yellow, darker in stipe; odour faint, raphanoid.

Reactions: NaOH reddish in flesh, black on cutis; acid FeCl₃ intensely bluish black.

Spores: 8.5-10.5 \times 5.5-6.5 μ m, elliptic, moderately verrucose.

In *Quercus* and *Fagus* forests; southerly; rare.

Ref.: DÄH, MAR1, PHI, HOL, BON, FLO.

Occurs in deciduous woods on the Continent, and has been reported from our southernmost counties. It resembles *C. speciosissimus* (above), but differs by a cap without an acute umbo, a stipe without conspicuous veil remnants, and narrower spores. It is even more poisonous (around 3 times more orellanine, dry weight). Cf. *C. tofaceus* in the next group.

GROUP 2: CAP ORANGE to YELLOW, GLABROUS, VEIL YELLOW

(sect. *Callistei*, *Limonii*)

If the cap is more yellow-brown and the fungus is robust, see the next group. [The cited sections have been shown to be monophyletic but not closely related. Both are present also in the South Hemisphere.]

C. callisteus (Fr.:Fr.) Fr.

Cap 30-90 mm, not hygrophanous; pale ochraceous-yellow to saturated brownish yellow, centre sometimes orange-yellow; glabrous or finely granulate to furfuraceous; young moist, waxy; obtusely rounded, later convex to campanulate.

Gills yellow to greyish yellow; fairly thick; distant.

Stipe most often clavate, sometimes vaguely tapering, robust; yellow, apex yellow-white, fibrous or flushed by butter-yellow to red-brown fibrils, base darker.

Veil yellow, darkening, sparse; cortina pale yellow.

Flesh yellow to pale yellow, marbled dark yellow, darker in stipe-base, blushing slowly on exposure; usually with a distinct odour of stearine, taste slightly bitter; exsiccata yellow.

Reactions: NaOH brick-red on cap; AgNO₃ greyish green (<2'); formalin, FeSO₄ trivial; fluorescence weakly yellow.

Spores: 7-8.5 × 6-7 µm, subglobose, rather coarsely verrucose.

In rich *Picea* forests; uncommon.

Ref.: FLO, MAR7, HOL, HEN4, LAN.

Differs from *C. limonius* (below) mainly by the shape of the stipe, but it is also more pure yellow-coloured, which is especially evident on comparing the exsiccata. The characteristic smell, which can sometimes be faint or absent, has been likened to "smoking locomotive" or ozone ("underground smell", "sparks", etc.), but "just extinguished candle" seems to be the most accurate metaphor.

C. infucatus Fr. differs by narrower spores and paler hues. [It is sometimes regarded as a variety of *C. callisteus*, and *C. citrinofulvescens* Moser is a synonym.] (See FLO, MEL14, MAR7, MOS31, JEC3D; Ramstigsberget). The species is rare, growing in calcareous *Picea* forests.

C. humicola (Quél.) Maire displays similar colours, but is strongly squamulose with a fusoid stipe and resembles a *Pholiota* (see FLO, DÄH, PHI). — **C. tofaceus** (Fr.) Fr. possesses a broadly clavate, strongly fibrous stipe. These rare species grow in southern *Fagus* forests (see DÄH, FLO, BRE15). — Finally, a taxon resembling *C. tofaceus*, found in rich *Picea* forest (Fårskär, Kalkugnsberget, Dropphäll), may be interpreted as **C. depexus** Fr. (= *C. subsquamulosus* Batsch s. Henry; see HRY13).

C. neocallisteus Kranab. et al.

Plate 1

Cap 25-55 mm, not or weakly hygrophanous; intensely orange, sometimes with a yellowish tint; glabrous to finely innate-fibrillose; margin ± paler with sparse brownish fibrils; campanulate to convex.

Gills pale grey; fairly thick.

Stipe clavate to cylindrical with a rounded bulb; pale yellow, with darker yellow fibrils and brownish tufts.

Veil dark brown to purple brown, fairly copious; cortina greyish white.

Flesh pale yellow, marbled yellow; odour weakly raphanoid, taste slightly farinaceous.

Reactions: NaOH red-brown to dark red on cutis and stipital veil; guayac blue-green; fluorescence yellowish.

Spores: 6.5-7.8 × 5-6.5 µm, subglobose, moderately to rather coarsely verrucose.

In rich *Picea* forests; rare. Fårskär, Vinäsgraven, Gryvelån.

Ref.: KIA24, and *Flammula abrupta* Fr. in MEL4, MEL14.

This rare fungus differs from *C. callisteus* (above) by its handsomely orange cap (reminiscent of *C. limonius* below) and whitish gills, as well as the somewhat smaller spores. It also lacks the typical "callisteus" (stearine) odour. [The taxon has been interpreted as *C. abruptus* (Fr.) Melot ined. *C. tophaceoides* Moser ined. is another possible synonym.]

C. limonius (Fr.:Fr.) Fr.

Cap 40-80 mm; ± hygrophanous; handsomely orange-yellow; glabrous to finely innate-fibrillose; rounded, later broadly umbonate.

Gills yellow.

Stipe cylindrical or attenuated at base; yellow, flushed by brownish fibrils and tufts.

Veil yellow; cortina pale yellow.

Flesh yellowish; exsiccata brown.

Reactions: NaOH blood-red to black on cutis, red-brown on stipital veil and context; formalin, acid FeCl₃ trivial; fluorescence very weak, yellow.

Spores: 7.5-9 × 5.7-7 μm, subglobose, moderately to rather coarsely verrucose.

In acidic *Picea* forests among *Vaccinium*; fairly common.

Ref.: DÄH, MAR7, HOL, HEN4, BON, FLO.

Is easy to discover from its brilliant colours. The fungus can look rather like *C. speciosissimus* (above), but has more crowded gills, and the cap is more glabrous, usually hygrophanous. Cf. *C. renidens*, *C. gentilis*, and sect. *Hinnulei* (*Telamonia*).

GROUP 3: CAP YELLOW-BROWN, VEIL WHITE

The group consists of species that are sometimes placed in *Phlegmacium*, despite the fact that their caps are entirely dry. [The taxa seem to occupy isolated positions in the phylogeny of the genus.]

C. vespertinus (Fr.:Fr.) Fr.

Cap 40-90 mm, not hygrophanous; saturated, dark yellow to yellow-brown; ± viscid in moist weather, matt, slightly flushed, finely innate-fibrillose with sparse fibrils that blush purple with age; young margin pale yellow with white fibrils; obtusely rounded, later convex to plane, long with an involute margin.

Gills grey-yellow to buff, edge paler, rarely with a violaceous tinge; fairly crowded.

Stipe stout, fusoid, sometimes with a bulb and a short, rooting point; pale brown-yellow, young coated white; base sometimes reddish or with wine-red fibrils.

Veil white, darkening to yellow, finally wine-red, sparse; cortina pale yellow.

Flesh buff to pale yellow, marbled darker yellow, staining darker on manipulation; friable in cap; odour faint, fruity.

Reactions: NaOH, formalin, lugol, guayac, AgNO₃, FeSO₄ trivial.

Spores: 6-7.5 × 4-6 μm, elliptic, often ± obtuse and angular, moderately, densely verrucose.

In *Picea* forests; uncommon.

Ref.: FLO, and *C. intentus* in BRA10, KS10.

An interesting and infrequent species with characteristic yellow colours. It may acquire reddish spots on the stipital base. Apart from the colour, the fungus resembles *C. crassus*, and has the same soft-textured flesh. [It was earlier interpreted as *C. intentus* Fr. *C. variipes* Henry is probably a synonym (see REU1, MOS29), and its var. *janthinophyllus* Moser then corresponds to the rare form with a violaceous tinge on gills and in the stipital context (Skärmarö).]

C. pinophilus Soop

Plate 1

Cap 35-75 mm; somewhat waxy, not hygrophanous; yellow to yellowish white, often with a pink shine from thin, red-brown fibrils; young thinly frosty greyish white, older butter-yellow to ochraceous; margin young with a white rim.

Gills pale grey, fairly crowded.

Stipe with a rounded bulb, sometimes clavate; pale greyish yellow, thinly coated white or with white bands when young, flavescent when bruised, apex white.

Veil white, sparse; cortina white.

Flesh pale grey with a yellow tinge, marbled yellow, darkening to butter-yellow when older or on exposure.

Reactions: NaOH citrinous, soon butter-yellow on stipital context and veil; AgNO₃, lugol, formalin, guayac trivial; fluorescence distinctly yellow.

Spores: 8-10 × 5.5-6.5 μm, elliptic, moderately verrucose.

In calcareous *Pinus* forests among *Cladonia*; uncommon; northerly.

Ref.: KS17, KS24, AMM10.

A neat fungus, so far found exclusively in the sandy pine forests of the North. It is characterised by a dry cap and yellow hues, especially in the context. It is easily confused with *C. leucophanes* (*Phlegmacium*)

in the same habitat, which, however, lacks an alkaline reaction, is distinctly viscid, and possesses markedly smaller spores. Cf. *C. callisteus* (above).

GROUP 4: CAP and VEIL with an OLIVE tinge

(sect. *Leprococybe*)

Characteristic of this group is the reddening of gills with alkaline solutions, and the fact that the fruit-bodies fluoresce intensely yellow in ultraviolet light. Cf. *C. phrygianus* below. [Sect. *Leprococybe* has been proven largely monophyletic, which is not the case for the corresponding subgenus, of which *C. cotoneus* (below) is the type.]

C. colymbadinus Fr.

Cap 20-70 mm, slightly hygrophanous; young olive-green, later olive-yellow to yellow-brown; glabrous, rounded with an obtuse umbo, later conical to convex.

Gills saturated brown; fairly distant; edge green to yellow-green.

Stipe cylindrical; brownish yellow with an olive tinge, apex greyish yellow; glabrous or with distant brown fibrils.

Veil olive-green, sparse; cortina citrinous.

Flesh pale greyish yellow, darker in stipe-base; blushing with a brownish tinge in stipe.

Reactions: NaOH red to red-brown on cap, stipe, gills; fluorescence yellow, yellow-green on mycelium.

Spores: 8-10 × 4-6 µm, citriform, moderately verrucose.

On the needle carpet in older, rich *Picea* forests, also under *Quercus*; often precocious; uncommon.

Ref.: FLO, MEL4, KS3, JEC2C, JEC15B, KIA14, and *C. isabellinus* in MAR7, HEN4.

The greenish gill edge is typical. Often, but not always, the cap darkens with age to chestnut-brown. The fungus can appear as early as summer (June—July). There also exists a small, distinctly hygrophanous form with cap up to 30 mm (see KS3 and *C. saniosus* in HOL). An interesting test is slicing a fruitbody and pressing the context on a piece of white paper. The juice then leaves a citrinous imprint.

[The species has been shown by molecular markers to belong a remote section in subgen. *Telamonia*. It has been named *C. isabellinus* (Fr.) Fr., which, however, is described as lacking an olive hue. *C. zinziberatus* (Scop.) Fr. under deciduous trees, is possibly a synonym.]

C. venetus (Fr.) Fr.

Cap 30-70 mm, sometimes weakly hygrophanous; olive-green, later red-brown with an olive reflex and a yellow-green margin; young tomentose, later granulate to minutely squamulose; rounded to obtusely conical, later convex.

Gills yellow-green to olive-brown.

Stipe cylindrical to clavate; young greyish green with a pale-green to yellow-green, thin girdle; later stained brownish.

Veil olive-green, sparse; cortina citrinous to pale grey.

Flesh yellow-brown to grey-brown with an olive tinge; odour faint like vegetables (parsley?).

Reactions: NaOH red on stipe, red-brown on cutis; formalin orange-yellow (5-10'); AgNO₃ intensely green-yellow; fluorescence intensely yellow.

Spores: 6-7.5 × 5.5-6 µm, subglobose, rather strongly verrucose.

On the needle carpet in rich *Picea* forests; uncommon.

Ref.: MAR7, DÄH, HOL, HEN4, BON, FLO.

An olive-green fungus that blushes red-brown with age. It differs from *C. colymbadinus* (above) by the granulose cap and thicker stipe, as well as by the spore shape. The flesh leaves the same colour imprint.

C. cotoneus Fr.

Cap 40-90 mm, not hygrophanous; green-yellow to olive-green; tomentose, covered by tiny tufts, smooth; obtusely rounded, later convex.

Gills olive-green with a yellowish edge.

Stipe clavate, robust; pale green-yellow with olive-brown girdles, apex pale green.

Veil olive-green, fairly copious; cortina olive-grey.

Flesh pale yellow with an olive tinge, paler in cap, weakly marbled yellow-green; odour and taste quite strong, radish like.

Reactions: NaOH red to red-brown on cutis, flesh, gills; fluorescence intensely yellow.

Spores: $8-9 \times 6.5-7.5 \mu\text{m}$, subglobose.

In broad-leaf (including *Tilia*) forests; southerly, uncommon. Åstad, Laxare, Munkängarna.

Ref.: MAR7, HEN4, MOS7, FLO.

Resembles *C. venetus* (above), but grows in deciduous woods. It is also larger with a softly tomentose cap and a strongly dilated stipe with distinct velar girdles.

A more yellow variety, *mellinus* (Britz.) Kühner has been found under *Corylus* (Åstad, Himmelsberga). [*C. mellinus* Britz. s. Moser, which exhibits a more orange hue, is a different taxon.]

GROUP 5: CAP with RED to PURPLE-BROWN VEIL REMNANTS

The species in this group are not closely related, but they all exhibit coloured fibrils or squamules on the cap.

C. bolaris (Pers.:Fr.) Fr.

Cap 20-50 mm, not hygrophanous; yellowish white; covered by pink to brown-red squamules or pustules; obtusely rounded, later plane to convex.

Gills greyish yellow to yellowish buff; young slightly decurrent, rather distant.

Stipe cylindrical, often slender and fragile; yellowish white, girdled or covered by red squamules, stipe-base rose-red, apex white.

Veil red to lilac-red, copious; cortina white to yellowish, blushing.

Flesh white, flavescent in section, darkening with age, reddish in stipe-base; odour faint, waxy.

Reactions: NaOH weakly to strongly yellow; acid FeCl_3 , guayac trivial; formalin orange-yellow (15'); AgNO_3 olive-grey; fluorescence fairly strong, pale yellow.

Spores: $6-8 \times 4.5-6 \mu\text{m}$, subglobose, rather coarsely verrucose.

In *Quercus* and *Betula* forests; uncommon.

Ref.: MAR7, PHI, HOL, BON, LAN, FLO, KIA23.

With some luck one may encounter this remarkable species in a mixed wood with oak. It gives a colourful impression with elegant red and yellow tones. It is normally fragile and slender, but may on occasion become quite robust.

C. rubicundulus (Rea) Pearson

Cap 30-70 mm, not hygrophanous; dry; pale yellow but zoned orange-red; matt, mottled with adpressed reddish fibrils, strongly blushing dark orange or yellowish red; margin with sparse reddish fibrils; rounded, later convex, sometimes with a shallow umbo.

Gills greyish yellow to pale yellow; thick but not anastomosed; edge somewhat red-spotted.

Stipe robust, clavate; white, turning golden yellow on manipulation, later reddening, flamed by red fibrils and thin girdles.

Veil red with an orange hue, sparse; cortina pale yellow.

Flesh soft; pale yellow to tan, sometimes strongly flavescent when cut and bruised.

Reactions: NaOH, formalin, guayac trivial.

Spores: $7-8 \times 3.8-4.5 \mu\text{m}$; cheilocystidia \pm cylindrical to capitate.

In rich *Picea* forests, mainly in the South-West; rare.

Ref.: DÄH, MAR7, PHI, HOL, FLO.

Differs from *C. bolaris* (above) mainly by the veil being more orange-red and breaking up into fibrils, not squamules, on the cap. It has the same soft and fragile context as *C. crassus*. [In the literature *C. rubicundulus* is often considered close to *C. bolaris*, but their affinity has proven illusory. Its only close relative is found in the South Pacific.]

***C. phrygianus* (Fr.) Fr.**

Cap 40-70 mm, not hygrophanous; greyish yellow to yellow-brown with a purple-brown centre, sometimes with an olive tinge, later increasingly red-brown; densely covered by tiny, adpressed, grey-brown to purple-brown squamules; margin paler yellow.

Gills pale mustard-yellow, soon dark yellow; often thick.

Stipe cylindrical to clavate; grey-yellow with a pale-grey apex, spotted or blushing red-brown; coated by fibrillose, lilac-brown girdles, sometimes breaking into several hazy bands.

Veil dark violaceous brown, fairly copious; cortina greyish yellow.

Flesh white in cap, mustard-yellow in stipe; odour spicy, like incense or wax candles.

Reactions: NaOH green-yellow in flesh, red-brown on gills, black with a violet tinge on cutis and stipital veil; guayac, lugol, formalin trivial; fluorescence intensely yellow to green-yellow.

Spores: $5-7 \times 4.5-5.5 \mu\text{m}$, obtusely elliptic to subglobose, moderately verrucose.

In calcareous *Pinus* forests; northerly, rare. Rullsand, Rättviksheden, Enån, Vinäsgraven, Gesunda, Alderängarna, Bonåsheden, Lombäcken.

Ref.: FLO, MOS7.

A spectacular but rare species, principally found with pine and best described as a *C. cotoneus* with a purple veil. The dark velar rings on the stipe and the scales on the cap also recall an *Armillaria*. [As shown by molecular evidence, this species belongs to sect. *Leprocybe* (above).]

Closely related is *C. melanotus* Kalchbr. growing in southern *Abies* forests. It is similar, but presents a stronger olive shade (see FLO, BON, DAH, MOS7).

4. Sections *Anomali* Konr. & Maubl. & *Delibuti* (Fr.) Melot

This chapter gathers two common sections that were formerly often assigned to subgenera *Sericeocybe* and *Myxaciium*, respectively, or sometimes to *Phlegmacium*, but have been shown to be genetically segregate. They share several characters, such as rounded spores, bluish gills, and a veil that is often distinctly ochraceous. Most representatives of these sections also exhibit a typical "anomalous" habit: middle-sized fruit-bodies with a relatively slender stipe and a non-hygrophanous, campanulate cap. The sections differ mainly in the degree of viscosity. [Both sections are monophyletic and represented on both hemispheres (GAR1, GAS7, KS44), which indicates an ancient origin.]

Gill colour is pale blue to deep violet, possibly merely greyish lilac. The veil varies between yellow and reddish in colour, and is often visible as bands or tufts on the stipe, but may in some cases be rather sparse. The stipe is cylindrical to clavate, never with a distinct bulb. Cf. *C. prasinocyaneus* (*Phlegmacium*), which also produces subglobose spores.

Check whether the stipe is viscid. If it is dry, the cap may still be viscid in moist weather.

GROUP 1: STIPE DRY

(sect. *Anomali*)

An interesting character of the group is the fact that the stipe easily breaks with an audible snap (as with *Chalciporus piperatus*). Fruit-bodies assume a yellow-brown tint with age, sometimes even when half-grown, which may lead to wrong identification. See KIA23, and cf. *C. spilomeus*, *C. raphanoides*, and *C. ionophyllus* in subgen. *Telamonia*.

***C. anomalus* (Fr.:Fr.) Fr.**

Cap 30-50 mm; dry to slightly viscid, not hygrophanous, grey-brown to bluish grey with a tan centre, young with a purple tone; silky matt to finely granulose; rounded, later convex to obtusely conical.

Gills greyish violet to grey-brown with a violet tinge; sometimes weakly decurrent.

Stipe slender with a dilated base; silky white to greyish with a violet tinge at apex; zoned with indistinct brownish yellow bands near the base.

Veil ochraceous, sparse; cortina greyish white with a violet tinge.

Flesh greyish white, marbled grey-violet, yellowish white in stipe-base.

Reactions: NaOH, formalin, trivial; guayac green.

Spores: $7-9 \times 6-7.5 \mu\text{m}$, subglobose, moderately verrucose.

In moist *Betula* and *Quercus* forests, also with *Betula nana* in alpine areas; often solitary; common.

Ref.: DÄH, MAR8, HOL, KIA23.

A rather slender species with varying colours. It occurs in several biotopes, but prefers young, moist, birch copses. The cap may be slightly viscid in wet conditions. The brownish-yellow bands on the stipe are usually distinct on young specimens, but sometimes disappear rapidly, and the fungus may then be difficult to identify. [*C. azureus* Fr. is a synonym.]

Many similar taxa gravitate around *C. anomalus*. *C. pastoralis* ined. (= *C. anomalus* subsp. *campestris* Soop) [Plate 2] is paler greyish and has slightly larger and stronger ornamented spores. It grows in calcareous pastures, where it apparently forms mycorrhiza with small *Helianthemum* herbs (see JEC1A; Åstad, Tveta). — A similar taxon under *Betula*, *C. albocyaneus* Fr., is pale violet and possesses a sparser veil. It has often been interpreted as a form of *C. anomalus*, but is easier to confuse with *C. albobolaceus*, which, however, exhibits distinctly white veil remnants (see FLO, BREI5, MAR8, STER32, KIA23). — *C. azureovelatus* Orton, is taller with more greyish colours and grows mainly in southern broad-leaf forests (see MAR8, REU). — The very rare *C. simulatus* Orton [Plate 18] is more robust with stronger violet tints, and grows with *Pinus* and *Betula* (see ORT4; Klacknäset). [The taxon is probably conspecific with *C. violaceocinereus* (Pers.:Fr.) Fr. s. Lindstr. (see FUN).]

***C. lepidopus* Cooke**

Cap 30-80 mm; dry, sometimes weakly hygrophanous; greyish brown with a red-brown tint at centre; young faintly yellowish frosty, later date brown; silky matt; finely innate-fibrillose; margin grey with yellow-brown fringes when young; conical, later convex to plane; margin often wavy or wrinkled.

Gills greyish violet.

Stipe slender, cylindrical to slightly clavate; upwards greyish blue, later pale yellow to greyish yellow; with adpressed orange to yellow-tan fibrils or tufts towards the base.

Veil orange-brown to ochre, fairly copious; cortina pale violet.

Flesh pale grey-brown, marbled violet, flushing greyish yellow.

Reactions: formalin reddish lilac (<20°); guayac strongly blue-green; NaOH, phenol trivial.

Spores: $7-9 \times 6-7 \mu\text{m}$, subglobose, rather strongly verrucose.

In *Pinus* forests, also with *Betula*; rare. Mockfjärd, Vinäsgraven, Silverknuten, Remmen, Sörviken.

Ref.: PHI, ORT4, BON, KS17, FLO, and *C. cervisipes* in KS3.

Is considerably darker than *C. anomalus* (above), often exhibiting bristling, yellowish veil tufts at the stipital base. The cap margin is typically sulcate, and the context reacts distinctly with formalin. [*C. cervisipes* Soop ined. is a synonym.]

***C. anomaellus* Soop**

Plate 2

Cap 15-40 mm; dry, not hygrophanous; warmly purple-brown or grey-brown with a red-brown tinge, later more grey-brown; matt, innate-fibrillose to finely granulose; margin faintly lilac to grey-lilac when young; campanulate, soon expanded to plane.

Gills ± saturated violet with a paler edge; distant.

Stipe silvery greyish with a violet tinge on upper half; lower part with thin brownish red to orange-brown fibrils and girdles.

Veil brownish red to greyish pink, fairly sparse; cortina greyish violet.

Flesh greyish, marbled violet, yellowish and occasionally blushing at stipe-base.

Reactions: guayac strongly green; formalin strongly lilac-red on stipital veil, nil in flesh; NaOH trivial.

Spores: $9-11 \times 6-7 \mu\text{m}$, elliptic, moderately to rather coarsely verrucose.

In rich, sandy *Pinus* forests; uncommon. Bonåsheden, Vinäsgraven, Gesunda, Selja, Skräddar Djurberga.

Ref.: JEC1A, SMF68.

This quite rare species resembles *C. lepidopus* (above) and typically grows in sandy pine heaths among *Cladonia*. It also resembles certain forms of *C. anomalus* (above), differing by its smaller size, deeply violet gills, reddish veil, and ellipsoid, significantly longer spores. Cf. *C. spilomeus*.

C. caninus (Fr.) Fr.

Cap 40-100 mm; dry, not hygrophanous, greyish to date brown with a red-brown centre, later yellow-brown; matt, smooth, minutely innate-fibrillose; margin grey, sometimes with a violet tinge; obtusely umbonate, often fleshy.

Gills greyish violet to purple-brown.

Stipe fairly robust, cylindrical to clavate; grey to silky white with a thin, brown ring, apex violet, later brownish buff.

Veil date brown, sparse; cortina pale grey.

Flesh greyish white to pale yellow, young marbled violet.

Reactions: NaOH nil to faintly brownish yellow; AgNO₃ trivial; guayac blue-green; formalin intensely reddish lilac (<10').

Spores: 7-9.5 × 6-8 µm, globose, rather strongly verrucose.

With *Picea*, often in young plantations, also in alpine *Betula* forests; fairly common.

Ref.: FLO, DÄH, MAR8, HEN4, LAN, BON, KIA23.

The "ring" is usually visible as a faint tobacco-brown line encircling the stipe, but must not be confused with the cortinal zone (rusty-brown from the spores), formed where the cortina collapses higher up on the stipe of most *Cortinarius*. The fungus can become quite robust, occasionally with a cap measuring up to 300 mm in diameter. With age the entire fruitbody becomes vaguely yellow-brown and is then difficult to recognise.

It can be hard to separate the preceding three or four species. One should observe the absence of ochraceous or yellow veil remnants on *C. caninus*. *C. anomalus* is usually more slender, and has none or only a faint reaction with formalin.

C. tabularis (Fr.) Fr.

Cap 30-90 mm, often viscid, not hygrophanous; argillaceous to pale buff, sometimes warmer brownish yellow at the centre; glabrous, margin pale grey, silky white when young; rounded, later convex.

Gills greyish white, sometimes with a faint violet tinge.

Stipe slender, cylindrical to weakly clavate; silky white, zoned by hazy, pale grey-brown to greyish yellow bands.

Veil greyish yellow to white, sparse; cortina white.

Flesh greyish white to pale grey-brown, marbled grey to greyish violet, yellowish white in stipe-base.

Reactions: NaOH weakly yellow; guayac yellow-green; formalin reddish lilac (<20'); phenol brown-red (10').

Spores: 6.5-8.5 × 5.5-6.5 µm, subglobose, moderately verrucose.

Under *Betula* or *Quercus*; fairly common.

Ref.: FLO, HEN4, LAN, ORT4, KIA23, and *C. decoloratus* in ORT1, LAN, DÄH.

Differs from *C. caninus* (above) by its pale hue. The cap colour may vary between yellow and greyish brown, and the gills may be grey to violet. [This variation is the origin of a host of interpretations. The form with a viscid cap is often named *C. decoloratus* (Fr.) Fr., but this should possess a bitter taste according to Fries, and is probably a *Myxacium* in sect. *Ochroleuci*.]

C. xanthocephalus Orton

Plate 2

Cap 35-95 mm; viscid, fleshy, not hygrophanous; clay grey to greyish yellow, later flushing greyish ochraceous from disk, finely innate fibrillose; rounded, later convex; margin decurved with sparse yellowish fibrils.

Gills bluish grey to violet, rather crowded.

Stipe cylindrical to clavate; white, occasionally with a faint violet flush and thin, greyish-yellow fibrils and bands.

Veil greyish yellow to pale ochraceous, sparse; cortina pale violet.

Flesh white with a pale tan tone, marbled violet, often with numerous hygrophanous, violaceous streaks or spots; odour faint, fruity or agaricoid.

Reactions: NaOH trivial.

Spores: 7-9 × 6.3-7.5 µm, subglobose, rather coarsely verrucose.

In calcareous *Corylus* and *Fagus* forests, also with *Betula*; uncommon. Tollagården, Rävsnäs.

Ref.: FLO, HEN4, PHI, MOS-P.

This uncommon species is more robust than *C. tabularis* (above), and prefers broad-leaf forests. Due to the viscid cap and comparatively crowded gills it has often been placed in subgen. *Phlegmacium* (cf. *C. cliduchus*). [*C. ortonii* Moëgne-Locc. & Reumaux (= *C. subdelibutus* Orton, nom. inval.) is a possible synonym (see REU, ORT1, KS39)]. Cf. *C. delibutus* below.

C. lebretonii Quéf. [Plate 2] is similar, but can be distinguished by a greyer cap colour and less verrucose spores (see REU). It is rare, growing in the same habitat (Hammersta). [*C. straminipes* Murrill may be a prioritary synonym.]

GROUP 2: STIPE VISCID

(sect. *Delibuti*)

Cap and stipe are distinctly viscid to glutinous. If the cap colour is mainly brown to red-brown, see *Myxacium*.

C. delibutus Fr.

Cap 20-60 mm; greyish yellow to egg-yellow, sometimes with an ochraceous or olive tinge; margin paler; glabrous; rounded, later convex with a long involute margin.

Gills greyish violet to pale blue.

Stipe with a dilated base, sometimes slender; white with a greyish violet tinge, and (sometimes indistinct) yellow, glutinous girdles.

Veil yellow to ochraceous-yellow; cortina whitish.

Flesh dirty white, occasionally with violet parts; brown-yellow in stipe-base.

Reactions: NaOH, formalin, AgNO₃ trivial.

Spores: 7-9 × 6-7 µm, subglobose, weakly verrucose.

In *Betula* forests, also with other deciduous trees; common.

Ref.: DÄH, MAR8, PHI, HOL, HEN4, BON, FLO.

The fungus is easy to recognise from the yellow cap colour, which, however, may vary considerably, also within one collection. Truly egg-yellow specimens can be quite handsome (cf. *C. arvinaceus*). Pale forms may be confused with *C. xanthocephalus* (above), which, however, has a dry stipe.

A similar taxon, which is probably distinct, has greyish gills and may be interpreted as *C. illibatus* Fr. (see BEN, BREI5).

C. betulinus Favre

Cap 30-60 mm; yellow to olive-ochre, occasionally with an orange tinge, grey-blue towards the margin, soon fading; glabrous, obtusely conical, later convex to plane.

Gills greyish white to pale grey-brown, often with a faint violet tinge.

Stipe slender; pale grey-blue with a dirty yellow base, apex grey-violet; glabrous; viscid.

Veil yellow, greying, sparse; cortina pale grey-violet to whitish.

Flesh whitish with a violet tinge in stipe, greyish yellow in cap and stipe-base.

Reactions: NaOH yellow to greenish yellow; guayac nil.

Spores: 7.5-9.5 × 6.5-7.5 µm, subglobose, moderately verrucose.

In *Betula* forests (including alpine habitats); uncommon, more common towards the North.

Ref.: BEN, KÜH, SVL2, FLO.

A slender fungus with pale yellow, blue, and grey hues, always growing with birch. It differs from *C. delibutus* (above) by the greyish-blue tints.

C. transiens (Melot) Soop

Cap 45-100 mm, fleshy; violet to greyish lilac with an olive-grey to tan centre, later fading to yellow-brown; glabrous to finely innate-fibrillose; margin long involute.

Gills grey to pale grey-brown with a faint violet tinge.

Stipe fusoid to clavate, robust, elastic, tough, often \pm hollow; white, coated greyish, flavescent.

Veil pale grey to olive-brown, flavescent, sparse; cortina white.

Flesh pale yellow to white, flavescent in stipe; odour faint, fruity; taste distinctly acerbic in cutis or cutical gluten.

Reactions: NaOH weakly yellow to trivial; formalin, guayac trivial.

Spores: $8-10 \times 7-8 \mu\text{m}$, globose, rather coarsely verrucose.

In *Picea* forests; uncommon, more common in the North.

Ref.: KS13, *C. epipoleus* in BEN, and *C. salor* subsp. *transiens* in FLO.

A robust fungus with a ventricose stipe, often hollow and tough as a rubber-hose. It is usually more robust than the surrounding species, from which it differs by an olive-brown, glutinous veil that is usually bitter or astringent in taste. Seen from above, the fungus recalls *C. subtortus* or *glaucopus* (*Phlegmacium*). [The taxon has variously been interpreted as *C. epipoleus* Fr., or as a subspecies of *C. salor* (below).]

C. largodelibutus Henry is closely related (see REU, MOS29). It presents more orange hues and grows in southerly *Abies* forests.

C. salor Fr.

Cap 30-70 mm; pale blue or greyish blue to dark lilac, often staining buff or fading from the centre; glabrous; rounded, later convex with a long involute margin.

Gills clay-grey to violet.

Stipe cylindrical to weakly clavate; pale violet with a grey-brown base.

Veil hyaline to violet, sparse; cortina pale blue.

Flesh pale yellow to white, marbled violet.

Reactions: NaOH, formalin trivial.

Spores: $7-9 \times 6-8 \mu\text{m}$, globose, rather coarsely verrucose.

In calcareous *Picea* and broad-leaf forests; uncommon. Tveta, Tjaukle, Eriksberg, Kalkugnsberget, Styggforsen.

Ref.: MAR8, HOL, BON, MEL1, FLO.

A beautiful species, easy to identify when young. With certain forms the violet component rapidly disappears with age and the cap turns vaguely brownish, but more robust forms often exhibit a persistent, intensely violet tint over the entire fruitbody. [The paler, more slender form, mainly growing in spruce forest, is sometimes separated as a variety *coniferarum* Melot (see *C. salor* in DÄH).]

C. emunctus Fr.

Cap 20-55 mm; grey-blue to grey with a violet tinge, staining grey-brown from the centre; finely innate-fibrillose; campanulate, later convex with a wide umbo.

Gills violaceous-grey to pale grey-brown; fairly thick; distant.

Stipe cylindrical to weakly clavate, sometimes fusoid; blue-grey, slightly zoned grey, apex white.

Veil greyish violet; cortina grey to blue-grey.

Flesh grey with a faint violet tinge, marbled violet.

Reactions: NaOH yellow-brown to trivial in flesh, yellow on stipital veil; formalin, lugol, guayac, AgNO₃ trivial.

Spores: $6.5-9 \times 5.5-7 \mu\text{m}$, subglobose, rather coarsely verrucose.

In calcareous *Picea* forests; rare. Fårskär, Garphyttan, Borrberg, Puttängesbäcken, Hammerdal, Funäsdalen.

Ref.: FLO, JEC3D.

The colour of the whole fruitbody is quite peculiar: a warm, handsome, greyish-violet shade that one seldom encounters in *Cortinarius* — once seen, never forgotten. In contrast to the other species in the group the stipe is distinctly coloured, and the veil does not oxidise to an olive or ochraceous tinge, which

may explain why it looks so different from e.g. *C. salor* (see MEL1). [Molecular evidence indicates, in fact, that the species is not part of sect. *Delibuti*.]

5. Subgenus *Phlegmacium* (Fr.) Trog

In principle the cap is non-hygrophanous, viscid in wet conditions, and the stipe is dry, but there are a certain number of exceptions. Most species are robust, a few very large. The gills are mostly crowded, often very crowded, and with few exceptions (*C. sphagnophilus*, *fulvocitrinus*) never distinctly brown when young. [As shown by several studies (e.g., GAR5) the subgenus as such is highly polyphyletic, while many sections are genetically homogeneous (see the group characters further along).]

The large subgenus *Phlegmacium* is first split according to gill colour, later according to other characters, such as veil colour, cap colour, and odour (regarding the latter, see comments in the Introduction). Reaction with alkaline solutions and other compounds is often important. Observe also the shape of the stipe: it rarely tapers downwards, but is cylindrical or clavate and may be provided with a bulb which is rounded or marginate with a sharp edge. If the bulb is widely marginate, it is often provided with a "moat" (i.e. depressed around the stipe); most such *Phlegmacia* are rare in Sweden, and occur primarily in southern Fagus or Quercus forests.

If the stipe has a bulb, the veil normally adheres to the bulb margin and underside, where it mixes with the humus and discolours. As no veil settles on the stipe above the bulb (the fibrils partly originate from the cortina), it may be hard to determine its colour. The cap is more or less obtusely rounded when young, later to expand into a convex shape, unless otherwise stated.

Examine the gill colour (young specimens!). What describes it best: olive, whitish, violaceous, or yellow? Considerable variation may occur within each category. Almost all species with yellowish gills (Ch. 5.4) are rare and found in calcareous grounds, many exclusively in the South.

5.1 GILLS OLIVE-COLOURED

GROUP 1

(sect. *Infracti*, *Scauri*)

Gill colour is greenish brown to greyish green, sometimes darker (if it is yellow-green, see Ch. 5.4). Taste the flesh. Notice that also certain *Myxadium* species have a bitter taste.

C. subtortus (Pers.:Fr.) Fr.

Cap 30-80 mm; olive-grey, later ochraceous with an olive tinge, when older often with a faint orange tinge on the disc, which may be finely granulate; glabrous; margin olive to olive-green, finely felty, long involute.

Gills olive-grey, fairly dark; distant, often rather thick; edge paler.

Stipe cylindrical to ± clavate or fusoid; pale greyish yellow with a thin, felty, pale green-yellow coating, apex greyish; moist to viscid.

Veil pale greenish yellow, darkening, sparse; cortina white to olive-yellow.

Flesh greyish white, yellowish in stipe, marbled grey to olive-grey; taste ± bitter; odour aromatic, spicy.

Reactions: NaOH reddish on yellow parts of cutis and flesh, red-brown on gills, yellow to red-brown on stipital veil; formalin, guayac, phenol, acid FeCl₃ trivial.

Spores: 6.5-8.5 × 5.5-6.5 µm, obtusely elliptic to subglobose, rather coarsely verrucose; cheilocystidia fusoid to lageniform, 50-80 × 12 µm.

In acidic, moist *Picea* forests, in or around *Sphagnum*; common.

Ref.: DÄH, MAR7, HOL, HEN4, BON.

A common, but peculiarly coloured *Cortinarius* in the mosses of marshy forests. The fungus smells faintly aromatic ("balsa wood", "incense", or like the *Sphagnum* it grows in). The presence of cheilocystidia is unusual. The species is among the very few *Phlegmacia* with conspicuously distant gills

and an often viscid stipe, which makes it resemble fungi in sect. *Delibuti*. [Genetically *C. subtortus* appears to be closely related to the latter.]

C. infractus (Pers.:Fr.) Fr.

Cap 30-90 mm; olive-grey to pale olive-brown or olive-yellow, older darker yellow-brown to grey-brown; glabrous to finely innate-fibrillose; margin ash-grey with olive-grey squamules; sometimes with a shallow umbo.

Gills dark olive-grey to olive-brown, crowded.

Stipe cylindrical to clavate; white to grey with olive-grey to brown fibrils; apex sometimes with a violet reflex.

Veil olive-brown to yellow-brown; cortina pure grey.

Flesh greyish white, marbled buff and bluish grey; taste \pm bitter, sometimes faint.

Reactions: NaOH yellow to orange-yellow; formalin yellow-green (20-25°); guayac blue-green; phenol weakly yellow; AgNO₃ black; lugol, acid FeCl₃ trivial.

Spores: 7-9.5 \times 5.5-7 μ m, subglobose, rather strongly verrucose.

In calcareous, deciduous and *Picea* forests, uncommon, more common in the South.

Ref.: DÄH, MAR7, PHI, HEN4, BON, FLO.

A species easily recognised by its dark gill colour. The cap colour is quite variable, and with age the entire fruitbody darkens to a ghostly blackish grey, almost metallic, tinge.

[The various forms have recently been shown genetically to constitute sect. *Infracti*, where they represent at least ten distinct species that are difficult to separate by morphology, but are characterised mainly by habitat and to some extent by the cap colour (see KIA18).] *C. obscurocyaneus* Secr. ex J. Schröt., is very dark with violaceous tints (see JEC15C; Foskflon). — *C. infractiflavus* (Moser) Kytöv. et al. is northerly with more yellow colours and paler gills.

The species described above, together with *C. amarescens*, *dibaphus*, and *amaenolens* in Ch. 5.3, are the only *Phlegmacia* with a distinctly bitter taste studied in the present work.

C. scaurus (Fr.:Fr.) Fr.

Cap 50-80 mm; olive-brown with an olive-green margin and hygrophanous regions (see below); glabrous; rounded, later conical to convex with a wide, shallow umbo.

Gills olive-brown to green, edge usually distinctly green.

Stipe fairly slender, with a (often weakly) marginate bulb, later often clavate; silky white with brown fibrils, blue tinge on apex, sulphur-yellow to yellow-green in base.

Veil and cortina olive-green, sparse.

Flesh greyish with an olive tinge, marbled blue, yellow-brown in stipe-base; not bitter.

Reactions: NaOH dark yellow-green in stipe-base (flesh and veil); lugol dark violet; AgNO₃ green-yellow; formalin nil; guayac, phenol trivial.

Spores: 10-13 \times 6.5-8 μ m, elliptic to cylindrical, strongly verrucose.

In preferably acid *Picea* and *Pinus* forests; often solitary; common.

Ref.: DÄH, MAR7, HOL, FLO.

This remarkable species looks trivially brownish seen from above, but is otherwise rather colourful with olive-green, yellow, and blue tints. The gills are sometimes strikingly green on young, moist specimens when collected, but the coloration usually fades quickly. The stipe bulb may be very robust on young specimens, but indistinct or gone on older ones. The iodine reagent (lugol) is a rather certain way of distinguishing *C. scaurus* from similar species (e.g. *C. glaucopus* or *pseudoarquatus*).

The fungus typically grows in moist, poor spruce forests. It is one of the few distinctly hygrophanous *Phlegmacia* in the country, which makes it easy to recognise. The form growing with pine is paler with a buff tint. [*C. scaurus* and relatives have been shown genetically to form an ancient section with several members described from North America and the South Pacific (see KS44, JEC16A, GAR1).]

C. sphagnophilus Peck growing in or around *Sphagnum* is more slender and lacks green tones on the gills. It is sometimes considered a variety of the preceding species (see FLO). — *C. herpeticus* Fr. in calcareous *Picea* forests is sometimes also regarded as a variety. The gills often display a violet tinge, and the fungus is

usually more robust with slightly shorter spores (see DÄH, MAR8, FLO, MOS31, KIA18). — *C. polychrous* Henry (= *C. violaceonitens* (Henry) Moëgne-Locc.) [Plate 14] is rare, growing in southern calcareous *Abies* forests see BER, MOS-P. Also this taxon is more robust than *C. scaurus*, and the gills are dark green to violet.

5.2 GILLS WHITISH

Young gills are pale grey to whitish brown. The flesh is usually predominantly white. Observe the colour of veil remnants on the stipe (a white veil may be masked by the stipe colour).

GROUP 2: CAP and VEIL BROWN to YELLOW, STIPE ± CLAVATE

(sect. *Phlegmacium*)

The stipe of young fruit-bodies displays distinct bands or fibrils coloured ochraceous to date brown. Notice that fibres from the cortina (or from the stipital cortex) that get tainted by the spores do not count. Cf. *C. spadicellus*, *russus*, and *pseudonævosus*, which also present brownish veils. Also note that the veil of many *Phlegmacia* darkens with age.

C. triumphans Fr.

Cap 50-120 mm; brightly orange-yellow to yellow-brown with an orange-brown centre; glabrous; margin young pale yellow with brown tufts and fibrils.

Gills greyish white, sometimes with a faint violet reflex.

Stipe cylindrical to clavate, sometimes robust and slightly radicate; pale yellow, with several yellow-brown girdles and bands.

Veil yellow-brown, copious; cortina white.

Flesh compact; white to whitish yellow.

Reactions: NaOH yellow to orange in context, red-brown on cutis and stipital veil; formalin, phenol, guayac, AgNO₃, FeSO₄ trivial.

Spores: 10-13 × 6-7 μm, amygdaliform, fairly coarsely verrucose.

Under *Betula* in woods and parks; fairly common.

Ref.: DÄH, MAR7, PHI, HOL, BON, FLO, BRA11.

Note that the gills may have a faint violet tinge. The fungus is usually quite robust with thick, brown girdles on the stipe, but there exist more slender forms with a sparser veil [*C. crocolitus* Quél. (see MAR7)]. *C. triumphans* often grows outside forests, in gardens, parks, copses, always with birch. It is a rather common species in the Mälär Valley, traditionally used for culinary purpose.

C. saginus (Fr.:Fr.) Fr.

Cap 50-100 mm; yellow-brown with a red-brown centre; glabrous to finely fibrillose, usually with brown, adpressed squamules, margin paler, often with brown tufts.

Gills greyish white, crowded.

Stipe clavate; yellowish white; with brown girdles, fibrils or sometimes merely hazy bands.

Veil date brown, copious; cortina white.

Flesh white with a yellow tinge in stipe.

Reactions: NaOH, AgNO₃, FeSO₄, formalin, lugol, phenol trivial; guayac weakly greyish green.

Spores: 9-11 × 5-6 μm, elliptic to amygdaloid, weakly to moderately verrucose.

In richer *Picea* forests; fairly common.

Ref.: FLO, BRA11, and *C. subvalidus* in DÄH, MAR7, HOL, HEN4.

A spectacular and typical companion of spruce in Central Sweden. The stipital veil is darker and sparser than that of *C. triumphans* (above), and the flesh reacts but insignificantly with alkaline solutions. [The species has also been named *C. subvalidus* Henry and *C. validus* Favre.]

The rare *C. norrlandicus* Brandrud in the same habitat, presents a duller coloration with a grey-brown veil and a weakly viscid cap. It also differs by having smaller spores (see FLO; Rådbjörka).

C. populinus Brandrud

Cap 40-85 mm; warmly ochraceous-yellow; centre somewhat darker; smooth but young with fine squamules, finely innate-fibrillose; margin concolorous.

Gills white to pale grey.

Stipe cylindrical to slightly clavate; white with brownish yellow girdles near base.

Veil yellow to yellow-brown, rather sparse; cortina white.

Flesh white, sometimes with a yellow tinge, fairly fragile.

Reactions: NaOH, formalin, phenol trivial; guayac weak.

Spores: 7-9 × 4.5-5.5 µm, elliptic, moderately but sparsely verrucose.

Under *Populus tremula*; rare. Myttinge, Mortorp, Sura.

Ref.: FLO, BRA11, JEC18C.

A rare species found exclusively under aspen. It is recognised from its clear yellow and white hues, but is easily confused with the similarly coloured *C. turmalis*. The latter differs by a white veil and very narrow spores, and does not normally grow under deciduous trees. Note that the spores agree with BRA11 in size, whereas those reported in FLO are truly wider (an error?). Cf. *C. argutus*, which may possess a darkening veil, as well as *C. luteocingulatus*. [According to molecular evidence, *C. saginus*, *C. norrlandicus* (above), along with *C. populinus* constitute sect. *Phlegmacium*.]

C. tiliae Brandrud is similar, very rare in *Tilia* forests (see FLO, BRA11, JEC3).

C. durus Orton

Cap 50-100 mm; red-brown to greyish yellow-brown; glabrous to finely fibrillose or granulose, margin greyish with sparse, thin, brownish tufts.

Gills pale grey, crowded.

Stipe cylindrical to clavate, robust; white to yellow-white with several adpressed, grey-brown to yellow-brown girdles.

Veil grey-brown to yellow-brown, fairly copious to sparse; cortina white.

Flesh white.

Reactions: NaOH, phenol trivial; guayac strongly blue-green.

Spores: 10-12 × 5.5-7 µm, amygdaloid, moderately verrucose.

In alpine or Arctic heaths with dwarf *Salix* or *Betula*; uncommon. Hamrafjäll, Vassijaure.

Ref.: BRA12, FLO, and *C. errabundus* in MEL10.

This species is exclusively found in alpine environments, where it is often larger than the shrubs it forms mycorrhiza with. It resembles the preceding species, but its colours are duller, more greyish, including the veil girdles on the stipe. [*C. errabundus* Melot is a synonym.]

C. ochraceobrunneus Henry ex Bidaud, Moëgne-Locc. & Reumaux**Plate 3**

Cap 50-100 mm; pale yellow-brown, sometimes with an olive tinge; glabrous, often darker pustulate from tiny squamules at the centre; margin olive-grey.

Gills pale grey-brown; often slightly decurrent.

Stipe clavate to cylindrical; greyish white with several thin, olive-yellow bands, which may be faintly viscid.

Veil olive-yellow to olive-grey, sometimes viscid; cortina white.

Flesh white with an olive-grey tinge; odour faint of "freshly-cut grass"; taste of raw peas or corn.

Reactions: NaOH brownish red on cutis, elsewhere trivial; formalin nil.

Spores: 7.5-9.5 × 5-6 µm, amygdaloid, moderately verrucose, fairly pale.

In *Picea* forests; uncommon.

Ref.: *C. olidoamethysteus* in FUN, BSMF31, and *C. cephalixus* in. MAR7.

Cap and veil are olive-tinged and paler than those of the other members of the group. The small, black or dark-red dots on the cap are typical. With its somewhat viscid veil, the species resembles a stout *Myxaciium*. [The species has been called *C. olidoamethysteus* Henry & Ramm, which is a southern species (see BSMF31), as well as *C. cephalixus* (Secr.) Fr., a name whose interpretation appears to be problematic (but cf. JEC10A).]

C. cliduchus Secr. ex Fr.

Plate 3

Cap 30-80 mm; yellow-brown to greyish yellow; finely innate fibrillose, disk with small, darker brown granules, later guttulate; margin concolorous.

Gills white to pale grey.

Stipe clavate to cylindrical; white with several yellow to yellow-brown girdles or zones.

Veil ochraceous yellow, sometimes with an olive tinge, fairly copious; cortina white.

Flesh white, sometimes faintly marbled violet; odour faint of "freshly-cut grass"; taste nil.

Reactions: NaOH trivial; guayac blue-green; phenol blackish red; formalin nil.

Spores: 9.5-12 × 5-6.5 µm, amygdaloid, moderately verrucose.

In broad-leaf forests, uncommon; Gråborg, Ismantorp, Tveta, Kvisttorp.

Ref.: FLO, and *C. olidus* in PHI, JEC7B, THM1, JEC12C; *C. vitellinopes* in MOS-P.

This fungus is almost identical to *C. ochraceobrunneus* (above), but grows with *Fagus* and *Quercus*, presenting more saturated yellow hues and frankly longer spores. Also cf. taxa in sect. *Anomali*, notably *C. xanthocephalus*, which, however, are only slightly viscid and produce subglobose spores. [The species has sometimes been named *C. olidus* J.E. Lange, which is a rare, southern species (= *C. vitellinopes* (Secr.) Schröt.; see JEC7B).]

C. papulosus Fr.

Cap 35-90 mm; warmly red-brown to purple-brown, sometimes more yellow-brown; mottled by ± dense, dark red to black, grainy squamules on a greyish yellow background, especially near the centre, elsewhere glabrous; margin greyish buff; cuticle tenacious.

Gills greyish white, rarely with a faint violet flush.

Stipe clavate to cylindrical; white with several brown girdles and tufts, which may be viscid.

Veil grey-brown to chestnut-brown, often with a pink to purple tinge, fairly copious, usually distinctly viscid; cortina white.

Flesh white; odour faint of "freshly-cut grass".

Reactions: NaOH saturated grey to greenish grey (± trivial) on cutis and stipital veil; lugol, formalin, phenol, AgNO₃ trivial.

Spores: 7.5-9.5 × 5-6 µm, amygdaloid, weakly verrucose.

In *Picea* forests; uncommon.

Ref.: FLO, MOS-P, JEC18C.

Differs from *C. ochraceobrunneus* (above) by the brown veil lacking an olive tint, which gives the entire fungus a darker, often purple-brown hue. The two species are otherwise quite similar, with the same dark dots at the cap centre and a viscid veil. [Molecular data have shown that they are not closely related, *C. papulosus* being affine mainly to South-Pacific taxa. Moreover, it is uncertain which of the two Fries intended with his epithet.]

GROUP 3: VEIL PALE or SPARSE, STIPE with a MARGINATE BULB
In DECIDUOUS wood (sect. *Multiformes* pp)

Cap colour is pale yellow to yellow-brown, and the alkaline reaction is mostly weak. If the fungus grows with conifers, see the next group.

C. talus Fr. s. Brandrud et al.

Cap 40-90 mm; honey-yellow to almost white or evenly ochre-yellow, glabrous, smooth, young frosty from thin, white fibres; margin greyish yellow, finely fibrillose.

Gills white to pale grey; very crowded.

Stipe with a marginate bulb; white to yellow-white, with a white felt on the bulb, older flushing brownish.

Veil white, sparse; cortina white.

Flesh white, faintly yellow in stipe-bulb; odour sweetish, like honey.

Reactions: NaOH blood red on brown stains on stipe, elsewhere trivial; guayac blue-green; guayac greyish green; phenol nil.

Spores: $7.5\text{--}9 \times 4.5\text{--}5.5\ \mu\text{m}$, elliptic, weakly to moderately verrucose.

Under *Betula*, *Quercus*, or *Corylus*; fairly common.

Ref.: FLO, JEC16B, and *C. multiformis* in LAN.

The cap of this handsome fungus is palest among the *Multiformes*. The melleous odour varies: sometimes so strong as to be detected several metres away, other times hardly perceptible. The remarkable alkaline reaction occurs only on brown areas on the stipe, a character shared by some other taxa in the section. [The name *C. talus* Fr. is doubtful as this should, according to Fries, have an olive tint on the cap, but the name is neotypified (KIA18) and in general use.] Cf. *C. caroviolaceus*.

C. pallidirimosus Kytöv. et al. [Plate 4] with a more greyish white cap and larger spores is rare, growing in northern *Betula* forests (see JEC16B, KIA18; Tuna Fäbod). — *C. gracilior* (Moser) Moser [Plate 10] resembles a miniature *C. talus* with a hygrophanous and more greyish cap. It is rare, growing in southern broad-leaf forests (see MAR7, FND71).

***C. malachoides* Orton**

Plate 5

Cap 35–70 mm, pale yellow to pale ochraceous, finely innate-fibrillose with sparse, thin, white fibrils; margin long involute with thin, brownish fibrils.

Gills very pale violaceous, soon greyish white.

Stipe with a distinctly marginate bulb, white and white-fibrillose.

Veil white, fairly sparse; cortina white.

Flesh white, marbled yellowish or grey; odour none, taste faint, pleasant.

Reactions: NaOH trivial.

Spores: $10\text{--}11.7 \times 6\text{--}7\ \mu\text{m}$, elliptic to subamygdaloid, rather coarsely verrucose.

In alpine *Betula* copses; uncommon. Hamrafjäll.

Ref.: BRA20.

The species is similar to *C. talus* (above), but grows primarily in the northern mountains with alpine birch. [The names *C. fallacecolor* Henry nom. inval. and *C. jotunæ* ined. have also been used for this taxon. Molecular markers place *C. malachoides* in sect. *Riederi* (Ch. 5.3), though it was described (ORT4) as a species in subgen. *Sericeocybe*, similar to *C. malachius*.]

***C. xanthochraceus* Orton**

Plate 6

Cap 50–90 mm; golden-brown to greyish yellow with a honey-yellow tinge, long frosty white, often with white patches; glabrous to finely innate-fibrillose; often with a shallow umbo.

Gills pale grey to brownish grey; very crowded and narrow.

Stipe with a distinctly marginate bulb; white, bulb-margin staining brown.

Veil white, fairly sparse; cortina white.

Flesh white, later creamy, somewhat marbled ochraceous; odour faint, not sweet.

Reactions: NaOH, formalin trivial.

Spores: $7.5\text{--}8.5 \times 4.5\text{--}6\ \mu\text{m}$, obtusely amygdaloid, strongly verrucose, dark.

In *Fagus* woods; southerly; rare.

Ref.: JEC7B, REU, *C. langei* in HRY12, ORT3, *C. rapaceus* in KS4.

The species resembles *C. multiformis* (below), but grows primarily in broad-leaf forests in the South. It differs from the latter mainly by the typical veil patches on the cap. [*C. langei* Henry and *C. fallacecolor* Henry nom. inval. are synonyms.]

***C. subdecolorans* Langl. & Reumaux**

Plate 7

Cap 50–80 mm, not or weakly hygrophanous; warmly yellow-brown, young with an orange tinge and a paler margin, later faintly greyish zoned; finely radiate, innate-brownish fibrillose; cutis remarkably elastic, often with a sinuous, \pm flabby margin.

Gills pale grey; moderately crowded.

Stipe with a rounded to napiform bulb; white, later with a faint tan shade, bulb-margin with date brown fibrils.

Veil white, darkening to brown, fairly sparse; cortina white.

Flesh white to creamy with a tan shade.

Reactions: NaOH darker brown on stipital veil, else trivial; lugol, phenol trivial.

Spores: $8.7\text{--}11 \times 5.5\text{--}6.8 \mu\text{m}$, amygdaloid to citriform/papillate, rather strongly verrucose.

In *Quercus* or *Corylus* woods; southerly; rare. Gråborg, Himmelsberga, Tveta, Åstad.

Ref.: REU, BAL7, and *C. polymorphus* in JEC6, SMF47.

The species differs from *C. talus* (above) mainly by a slightly darker, radially innate-fibrillose cutis, which is unusually elastic, and by a more rounded stipe-bulb. [The name *C. polymorphus* Henry has also been used, but genetical studies have shown that this is a southern fungus, almost identical but more slender with a smoother cutis (see MAR7, AMB21).]

C. osmophorus Orton [Plate 3] is similar, but exhales a strong, nauseating odour, resembling that of *Hebeloma sacchariolens* (see PHI, VES2). It mainly grows in *Fagus* forests in the South. [Like *C. subdecolorans* (above), it occupies an isolated position in the phylogeny.]

***C. saporatus* Britz.**

Cap 40–75 mm; yellow to yellow-brown; glabrous, centre often granulose to spotted; robust.

Gills grey to pale grey-brown, sometimes with a violet tinge; rather thick.

Stipe with a wide, rounded to weakly marginate bulb; white, bulb-margin coated ochre.

Veil yellow, darkening to yellowish brown, sparse; cortina white.

Flesh white, occasionally marbled pale violet; compact; odour faint, pleasant, \pm of "freshly-cut grass".

Reactions: NaOH, guayac trivial.

Spores: $10.5\text{--}12 \times 6\text{--}7 \mu\text{m}$, amygdaloid, strongly verrucose.

In calcareous *Quercus* and *Corylus* forests; southerly; rare. Åstad, Fonnsänget.

Ref.: FLO, BON, MAR7, JEC12C.

This taxon is characterised by its robust stature and wide stipe-bulb. It resembles *C. subdecolorans* (above), but is larger, possessing a sparser veil and larger spores. [It belongs genetically to sect. *Calochroi* s. lato (Ch. 5.3). *C. subturbinatus* Henry and *C. multiformis* Fr. s. Moser (see MOS-P, DÄH, MAR7, HEN4) are possible synonyms.]

***C. caesiocortinatus* Schöff.**

Plate 14

Cap 60–120 mm; saturated yellow to brown-yellow; glabrous, centre slightly brownish flushed or granulate; margin pale yellow with thin, brown, sparse fibrils.

Gills pale grey, sometimes with an evanescent, violet tinge.

Stipe robust, with a marginate, often napiform bulb; white to yellow-white, flushing brownish towards the base; bulb-margin yellow with brownish stains.

Veil yellow, darkening to date brown, very sparse; cortina white to pale violet.

Flesh compact; greyish white, later pale yellow, turning brownish in stipe-base; odour faint.

Reactions: NaOH red-brown to red on cutis and stipital veil, rosy to yellow in flesh; lugol, phenol and guayac nil.

Spores: $7.5\text{--}10 \times 6.5\text{--}7.5 \mu\text{m}$, papillate subglobose to citriform, coarsely verrucose.

In broad-leaf forests; southerly; rare. Himmelsberga, Tveta, Åstad, Österplana.

Ref.: SMF31, MOS-P, JEC13B.

This species is characterised by its brightly yellow cap colour and the rounded, strongly verrucose spores, which distinguishes it from all similar taxa. The gills may sometimes develop a violaceous tint.

GROUP 4: VEIL PALE or SPARSE, STIPE with a MARGINATE BULB In CONIFEROUS forest (sect. *Multiformes* pp)

The cap colour is yellow to orange-brown. The bulb on the stipe may be only weakly marginate, at least on mature specimens. The alkaline reaction is mostly weak in this group.

***C. multiformis* Fr.**

Cap 40-100 mm; usually hygrophanous; golden yellow to ochraceous, sometimes more orange, young frosty white; glabrous but innate-fibrillose towards the margin, often with concentric, hygrophanous rings and spots; margin with a thin, white rim, long decurved, often wrinkled.

Gills greyish white.

Stipe with a rounded to marginate bulb; white to yellowish white; older flushing brownish.

Veil white, sparse to fairly copious; cortina white.

Flesh white, later flavescent; odour faint (*auct.* sometimes honey-like).

Reactions: NaOH blood red on brown stains on stipe, elsewhere trivial; guayac weakly yellow-green; phenol, FeSO₄, acid FeCl₃ trivial.

Spores: 7.5-9.5 × 5-6 µm, elliptic to obtusely amygdaloid, moderately verrucose.

In *Picea* and *Pinus* forests; common.

Ref.: HOL, FLO, and *C. allutus* in DÄH, MAR7, PHI.

The cap is often hygrophanous, which is unusual in the subgenus. The stipe bulb is sometimes only weakly developed with an indistinct margin. [It has earlier often been interpreted as *C. allutus* Fr.] With pine one sometimes finds a form with a brighter yellow cap. If the cap is fibrillose, cf. *C. subrugulosus*.

There exist a number of closely related species within sect. *Multiformis*, all rare, growing in rich *Picea* forests, and depicted in Plate 4: *C. caesiolamellatus* (Bidaud) Kytöv. et al. possesses a darker, mahogany-brown, often more robust cap, and a violet tint in gills and context (see KIA18, JEC16B, REU; Blankared). [The species has also been named *C. rufoallutus* var. *caesiolamellatus* Bidaud and *C. multiformis* var. *cyanoallutus* ined.] — *C. caesiophylloides* Kytöv. et al is more yellow-brown and the gills are slightly violet (see KIA18, JEC16B; Remmen). — *C. armenicorius* Soop & Brandrud presents a handsome, orange-yellow cap with a white rim and pale-brown gills (see JEC16B). It has a southerly distribution and is very rare.

C. rufoallutus* Henry ex Bidaud & Reumaux*Plate 3**

Cap 70-100 mm; not hygrophanous, fleshy; brick red to apricot brown or dark orange, young white frosty; coarsely innate-fibrillose, often rugose or flammeous; margin long involute.

Gills greyish white; very crowded, often serrulate.

Stipe obtusely marginate bulbous, robust; white; later flushing golden orange to yellow-brown, woolly white fibrillose.

Veil white, fairly sparse; cortina white.

Flesh compact, white, ± marbled grey to brownish.

Reactions: guayac greyish green; NaOH, lugol, formalin, phenol, FeSO₄, AgNO₃ trivial.

Spores: 9-10.5 × 5-6 µm, oblong elliptic to amygdaloid, rather weakly verrucose.

In *Picea* forests; rare. Røfors, Ramstigsberget, Mockfjärd.

Ref.: REU, and *C. allutus* var. *rufescens* in HRY11, *C. allutus* in LAN.

Differs from *C. multiformis* (above) by a strikingly handsome, brick to orange colour on the cap, which is not hygrophanous and manifestly more fibrillose, often uneven with small craters. The cutis therefore evokes certain bolets (cf. *Leccinum versipelle*). Also the spores are longer and of a different shape. [This taxon has alternately been named *C. allutus* var. *rufescens* Henry, *C. allutus* Fr. s. Lange, and possibly *C. subhygrophanicus* (Moser) Moser; see HRY15, ORT3.] Cf. *C. napus* (below).

C. fulminoides* (Moser) Moser*Plate 6**

Cap 35-60 mm; not hygrophanous; dark yellow-brown to apricot yellow, glabrous to finely innate-fibrillose; margin pale yellow.

Gills greyish white.

Stipe cylindrical with a marginate bulb; white.

Veil yellowish, sparse; cortina white.

Flesh white, faintly marbled grey-brown; taste unpleasant.

Reactions: NaOH trivial.

Spores: 8.7-10.5 × 4.5-5.5 µm, amygdaloid, moderately verrucose.

In coniferous (especially *Abies*) forests, southerly; uncommon.

Ref.: JEC11B, MOS-P, DAH.

This fungus is similar to *C. multiformis* (above), but more robust and not hygrophanous with an apricot-yellow cap and a yellow veil (see JEC11B). Cf. *C. subrugulosus* and *C. xanthoohraceus*, which are genetically closely related.

***C. napus* Fr.**

Plate 7

Cap 60-140 mm; not hygrophanous, fleshy; saturated orange-brown, later darker red-brown; centre glabrous, sometimes mahogany-brown, often irregularly flammeous or zoned, radially innate-fibrillose; margin pale brown with a white rim and sparse, brownish tufts.

Gills pale grey; edge coarsely, irregularly serrated.

Stipe cylindrical with a robust, sharply marginate bulb of inverse-conical shape; white, later flushing brown or yellowish from the base, also on manipulation; longitudinally white fibrillose.

Veil white, rarely violaceous, darkening to yellow-brown, fairly sparse; cortina white.

Flesh white, slightly yellow in stipe-base; compact.

Reactions: NaOH trivial including stipital cortex; phenol reddish lilac; guayac blue-green.

Spores: 10.5-13.5 × 6.5-8 µm, amygdaloid to citriform, moderately to rather strongly verrucose.

In calcareous *Picea* forests; uncommon. Garphyttan, Rönningen, Styggforsen, Alderängarna, Dalsvallen, Sörviken.

Ref.: MAR8, KS13, KS15, MOS-P.

A rather rare species, characterised by a saturated red-brown cap with irregular colour patterns and a turnip-shaped bulb on the stipe. It is usually quite robust (cap may reach 170 mm and stipe-bulb 50 mm in diameter). Cf. *C. rufoallutus* (above), which is distinguished mainly by the smaller spores.

C. pseudoarcuatorum Henry (= *C. delaporteii* Henry) differs mainly by a violet veil. It is very rare in the same habitat (Klockhammar; see FLO, GMI2, HRY19, JEC13D).

***C. corrosus* Fr.**

Plate 7

Cap 50-120 mm; fleshy; pale ochraceous to yellowish grey; glabrous, centre somewhat granulose, sometimes with red-brown stains.

Gills pale grey to brownish grey; crowded.

Stipe robust with markedly marginate bulb, often with a "moat"; white to pale, bulb margin thinly coated brownish.

Veil pale grey-brown, sparse; cortina greyish white.

Flesh grey-buff to white; compact.

Reactions: NaOH rosy in flesh, red-brown on stipital veil; AgNO₃, FeSO₄, formalin, guayac trivial.

Spores: 9-11 × 5-6.5 µm, elliptic to amygdaloid, strongly verrucose.

In calcareous *Picea* and *Pinus* forests; uncommon. Skogskyrkogården, Glanshammar, Kalkugnsberget, Klikten, Rättviksheden.

Ref.: HOL, MOS-P.

A pale, straw-coloured and very robust fungus with a cap that can reach 150 mm diameter. It has the widest stipe bulb in the group. [*C. corrosus*, like *C. napus* (above), belong to sect. *Calochroi* s. lato (Ch. 5.3).]

The very rare *C. dalecarlicus* Brandrud is less robust with a darker cap. It is northerly, growing with *Picea* (see FLO; Gesunda).

GROUP 5: VEIL PALE, CAP YELLOW-BROWN to ORANGE-BROWN STIPE WITHOUT a BULB (sect. *Claricolores* pp.)

The alkaline reaction is absent in this group, and spores are unusually narrow, fuse-shaped. If the cap is dry, see the next group.

***C. claricolor* (Fr.) Fr.**

Cap 60-120 mm; pale date brown, later ochraceous-yellow with a darker centre; glabrous; margin paler with thick white tufts, often wrinkled.

Gills pale grey; conspicuously crowded.

Stipe cylindrical, often tapering; robust, hard, tall; white; fibrillose with thick white girdles and tufts.

Veil white, sometimes with a yellow tinge, very copious; cortina white.

Flesh white, marbled grey to pale brown.

Reactions: NaOH, guayac weakly grey-green; formalin trivial.

Spores: $7.5-8.5 \times 3.5-4.5 \mu\text{m}$, fusoid to amygdaloid, almost smooth, pale.

In *Picea* and *Pinus* forests; fairly common.

Ref.: DÄH, MAR7, BON, FLO.

A robust fungus of tall stature with a remarkably stiff stipe and a very abundant, white veil, covering most of the fruitbody. It may recall *C. caperatus* (below), but this has a distinctly annulate stipe and no cortina. The form found with pine is usually very large and paler. A less common variety, *immissus* Schlapfer, has greyish-violet gills and a darker cap, and reacts yellow with alkaline solutions (see MOS29; Kalkbro, Röfors). Cf. *C. blattoi*.

***C. turmalis* Fr.**

Cap 40-100 mm; yellow to pale ochraceous with a darker centre; glabrous; sometimes with grey streaks or hygrophanous stains towards the margin; finely innate-fibrillose; margin paler.

Gills clay-grey; very crowded.

Stipe cylindrical or with an indistinct bulb; white, silky fibrillose without girdles; base sometimes stained violet.

Veil white, sparse to fairly copious; cortina white, very copious.

Flesh white, immutable.

Reactions: NaOH nil, including stains on the stipital base; guayac green; lugol, formalin trivial.

Spores: $7.5-9.5 \times 3.5-4.5 \mu\text{m}$, oblong amygdaloid, almost smooth, pale.

In *Picea* forests; usually fasciculate; fairly common.

Ref.: FLO, BREI5, and *C. sebaceus* in DÄH, MAR7, HOL, HEN4.

Resembles *C. claricolor* (above), but the stipe is usually shorter, the cap paler, and the veil considerably sparser. The fungus may acquire violaceous stains on the stipital base. It is almost always found growing in clusters. [The species was earlier named *C. sebaceus* Fr., but this should have distant gills according to Fries. *C. turmalis* has been shown by molecular markers to form an isolated clade with its nearest relative in the South Pacific.]

***C. variegatus* Britz.**

Cap 35-75 mm; brick-red to yellow-brown with a darker disk, young apricot-red with a thin, white to violaceous frost, later with darkening, purplish fibrils, else glabrous; margin pale buff.

Gills pale grey; crowded.

Stipe cylindrical, sometimes with an indistinct bulb; white to yellow-white, with pale yellow-brown to violet, thin, zigzag bands; base sometimes zoned yellow-brown.

Veil reddish lilac to purple-brown, sometimes paler and more yellow-brown, sparse; cortina white.

Flesh white with a faint, yellow shade.

Reactions: NaOH nil.

Spores: $6.5-8 \times 3-4 \mu\text{m}$, oblong elliptic to fusoid, weakly to moderately verrucose.

In *Picea* or *Pinus* forests; usually fasciculate; rare. Röfors, Säs, Vinäsgraven, Bonäsheden.

Ref.: FLO, DÄH, MAR7, JEC5A.

Resembles a red-brown *C. turmalis*, but appears to be genetically remote. The veil remnants on the stipe are sometimes hazy or absent, but with luck one may find specimens with nicely rosy-lilac or violet girdles. [*C. roseolimbatus* (Secr.) Schaeff. is a synonym.]

GROUP 6: CAP YELLOW-BROWN, DRY, CORTINA MEMBRANOUS(sect. *Rozites*)

Species in this group resemble *Cortinarius* in the previous group, but the inner veil (cortina) is not cobweb-like but membranous, leaving a collar on the stipe. [There is in principle only one European member of the group, previously known as the genus *Rozites* Karst. (cf. below), but additional species occur in Asia and the South Pacific. Recent molecular research (PEI3, PEI4) has demonstrated that they are all part of *Cortinarius*, but also that the group is polyphyletic.]

***C. caperatus* Fr.**

Cap 50-90 mm; dry to waxy, not hygrophanous; pale tan to brownish yellow; glabrous or frosty from white to greyish violaceous fibrils; margin paler greyish yellow, young almost grey-white, \pm wrinkled, often with appendiculate cortina remnants.

Gills grey to pale tan, when old often serrulate.

Stipe cylindrical, white, somewhat flavescent from base, with a membranous, striate, pale greyish yellow, erect collar, fixed to cap margin when young; apex zoned, almost pruinose.

Veil white, often shaded violaceous, fairly copious; cortina greyish yellow, not arachnoid.

Flesh white, somewhat flavescent in stipe-base and near cutis; odour and taste phlegmacioid.

Reactions: NaOH, formalin nil; guayac weakly yellowish green; lugol strongly blue-green.

Spores: $10-13 \times 7-8.5 \mu\text{m}$, obtusely amygdaloid, moderately verrucose, strongly dextrinoid.

In mossy *Picea* and *Pinus* forests, also with *Betula* (including alpine *Betula* copses); common.

Ref.: DÄH, HOL, LAN, PHI, BREI5 as *Rozites c.*

A common to very common fungus in most coniferous forests. It is easily recognised from the membranous inner veil, which usually leaves a distinct pale-yellowish collar on the stipe. The young fungus often displays a frosty violaceous tint from the outer veil. The spores turn dark red to reddish orange in iodine solutions (Melzer), which is unusual in *Cortinarius*. *C. caperatus* has a long tradition as an edible fungus in the country. [It was earlier named *Rozites caperatus* (Fr.) Karst.]

A possible second *Rozites* has been reported from the Continent: *R. phaleratus* (Fr.) Bon & Ramm, recombined from a Friesian *Pholiota* (see DM92).

GROUP 7: CAP YELLOW-BROWN to RED-BROWN, DRY, CORTINA ARACHNOID(subsect. *Variecolores* pp)

Cuticle is dry, but the species are usually considered to belong to *Phlegmacium*. Cf. taxa around *C. vespertinus* (Ch. 3).

***C. crassus* Fr.**

Cap 40-100 mm; dry; pale buff to brick-brown, young faintly white frosty; finely innate-fibrillose to furfuraceous, disk finely granulose; margin long involute with a thin, white coating when young.

Gills pale brown to almost white, often spot-wise darkening from spores; edge paler; crowded.

Stipe cylindrical to clavate, robust, often tapering at base; white, flushing brownish on bruising; often with white girdles; apex sometimes pruinose.

Veil white, sparse to fairly copious; cortina white.

Flesh pale buff, marbled cinnamon, darkening to pale red-brown with age and on bruising; texture rather soft and friable; odour faint, fruity.

Reactions: NaOH, lugol, formalin, guayac trivial.

Spores: $7-9 \times 3.5-5 \mu\text{m}$, amygdaloid, weakly verrucose; cheilocystidia slender to \pm swollen, sometimes bent or ramified, 20-35 μm .

In *Picea* forests; uncommon.

Ref.: DÄH, FLO, BREI5, and *C. pseudocrassus* in JOSS, KS6, KS10, MOS-P, JEC2B.

The cap, having a very thin epicutis, may be compared to a piece of bread or pasteboard in colour and texture. The context is soft and easily broken, somewhat like that of *Hydnum repandum*. The presence of

cheilocystidia is also unusual; it should be noted, though, that on some gill edges they occur but sparingly. The fungus recalls *C. balteatus*, which is not closely related; also cf. *C. suillus* (*Telamonia*).

[It is likely that the Friesian epithet designates a combination of this species and *C. balteatus*, which accounts for the creation of a new name *C. pseudocrassus* Joss. One form is possibly identical to *C. opimus* Fr. var. *fulvobrunneus* Fr. Because of its deviating characters, the species has sometimes been placed in *Hebeloma*, and even in a special genus *Meliderma* Velen. *C. crassus* has been shown by molecular markers to occupy an isolated position in the genus, with its nearest relatives in the South Pacific. This section, *Crassi*, is sister to the *C. rubicundulus* clade.]

***C. russus* Fr.**

Cap 30-70 mm; dry; buff to grey-brown, but \pm densely covered by brownish red fibrils; irregularly zoned, sometimes minutely squamulose to spotted; convex with a shallow umbo.

Gills grey to cinnamon, often spot-wise darkening from spores; crowded.

Stipe cylindrical to clavate, often with a short, pointed root; pale greyish buff, covered by a brown to brownish red layer of thin, adpressed fibrils.

Veil brownish red to red-brown, young paler, sparse to fairly copious; cortina pale grey.

Flesh pale greyish yellow, soon yellowish brown to reddish when cut; soft; taste fairly strong, unpleasant.

Reactions: NaOH instantly yellow, soon dark red to brownish red in flesh, golden-yellow on stipital veil; AgNO₃, lugol, formalin trivial; guayac blue-green; phenol reddish lilac.

Spores: 9-11 \times 5-6.5 μ m, amygdaloid, strongly verrucose.

In rich *Picea* forests; rare; often precocious. Hamra, Kalkbro, Lejondal, Styggforsen, Dropphäll, Oviken.

Ref.: KS8, KS11, MEL4, FLO, BRA12.

The fungus gives the impression of a reddish-brown *Telamonia* (cf. *C. balaustinus*), but has crowded gills and is not hygrophanous. The species is further characterised by the alkaline reaction, and by its nauseating taste, recalling some rotten vegetable, even when young and fresh. It is usually more slender than *C. crassus* (above). Cf. *C. norrlandicus*.

GROUP 8: CAP WHITE to PALE BUFF, weakly to moderately VISCID

(sect. *Arguti*, *Elastici* pp)

If the cap colour of young specimens is yellow-brown, see surrounding groups. See also *C. tabularis* (*Anomali*), *patibilis*, and *amarescens*.

***C. argutus* Fr.**

Cap 40-100 mm; sometimes merely weakly viscid; yellow-white, turning pale yellow-brown; glabrous with sparse, innate fibrils, young thinly white frosty; convex with a wide umbo.

Gills strikingly white.

Stipe fusoid, tapering to a short root; hard, tough; whitish, flavescent.

Veil white, sparse; cortina chalky white.

Flesh white to pale yellow, slowly blushing on exposure to air; compact, tough; odour none to fruity, later reminding of "transpiration".

Reactions: NaOH weakly yellow to pinkish; AgNO₃, FeSO₄ trivial; formalin nil to greyish blue; guayac faint.

Spores: 9.5-11.5 \times 5-6.5 μ m, amygdaloid, rather weakly verrucose.

Under *Populus tremula*; fairly common.

Ref.: HOL, MEL3, MEL4, FLO, BRA11.

A very variable species, showing up in large quantities in aspen copses certain years. The flesh normally blushes slowly after cutting (may take a day or more), and then it also turns green to bluish black where manipulated. Also the odour may take a while to manifest itself. It is often asserted that the cap is dry, but this is in fact exceptional. [Because of this the species has sometimes been placed in subgenus *Sericeocybe*.] Cf. *C. durus* and *C. daulnoyæ*.

***C. fraudulosus* Britz.**

Cap 30-80 mm; fleshy; usually distinctly viscid; creamy-white to pale yellow-brown, centre darkening to ochraceous; glabrous to finely innate-fibrillose; margin thinly fibrillose.

Gills pale grey.

Stipe clavate to cylindrical with a small, rounded bulb; hard; white, flavescent; with \pm thick, white girdles.

Veil white, fairly copious; cortina white.

Flesh white, flushing ochre towards stipe-base; odour \pm like "boiled beets", often faint; taste vaguely farinaceous.

Reactions: NaOH weakly yellow, yellow-brown on stipital veil; AgNO₃, FeSO₄, formalin, guayac, lugol, phenol trivial.

Spores: 11-14 \times 7-8 μ m, amygdaloid, strongly verrucose.

In calcareous *Picea* forests; rare. Sjöskogen, Flemingsberg, Mortorp, Fårskär, Östbjörka.

Ref.: KÜH, PHI, BRA11, JEC2B, and *C. argutus* subsp. *fraudulosus* in FLO.

Is quite similar to *C. argutus* (above), and has sometimes been regarded as a subspecies. The taxon differs mainly by significantly larger spores, and by occurring in a different habitat. Also the stipe is normally not rooted, and the veil is usually more copious. [The species is here regarded *s. lato*, including the similar *C. subfraudulosus* Kytöv. et al. [Plate 9]. The latter may be the more common taxon in Northern Europe (see KIA18, JEC18A).]

C. rosargutus is less robust and has smaller and less ornamented spores. Its veil remnants tend to turn yellow-brown at the edges (see FLO, HRY1, BRA11, JEC18A; Dropphäll, Bergkarlås, Sörviken). It is an uncommon species, growing in the same habitat as *C. fraudulosus*, often in ant-hills (presumably due to the higher ambient temperature). Cf. *C. pseudovulpinus*.

***C. balteatoalbus* Henry**

Cap 75-140 mm; slightly viscid to almost dry, fleshy; pale yellow-brown to whitish, later darkening to yellow-brown, finely fibrillose with pale-brown hairs and sparse tufts; margin with a white, floccose rim.

Gills pale grey to white; very crowded and narrow.

Stipe robust with a rounded, sometimes napiform bulb, not rooted; white, gradually flushing pale brown from base, sometimes with brownish tufts and fibrils on the bulb.

Veil white, flushing yellow-brown, sparse; cortina white.

Flesh white, compact; odour insignificant.

Reactions: NaOH strongly yellow in flesh and gills; phenol pink; AgNO₃, lugol trivial.

Spores: 9.5-11 \times 5-6 μ m, amygdaloid, finely verrucose.

Under *Betula*; rare. Grötingen, Gesunda, Bonåsheden.

Ref.: HRY15, KS24, FLO, BRA12, JEC2B.

This rare species is characterised by its pale hues, in particular on young fruit-bodies, and the weak alkaline reaction. [*C. conrescens* Bidaud et al. is a synonym.] Cf. *C. fraudulosus* (above), which has larger spores and grows with conifers.

C. areni-silvæ (Brandrud) Brandrud, growing with *Pinus*, possesses markedly smaller spores (7.5-9.5 μ m long), and produces a golden-yellow alkaline reaction on the stipital veil (see FLO, BRA12; Storuman, Bonåsheden, Skogskyrkogården). — *C. balteatibulbosus* Kytöv. et al. (Plate 8), growing with *Fagus* and *Corylus*, is quite similar but the cap is darker, the stipe more marginate-bulbous, and the alkaline reaction weaker (see KIA18; Djurgårdsön, Gråborg).

C. leucophanes* Karst.*Plate 1**

Cap 25-65 mm; distinctly viscid; ivory-white to creamy-yellow with a more yellow disk, older pale brown; glabrous, sometimes with sparse, yellow-brown fibrils; rounded, later campanulate or convex with a wide umbo; margin long involute.

Gills greyish, usually with an evanescent, rosy to violet tinge; crowded.

Stipe clavate to cylindrical with a small bulb; silky white, felty, greying on pressure; older with brownish yellow fibres, apex sometimes violet.

Veil white to pale violet, fairly copious; cortina white to pale violet.

Flesh white, marbled violet, older greyish yellow in stipe; soft.

Reactions: NaOH weakly red-brown or trivial; lugol trivial; guayac weak.

Spores: $5.5\text{--}7 \times 3.5\text{--}4.5 \mu\text{m}$, elliptic, weakly verrucose, pale.

In *Pinus* forests, usually among *Cladonia*; fairly common in the North, rare in the South.

Ref.: KS3, KS6, KS16, KS17, BAL1, and *C. compar* in HRY2.

An attractive little fungus, silky smooth with tender hues and a lilac flush to the gills. It is characteristic for the sandy pine heaths of the North, and possesses uncommonly small and pale spores. The species has also been found with *Larix* (Silverknoten), and a form whose context stains yellow to ochraceous on pressure and exposure has been collected under *Salix* (Lövsta, Skärmarö). [*C. compar* Fr. is probably a synonym.] Cf. *C. pinophilus* (Ch. 3).

The very rare *C. lustratus* Fr. is almost identical and produces similar spores. It is more southerly, growing in *Picea* and broad-leaf forests (see MOS-P, ORT3, JEC1B). It is usually more robust than *C. leucophanes* and exhales a farinaceous odour. [Molecular data show that the two species form a clade together with Central American taxa.]

GROUP 9: CAP BROWN, possibly with a VIOLET MARGIN, weakly to moderately VISCID (subsect. *Balteati* pp)

The species are robust and fleshy, tending to fruit early in the season. If the cap is purple-brown or entirely violet, see the next group. Cf. *C. varicolor*.

***C. balteatus* Fr.**

Cap 40-140 mm, weakly viscid, soon dry, fleshy; grey-brown, sometimes more red-brown when old; rough, fibrillose, later tufted and rimose, margin young pale lilac or white; convex with a long involute margin.

Gills pale grey, occasionally with a faint violet shade.

Stipe clavate, robust; white; fibrillose.

Veil white, sparse; cortina greyish white.

Flesh white, turning yellow-brown, marbled grey.

Reactions: NaOH weakly yellow, soon orange in flesh, yellow-brown on stipital veil; AgNO₃ brownish pink; lugol, formalin trivial, guayac faint.

Spores: $8.5\text{--}11 \times 5\text{--}7 \mu\text{m}$, amygdaloid, rather strongly verrucose.

In *Picea* and *Pinus* forests; precocious; fairly common.

Ref.: MOS-P, FLO, BRA12, and *C. subbalteatus* in HOL, KÜH, *C. crassus* in LAN, MEL4, KS6.

This species may become very large and heavy. The cap margin is persistently pale, but only sometimes displays a violet tinge, though it should be noted that this is not due to a violaceous veil, as is the case for many other *Phlegmacia*. The form occurring under pine often has a more glabrous, waxy cap surface. [The species is also named *C. subbalteatus* Kühner as there is some uncertainty as to whether Fries designated this or *C. balteatocumatilis* (below) by the epithet *balteatus*.] Cf. *C. violaceomaculatus*.

***C. pseudonævosus* Henry**

Plate 8

Cap 40-90 mm; weakly to distinctly viscid; yellow-brown to brownish grey, sometimes with a faint violet tinge, brownish spotted or granulose on disc; fairly coarsely innate-fibrillose; margin paler, young faintly violaceous, with thin, brownish tufts, long involute.

Gills pale grey, occasionally with a faint violet shade; sometimes weakly decurrent.

Stipe cylindrical to ± clavate, sometimes slightly tapering; white, later flushing yellowish, with brown to vinaceous-brown fringes on lower half.

Veil date brown to wine-brown, paler when young, fairly sparse; cortina white.

Flesh white, marbled pale brownish to pale violet.

Reactions: NaOH strongly yellow in flesh, yellow to reddish on cutis and stipital veil; lugol dark purple-brown; formalin nil to yellowish red (25'); guayac strongly green; phenol red; AgNO₃ trivial.

Spores: $11\text{--}13.5 \times 5.5\text{--}6.5 \mu\text{m}$, amygdaloid, moderately verrucose.

In *Picea* forests; rare. Frötuna, Gesunda, Fettjan, Sörviken.

Ref.: BRA12; *C. schæfferianus* in MOS-P, REU, and *C. vacciniophilus*, *C. acidophilus* in FLO.

Resembles *C. balteatus* (above), but is more ochraceous with a brownish veil and larger spores. Young specimens may display a violet tinge on the cap margin. A useful character is the strong chemical reactions, approaching those of *C. patibilis* and allies. [*C. vacciniophilus* Brandrud, *C. acidophilus* Brandrud, and *C. schæfferianus* (Moser) Moser nom. inval. are all synonyms.] (See BRA12, MOS-P.)

***C. balteatocumatilis* Orton**

Cap 50-130 mm, distinctly viscid; violet with a dark brown centre; innate-fibrillose; viscid; margin long intensely violet, fleshy with an involute margin.

Gills greyish white to white.

Stipe clavate to cylindrical, sometimes pointed at base, often short, robust; white, young coated violet, base yellow-brown.

Veil saturated violet, copious; cortina white.

Flesh white; compact.

Reactions: NaOH slowly yellow in flesh, brick-red on stipital veil; AgNO₃, formalin trivial.

Spores: 10-11.5 × 5-6 µm, oblong amygdaloid, moderately to rather coarsely verrucose.

Under *Quercus* or *Betula*; uncommon.

Ref.: PHI, HOL, MOS-P, BRA12, FLO; and *C. balteatus* in MAR7, MEL4, LAN.

The fruitbody has beautifully violaceous hues when young, and the cap is distinctly viscid. It is one of our largest *Cortinarius*, with a thick, inflated, often fusoid stipe.

GROUP 10: CAP PURPLE-BROWN to entirely VIOLET, distinctly VISCID (sect. *Claricolores* pp.)

The violet tint is more or less evenly distributed over the cap surface and not concentrated at the margin as in the previous group. The fungi in this group are rare.

***C. cumatilis* Fr.**

Cap 50-85 mm; beautifully violet to lilac; glabrous to finely innate-fibrillose; margin slightly paler with a white border when young.

Gills greyish white to white, sometimes with a violet shade.

Stipe cylindrical to weakly clavate; white, young faintly violet with a white, fibrillose layer.

Veil white with a violet tinge, fairly copious; cortina white.

Flesh white, marbled grey with a violet tinge; odour faintly rubbery.

Reactions: NaOH reddish on cutis, elsewhere trivial; AgNO₃, formalin trivial.

Spores: 9.5-11.5 × 5-6 µm, amygdaloid, moderately verrucose.

In rich *Picea* forests; uncommon, rare in the North. Tyresta, Kvisttorp, Röfors.

Ref.: DÄH, MAR7, HOL, FLO, MOS-P.

An attractive fungus, easy to recognise from the intense cap colour, which may vary from dark violet to pale lilac, contrasting against the white gills.

***C. serarius* Fr.**

Cap 50-120 mm; warmly violaceous-buff to pale purple-brown, fading when old; glabrous to finely innate-fibrillose, cuticle thick, elastic; margin long violet.

Gills pale grey to grey, rarely with a faint violet tinge.

Stipe cylindrical to slightly clavate; white, young faintly violet with thin, felty, white remnants.

Veil white, occasionally with a violet tinge, sparse; cortina white.

Flesh white, marbled grey with a violet tinge.

Reactions: NaOH nil to weakly yellow; lugol black (including cutis and gills); AgNO₃, formalin trivial; guayac weak.

Spores: 10.5-13 × 6-7.5 µm, amygdaloid, weakly verrucose.

In rich *Picea* forests; rare. Gräsvreten, Kalkbro, Frötuna, Ramstigsberget, Fanthyttan.

Ref.: FLO, BRA12.

Recalls *C. cumatilis* (above), but the cap has a brownish-lilac hue of a warm, handsome shade that is quite characteristic. The veil is sometimes slightly viscid on the stipe. Cf. *C. borgsjæensis*.

C. præstans (Cord.) Gill.

Cap 60-150 mm; fleshy; dark umber with a purple tinge and thin, greyish white, diffuse patches; wrinkled towards the margin, which is paler, silvery-violet; convex with a long involute margin.

Gills grey to pale violet; crowded, narrow; edge serrulate.

Stipe clavate, robust, sometimes fusoid when young; whitish; young with thick, breaking, pale violet to white girdles.

Veil pale violet to grey, copious; cortina white with a blue tinge.

Flesh compact; white, with a faint violet tinge when young, turning slightly brown-yellow in the stipe when cut.

Reactions: NaOH weakly yellow; lugol trivial; guayac blue-green; phenol weakly rosy.

Spores: 14.5-17 × 8-10 µm, elliptic to citriform, dark, moderately and densely verrucose.

Under *Quercus* and *Corylus*; rare. Ismantorp, Munkängarna, Hellasgården, Näsudden.

Ref.: MAR2, BON, FLO, MOS-P, and *C. variegatus* in HEN1.

The largest and most imposing of our *Cortinarius* with a cap that may reach 210 mm in diameter. Even the spores are enormous. On the Continent it is regarded as the best edible species in the genus.

The rare *C. blattoi* Mazza is rather similar but presents a red-brown cap and smaller spores. It grows with *Picea* and *Betula* in the alpine region of the country (see JEC15A).

5.3 GILLS VIOLET

The gill colour is pale blue to deep violet, possibly merely greyish lilac. Check whether stipe and flesh darken on manipulation. Has the cap, at least somewhere, an olive tinge? Notice that a few species, whose gills may have an evanescent, violet shade, were treated in preceding chapters (*C. triumphans*, *cæsiolamellatus*, *cæsiocortinatus*, *claricolor*, *leucophanes*, *herpeticus*, *pseudonævosus*, *præstans*).

With the exception of *C. prasinocyaneus*, none of the species in this chapter possesses subglobose spores. If your fungus does, see Ch. 4 (sect. Anomali, Delibuti). You should then look for yellowish veil remnants on the stipe, especially if the fungus grows with *Betula*.

In this chapter there are many **pairs** of similar Phlegmacia (the taxa associated with conifers to the left, with broad-leaf trees on the right):

<i>variegatus</i>	<i>largus</i>
<i>varius</i>	<i>luteocingulatus</i>
<i>anomalochrascens</i>	<i>argenteolilacinus</i>
<i>cæsiostramineus</i>	<i>amænolens</i>
<i>metarius</i>	<i>calochrous</i>
<i>cæsiocinctus</i>	<i>nymphicolor</i>
<i>cæsiocanescens</i>	<i>cærulescens</i>
<i>dibaphus</i>	<i>arcuatorum</i>

GROUP 11: FLESH turns LILAC or REDDISH when BRUISED

(sect. *Purpurascens*, *Cyanites*)

On manipulation the flesh, and perhaps also gills and stipe, acquire a deeper hue. This character works well only on humid specimens; under dry conditions you may have to wait a long time for the colour change. Check the reaction, if any, with iodine solutions (lugol; see the Introduction and cf. *C. scaurus*).

[Taxa (except the last) in this group belong to the monophyletic section *Purpurascentes*, which is present on both hemispheres, thus indicating an ancient origin (KS44).]

C. porphyropus (Alb. & Schwein.) Fr.

Cap 40-80 mm; clay-grey with sparse, brown fibres, older pale ochre; margin pale grey to violet with pale-violet fringes; often with a wide umbo.

Gills saturated violet; darkening on manipulation.

Stipe clavate; silky greyish white, young covered by violet fibrils; blushing reddish lilac to purple when bruised.

Veil violet, sparse; cortina pale violet.

Flesh greyish violet, marbled violet; darkening on manipulation; odour usually fruity to honey-like, sometimes like bitter almonds.

Reaction: NaOH nil to weakly yellow; lugol dark reddish lilac; phenol brownish black; formalin, guayac trivial.

Spores: $8.5\text{--}10.5 \times 5\text{--}6 \mu\text{m}$, elliptic to cylindrical; rather strongly verrucose.

Under *Betula*, including *B. nana* in alpine heaths; fairly common.

Ref.: HOL, LAN, HRY1, FLO.

May look like a robust *C. azureus* (sect. *Anomali*), but differs mainly by the colour change when bruised. In rare cases the entire fruitbody is deep violet from the beginning. Cf. *C. anomalochrascens*, which may exhibit a similar coloration.

The similar but rare *C. subporphyropus* Pilát is a tiny fungus (cap barely 30 mm diam.) that grows in the same habitat. Its spores are longer, reaching $13 \mu\text{m}$ (see KÜH, BREI5, JEC14B; Røfors). [*C. mendax* Bidaud et al. is probably a synonym.]

C. purpurascens Fr.

Cap 40-80 mm; red-brown to date brown, sometimes with an olive tinge; margin \pm violaceous; glabrous to finely brownish fibrillose, especially towards the margin.

Gills pale to saturated violet, darkening on manipulation.

Stipe with a \pm marginate bulb; greyish violet, blushing deep red-violet on manipulation.

Veil and cortina greyish violet, sparse.

Flesh greyish white with a violet tinge, blushing deep violet on manipulation; sometimes with a fruity odour.

Reaction: NaOH, formalin trivial; lugol dark violet.

Spores: $7.5\text{--}9 \times 4.5\text{--}5.5 \mu\text{m}$, obtusely amygdaloid to subelliptic, coarsely verrucose.

In rich *Picea* forests; fairly common.

Ref.: DÄH, MAR7, PHI, HOL, BON.

The species is not infrequent late in the season. It is darker and significantly more robust than *C. porphyropus* (above), and is provided with a distinct stipital bulb. Older specimens often turn dark purple-brown.

C. subpurpurascens (Batsch) Fr. (= *C. purpurascens* var. *largusoides* Henry) [Plate 14], is similar but the cap is yellow-brown and the stipe is clavate. It grows in southern broad-leaf woods (see LAN, MOS-P, AMB18, JEC14B).

C. cyanites Fr.

Cap 50-80 mm, viscid to almost dry; blue-grey, often grey-brown to olive-grey at the centre, margin ash-grey; smooth or with sparse brown fibrils and tufts; matt; long rounded, finally convex, fleshy with an involute margin.

Gills saturated greyish blue to lilac; conspicuously thick, narrow.

Stipe robust, clavate; violet to greyish blue, also olive-grey; with brown, longitudinal fibres; base sometimes red spotted.

Veil violet to blue; cortina pale blue to grey.

Flesh greyish blue, marbled violet, blood red to vinaceous when cut or manipulated, especially in stipe; taste slightly acerbic.

Reactions: NaOH, AgNO₃, FeSO₄, formalin, lugol trivial.

Spores: 7.5-10 × 4.5-6 µm, elliptic to obtusely amygdaloid, coarsely verrucose, fairly dark.

In calcareous deciduous or mixed woods; uncommon.

Ref.: HOL, MOS-P, FLO.

A remarkable species with a blue tint rarely seen with other *Cortinarius*. It seems to appear in one form with olive-brown and in one with violet tones. The spectacular red coloration of the context is instant if the fungus is fresh and humid. The cap may be almost dry, and the species is therefore sometimes placed in other subgenera. [This fact, along with sporal variations, indicates that one is faced here with a complex. Genetically, the taxon splits into a number of distinct species, including *C. boreocyanites* Kytöv. et al. and *C. violaceorubens* Moënné-Locc. & Reumaux (see KIA18).]

GROUP 12: STIPE WITHOUT a MARGINATE BULB; young cap MARGIN VIOLACEOUS, FLESH IMMUTABLE when bruised

(subject. *Variecolores* pp)

Members of the group display a characteristic alkaline reaction whose intensity varies with the concentration of the reagent and the humidity of the fungus. The coloration may be more yellow with a weak alkaline solution or with ammonia, more brown after a while, and is often surrounded by a paler yellow rim. If the cap is whitish, see *C. leucophanes*, and if it lacks violet coloration, see the next group.

C. variecolor (Pers.:Fr.) Fr.

Cap 40-150 mm; viscid, soon dry, fleshy; grey-brown to date brown, usually fairly dark, with a wide violet margin when young; brownish innate-fibrillose to granulose.

Gills violet to greyish violet, edge paler.

Stipe clavate, robust; whitish, sometimes with a violet sheen, base yellow-brown from thin fibrils.

Veil violet, darkening, sparse; cortina white to pale violet.

Flesh greyish white, marbled violet, compact; odour of "boiled red beets", taste somewhat unpleasant.

Reactions: NaOH yellow to yellow-brown in context, weakly red-brown on cutis; guayac blue-green; lugol black; formalin nil.

Spores: 10-12 × 5.5-6.3 µm, amygdaloid, rather strongly verrucose.

In *Picea* forests, but also in *Quercus* and *Corylus* copses; fairly common.

Ref.: DÄH, MAR7, BON, FLO, BRA12.

The violet cap margin soon turns brown, like the gills. In deciduous woods one finds the variety *nemorensis* Fr., which is sometimes regarded as a separate species (see JEC12B). It is often claimed that the type has a more obnoxious, "terreous" odour, but there is considerable variation in this character and the odour is sometimes faint. Cf. *C. balteatocumatilis*.

C. largus Fr.

Cap 50-120 mm; violaceous grey when young, sometimes with a pink shade, later pale grey-brown to yellow-brown, grey-violet towards the margin; glabrous.

Gills violet to grey-violet.

Stipe clavate to cylindrical, rarely tapering; white or pale violaceous to pale grey-brown.

Veil whitish to violet, flushing pale yellow-brown, sparse; cortina white to violaceous-grey.

Flesh white to pale violet, marbled violet.

Reactions: NaOH weakly yellow in flesh, yellow to orange on cutis and stipital veil; lugol blue-green; guayac green-blue.

Spores: 9.5-11.5 × 5.5-6.5 µm, amygdaloid, moderately to rather strongly verrucose.

In *Quercus* and *Corylus* copses; uncommon.

Ref.: FLO, BON, DÄH, BRA12, AB30, JEC12B.

This species is less common than *C. variecolor* (above), from which it differs mainly by its paler colours with a more clear blue component, by a weaker alkaline reaction, and by the habitat. Cf. *C. balteatus*.

In southern calcareous *Fagus* forests one may find the rare *C. eliae* (= *C. lividoviolaceus* (Henry ex. Moser) Moser [Plate 8], which is somewhat smaller (see MAR7, MOS10, BREI5, JEC12B). — *C. daulnoyae* (Quél.) Sacc. (= *C. chromatophilus* Henry) [Plate 8] is considerably paler than *C. largus*. It displays white to pale grey-brown and violaceous hues, and is very rare with *Betula* and *Quercus* (Saltarö; see JEC18B, JEC18D, MAR8).

***C. violaceomaculatus* Brandrud**

Cap 40-100 mm; grey-brown to dark yellow-brown, older umber; glabrous, centre somewhat darker and granulose; margin young pale violaceous, later with sparse, coarse, brown fibres.

Gills grey to grey-brown, sometimes with a pale violet tinge.

Stipe clavate to cylindrical, base often slightly pointed; whitish with a violaceous sheen above, saturated violet towards the base; with coarse brown fibres on lower part; apex pale blue.

Veil dark brown, fairly copious; cortina pale brown to pale violet.

Flesh pale tan to greyish white, occasionally ochraceous in stipe and violaceous near cortex; taste faint, unpleasant.

Reactions: NaOH yellow to orange in context and on stipital veil, gills dark yellow, cutis reddish brown; formalin strongly reddish lilac (25'); phenol greyish red (5'); guayac strongly greyish green; AgNO₃ weakly grey-green; lugol trivial.

Spores: 9-11 × 5-6 µm, amygdaloid, moderately to rather coarsely verrucose.

In calcareous *Picea* forests; rare. Bosarve, Billudden.

Ref.: FLO, BRA12, JEC12B, and *C. cyanobasalis* in REU.

Primarily recognised by the strong violaceous tint on the stipe, especially its lower half, and by the dull, brownish cap. The species otherwise recalls *C. varicolor* (above), while the rich chemical properties remind of *C. patibilis* (below). [The name *C. cyanobasalis* Henry nom. inval. has sometimes been used.]

A similar, very rare and unnamed species with a felty-tomentose cutis and larger spores has been found in rich *Picea* forest [Tyresta]. It was earlier identified as *C. balteatotomentosus* Henry (KSv10), which, however, has been shown genetically to be a synonym of *C. balteatus*.

GROUP 13: STIPE WITHOUT a MARGINATE BULB; cap MARGIN NOT VIOLACEOUS (subsect. *Variecolores* pp)

Several taxa in the group display strong alkaline reactions in line with those of the previous group.

***C. patibilis* Brandrud & Melot**

Cap 30-100 mm; pale tan to yellow-brown, young silky-white, disc darker; innate fibrillose with a squamulose to granulose centre; soon dry; margin with white to pale grey-brown tufts, long involute.

Gills grey to grey-violet, soon clay-grey, sometimes serrulate.

Stipe clavate to cylindrical; white, zoned, sometimes with white girdles that soon turn brownish at the edges, apex pale violet, base brownish.

Veil white, sparse to rather copious, darkening to pale ochre; cortina white.

Flesh greyish white, often marbled greyish violet; odour faint, fruity; taste rather unpleasant.

Reactions: NaOH golden yellow to orange on stipe cortex, orange to brick-red, soon brown in stipital context; formalin inconsistently yellow-red (<5') in flesh and particularly on gills; guayac strongly blue-green; lugol grey-violet to reddish black; AgNO₃ yellow-green; phenol strongly red to pink.

Spores: 10.5-13.5 × 5.5-6.5 µm, amygdaloid, moderately verrucose.

In all kinds of *Picea* forests; uncommon.

Ref.: FLO, MEL6, BRA12, and *C. spadiceus* in KS18, *C. amigochrous* in KS3.

Differs from most taxa in *Variecolores* by a more slender build and paler colours. Though the veil remnants may become as thick as those of *C. claricolor*, there also exist forms with a sparse veil. The chemical reactions are unusual and spectacular, and the orange-coloured formalin reaction on the gills is unique. The species is probably overlooked and is perhaps not so infrequent in the spruce forests of Central Sweden.

C. spadicellus Moser

Cap 40-150 mm, fleshy; slightly viscid; yellow-brown to pale greyish tan; smooth, thinly innate-fibrillose, often with coarser, sparse, brownish fibrils; margin with a white rim when young

Gills pale violet or greyish white, very crowded.

Stipe cylindrical to somewhat clavate, robust; greyish white with brownish girdles near base, sometimes slightly peronate.

Veil white to pale violaceous or pale grey-brown, rather sparse; cortina white.

Flesh white, soft, slightly flushing brown on exposure; odour faint, fruity; taste faint, unpleasant.

Reactions: NaOH yellow, later orange in context; AgNO₃ yellow-green; lugol grey-violet; formalin yellow to reddish; FeSO₄ trivial.

Spores: 10-12.8 × 5-6.5 μm, amygdaloid, moderately verrucose.

In *Picea* or mixed forests; rare. Blankared, Myttinge, Borrberg.

Ref FLO, BRA12, MAR7; and *C. latus* in KS24, KS36.

A rare species recalling *C. patibilis* (above), but has a thinner veil and a smoother, evenly tan cap evoking a loaf of bread. [*C. amigochrous* Kühn and *C. latus* Fr. s. Soop are synonyms.]

C. borgsjæensis Brandrud differs by a greyer and soon drying cap, making the fungus look like a taxon in sect. *Malachii*, but is recognised primarily by its lack of alkaline reaction (see FLO, BRA12; Kalkbro, Arvselen, Hammerdal, Vuollerim). It is rare, growing in rich *Picea* forests.

C. varius (Schaeff:Fr.) Fr.

Cap 40-100 mm; beautifully yellow-brown with a darker, date brown centre; glabrous, smooth.

Gills violet or at first pale grey, soon greyish violet with an intensely lilac edge.

Stipe clavate or with a rounded, rarely ± marginate bulb, robust; chalky white; smooth; often with yellowish bands near bulb.

Veil white, sparse; cortina pale violet to white.

Flesh chalk white.

Reactions: NaOH intensely yellow in flesh, nil elsewhere; AgNO₃ citrinous; formalin nil; lugol black.

Spores: 9.5-11 × 5.5-6.5 μm, amygdaloid, moderately verrucose.

In calcareous *Picea* forests; fairly common, rarer in the North.

Ref.: DÄH, MAR7, HOL, BON, FLO, BRA11.

An attractive species with a golden cap and strikingly blue gills. It recalls *C. metarius*, which, however, possesses a marginate stipe-bulb.

The rare **C. decolorans** (Pers.) Fr. [Plate 7] is similar and found in the same habitat (Tjaukle, Billudden), but lacks the lilac tint on the gills. [It has often been considered a variety of *C. varius* (see MOS-P), but as shown by molecular markers, Fries' original conception of a segregate species should be retained.] — **C. pini** Brandrud is a rare species found in calcareous *Pinus* forests (see FLO, BRA1, JEC9B; Rullsand). It differs from *C. varius* by a more slender habit and a paler cap and gills.

C. luteocingulatus Bidaud & Fillion

Cap 40-75 mm; golden dark yellow to yellow-brown with a darker, sometimes orange-brown centre; finely innate-fibrillose with fairly coarse fibrils outside the disc, margin paler.

Gills beautifully amethyst lilac, fairly broad.

Stipe cylindrical to clavate, occasionally with a pointed base; white with ± hazy brown girdles.

Veil yellow to date brown, sparse; cortina white.

Flesh white.

Reactions: NaOH red-brown on cutis and flesh, elsewhere nil; guayac greenish blue; lugol black.

Spores: 10-12 × 5.5-6.5 μm, amygdaloid, rather coarsely verrucose.

In calcareous broad-leaf forests; rare. Halltorp, Himmelsberga, Österplana.

Ref.: BID12, and *C. variiformis* in FLO, BRA11, and as a variety of the latter in REU.

Another attractive fungus with a striking combination of golden cap and lilac gills. It is very similar to *C. varius* (above), but grows in a different habitat and may be recognised from its usually distinct and

contrasting yellow-brown velar remnants on the stipe. These evoke *C. ochraceobrunneus*, which, however, displays a different gill colour. [The species was earlier considered a variety of *C. variiformis* Malençon, which is a very similar, but southerly species (see HRY1),]

***C. pseudovulpinus* Henry**

Cap 35-50 mm; greyish, soon yellow-brown; felty, rather coarsely innate-fibrillose; margin fibrous, young with thick, pale greyish fringes.

Gills pale violet to greyish violet.

Stipe cylindrical to slightly clavate; white, peronate with thick, ochraceous-yellow girdles, often forming a collar, apex sometimes violet.

Veil pale ochraceous, flavescent, copious; cortina white to pale grey.

Flesh soft, white, after cutting rapidly turning intensely yellow, especially in lower stipe; odour strong, acerbic, unpleasant; taste similar but faint or nil.

Reactions: NaOH nil; guayac greenish; phenol dark purplish lilac.

Spores: 11-13.5 × 6-7.5 µm, amygdaloid, moderately to fairly strongly verrucose.

Under *Carpinus* or *Corylus*; rare. Halltorp, Åstad.

Ref.: BSMF31, and *C. vulpinus* subsp. *pseudovulpinus* in FLO, BRA11.

A relatively small and often flaccid fungus, typical for southern hornbeam forests. The species is mainly characterised by the abundant, ochraceous veil and especially by its strongly flavescent context. [It has sometimes been regarded as a subspecies of *C. vulpinus*.]

The similar *C. vulpinus* (Velen.) Henry (= *C. rufoalbus* Kühner, *C. fluryi* (Moser) Moser), growing in southern *Fagus* forests, has a non-yellowing context and an even thicker, peronate veil (see DÄH, FLO, MAR7).

GROUP 14: STIPE with a ± MARGINATE BULB; CAP FIBRILLOSE with a ± OLIVE-BROWN tinge (sect. *Glaucopodes* pp)

With one exception the cap exhibits an olive tinge, at least on the margin. Most species have a distinctly marginate bulb. If the cap is glabrous or paler (white, grey, buff), or exhibits a distinct, violet tinge, see subsequent groups.

***C. glaucopus* (Schaeff.:Fr.) Fr.**

Cap 50-110 mm; yellow-brown to olive-brown; irregularly mottled from brown fibres; margin young olive-grey, long involute.

Gills violet to greyish blue, long with a bluish shade.

Stipe with a ± marginate bulb, often short, robust; pale yellow, shiny zoned grey-violet, sometimes entirely grey-violet; base yellow-brown.

Veil olive-yellow to olive-brown, sparse; cortina pale grey with an olive or violet tinge.

Flesh yellow-white with violet or olive-grey areas, yellow-brown in stipe-base.

Reactions: NaOH red-brown on stipital veil, elsewhere trivial; lugol, phenol, formalin trivial.

Spores: 7-9 × 4.5-5 µm, elliptic, moderately to rather strongly verrucose, dark.

In *Picea* forests; fairly common, late in the season.

Ref.: DÄH, MAR7, PHI, HOL, HEN4, BON, FLO.

A variable species that may be quite common in late autumn. It is best recognised by the cap structure: mottled and fibrous, often maculated, giving an "untidy" impression. Another good character is the unusually small spores. The rare variety *olivaceus* Moser has a dark olive-brown cap and a wide, marginate stipe-bulb (see DÄH; Lejondal, Billudden).

There exist several taxa similar to *C. glaucopus*, all in sect. *Glaucopodes*, three of which are illustrated in Plate 11: *C. pansa* (Fr.) Fr. may be described as an orange-brown form with a more glabrous cap (see HEN4). It is rare, growing in calcareous *Picea* forests (Bonäsheden). — *C. magicus* Eichhorn in broad-leaf forests is also closely related (see HEN4, ZMYK3; Tveta). — *C. olidoamarus* A. Favre [= *C. misermonitii* Chevassut & Henry], also in broad-leaf forests, has a paler cutis and greyish gills (see BAL5, REU; Kvisttorp).

C. subrugulosus Bidaud & Armada

Plate 6

Cap 30-100 mm; ochraceous yellow with white to pale yellow patches; coarsely greyish innate fibrillose; margin grey-white with white fibrils.

Gills white to pale greyish, sometimes with a faint violet tinge.

Stipe with a rounded to marginate bulb, robust; white, \pm yellowish towards base when older, bulb margin with a white coating.

Veil white, darkening, sparse to rather copious; cortina whitish.

Flesh white to pale greyish yellow; odour faint, fruity.

Reactions: NaOH yellow in context, red-brown on cutis, nil on stipital veil; guayac green; phenol trivial.

Spores: $7.5-9-5 \times 5-5.7 \mu\text{m}$, elliptic to amygdaloid, rather strongly verrucose.

In calcareous *Picea* forests; rare. Fårskär, Rullsand, Rättviksheden.

Ref.: MAR7, HRY20.

This species is similar to *C. glaucopus* (above), but is almost devoid of violet tones, and the cap is paler. In addition, the veil is white, often forming white patches on the cap, and the spores are slightly wider. [The taxon has been regarded as a variety *acyaneus* Moser of the latter (see BRE15), but molecular evidence shows that it is distinct.] Cf. *C. subdecolorans*.

C. dionysæ Henry

Cap 30-80 mm; dark yellow-brown with an olive tinge, young thinly greyish frosty, older saturated, warmly yellow-brown to date brown in centre; coarsely innate dark-grey fibrous; margin often distinctly green when young.

Gills neatly greyish blue.

Stipe with a wide, marginate bulb, sometimes with a "moat"; pale greyish blue, \pm yellowish towards the base; bulb-margin olive-brown.

Veil grey-brown to ochre or greenish, sparse; cortina grey-blue.

Flesh grey with a violet, later yellow tinge in stipe-base; marbled greyish violet; odour \pm distinct, farinaceous; taste strong, farinaceous.

Reactions: NaOH yellowish in flesh, red-brown on stipital veil; guayac, lugol trivial.

Spores: $9-11.5 \times 5.5-6.5 \mu\text{m}$, citriform to amygdaloid, coarsely verrucose.

In calcareous *Picea* forests; rare. Fårskär, Bergsäng, Styggforsen, Östbjörka, Råbergsängarna.

Ref.: MAR7, MOS-P, FLO, SVA36, JUR.

One of the few *Cortinarius* with a strong, mealy odour, or at least taste. Barring this character, it may be difficult to separate it macroscopically from *C. glaucopus* (above), but *C. dionysæ* is usually more slender with a wider stipe-bulb, and the cap margin is often distinctly green. In addition, it has significantly larger spores. [It is possible that *C. dionysæ* is applicable only to a southern species, and that the name *C. olivaceodionysæ* Ortega et al. should be used instead for Nordic collections (see OGA17, KIA18).]

C. aureopulverulentus Moser

Cap 35-70 mm; pale yellow-brown to greyish buff, often with an olive tinge or entirely olive-brown, darker at centre; fibrillose to striate brown; margin young olive-grey to whitish with a thin yellow rim.

Gills beautifully violet.

Stipe with a marginate bulb, sometimes with a "moat"; frosty white with a violet shade, yellowish or dirty brown towards the base; bulb-margin usually distinctly yellow.

Veil strikingly butter-yellow, fairly copious, often viscid; cortina grey-violet.

Flesh greyish white with a yellow to olive tinge in stipe; marbled violet.

Reactions: NaOH pink in flesh, blood red on cutis and stipital veil; guayac, AgNO₃, lugol, formalin, phenol trivial.

Spores: $11-14 \times 7-8.5 \mu\text{m}$, citriform to amygdaloid, coarsely verrucose.

In calcareous *Picea* forests; rare. Fårskär, Kungshol, Tubbobäcken.

Ref.: FLO, SMF33, MOS-P, ORT3, JEC4A, JEC5B.

The fungus resembles *C. metarius* (below), but differs by duller, more olive tones and a more fibrillose cutis. It may be separated from *C. glaucopus* by the alkaline reaction, by the yellow veil, which settles on the bulb-base, and especially by the large spores.

C. prasinocyaneus Henry

Plate 14

Cap 35-75 mm; grey with an olive tinge, young with violaceous zones, later turning \pm yellow to dark yellow-brown; coarsely innate, brownish fibrillose; margin young with a violet felt and thin, violet fibrils.

Gills strongly violet.

Stipe clavate, occasionally with a rounded bulb; dark bluish lilac, remaining so, with thin, violet fibrils; base yellowish.

Veil violet, sparse; cortina grey-white.

Flesh white, more yellow in stipe-base and cap, weakly marbled violet; taste faint, unpleasant.

Reactions: NaOH red to red-brown on cutis and stipital veil, elsewhere weak or nil; phenol purple-red; lugol, guayac trivial.

Spores: $8.5\text{--}10.5 \times 7.5\text{--}8.5 \mu\text{m}$, subglobose, not papillate, coarsely verrucose.

In calcareous *Corylus* and other broad-leaf forests; very rare. Åstad, Tveta.

Ref.: HRY11.

A strange and rare *Phlegmacium*, characterised mainly by its colour combination and its remarkably rounded, strongly warty spores, comparable only with those of *C. caesiocortinatus*, to which it is closely related. The cap is greyish olive, whereas the stipe is persistently blue with a metallic sheen, the flesh being pale in contrast. [By some authors the name has been interpreted differently (e.g. MAR8) as a taxon with oblong spores.]

GROUP 15: CAP GLABROUS, YELLOW to BROWN, often with an OLIVE tinge
(sect. *Calochroi* s. str.)

These fungi grow preferably on calcareous soil. The stipe is provided with a marginate bulb and the cap sometimes displays an olive shade, perhaps only at the margin. If the cap has a violet tinge, see subsequent groups. [The very large section *Calochroi* s. lato, with over 80 confirmed species, has been shown to be monophyletic and probably endemic for the Northern Hemisphere (GAR4, GAR6). It would no doubt qualify as a separate subgenus.]

C. metarius Kauffm.

Cap 35-110 mm; yellow to brown-yellow, often brilliantly so, disk often stained by darker, yellow-brown to red-brown granules; glabrous; margin young citrinous to greenish.

Gills greyish with a violet shade.

Stipe with a marginate bulb, sometimes with a “moat”; white with a violaceous sheen; bulb-margin yellow, later yellowish brown.

Veil yellow to citrinous, darkening, sparse; cortina white to violaceous-grey.

Flesh white to pale grey, more yellow in cap, sometimes marbled violet.

Reactions: NaOH red on cutis and stipital veil, pink to rusty-brown in context.

Spores: $9.7\text{--}11.7 \times 5.7\text{--}7 \mu\text{m}$, amygdaloid, rather strongly verrucose, fairly dark.

In calcareous *Picea* and *Pinus* forests; uncommon.

Ref.: JEC4, JEC19; *C. barbarorum* in FND29, REU; and *C. calochrous* var. *coniferarum* in FLO.

A handsome fungus with the special combination of yellow cap and violet sheen on stipe and gills. It is the most frequent representative of the *C. calochrous* complex, with many sister species in various habitats (see below, and cf. GAR4, FRØ3). [The species is probably identical to *C. arquatus* Fr. s. Moser (see MOS-P). *C. barbarorum* Bidaud et al. is a synonym.] Cf. *C. caesiocortinatus*.

Three species are almost identical to *C. metarius*, rare in rich or calcareous *Picea* forests; they are depicted in Plate 12: **C. barbaricus** (Brandrud) Frøslev et al. (= *C. calochrous* var. *barbaricus* Brandrud; see FLO, FRØ4; Rättviksheden), with a rather strong violet coloration on stipe and gills, has larger spores ($10.5\text{--}13 \times 6.5\text{--}8 \mu\text{m}$). — **C. piceae** Frøslev et al. [= *C. calochrous* var. *coniferarum* (Moser) Nezdójm.] lacks both the alkaline reaction and the violet tinge (FRØ4; Sjöskogen, Rättviksheden). — The very rare **C. kristinae** Brandrud lacks violet tints but exhibits a strong, red alkaline reaction (BRA19; Alderängarna, Foskflon).

The type of the section, *C. calochrous* Fr. is found with *Fagus*. It is often somewhat smaller than *C. metarius* and the stipe is slender, provided with a wide bulb with a "moat" (see FLO, DÄH, MAR7) — *C. cisticola* Frøslev & Jeppesen [= *C. calochrous* var. *caroli* (Velen.) Nezdójm.; Plate 12] has been found in calcareous *Corylus* copses. It is paler with beautifully violet gills, a whitish veil, and larger spores (see FLO, FRØ2; Åstad).

C. ionodactylus Knuts. & Soop

Plate 9

Cap 50–70 mm; dark date brown to reddish brown; rather coarsely innate-fibrillose, somewhat mottled and rugose; margin more grey-brown with a violet tinge.

Gills persistently deep violet.

Stipe with a marginate bulb; pale violet with dark violet fibrils at bulb margin.

Veil violet, sparse.

Flesh white, immutable even in bulb; odour faint, more or less fruity; taste indistinct, somewhat acerbic.

Reactions: NaOH red to reddish brown on cutis, else trivial; guayac pale greyish green; lugol nil.

Spores citriform to subamygdaloid, $9\text{--}11.5 \times 5.7\text{--}6.5\ \mu\text{m}$, coarsely verrucose.

In calcareous *Corylus* copses, rare. Himmelsberga, Åstad.

Ref.: JEC7A.

This beautiful species differs from taxa in the *C. calochrous* complex by a dark red-brown to date brown cap, contrasting against the violet of gills and stipe. It is very rare, found in calcareous pastures with *Corylus*.

C. ionochlorus Maire has a strongly yellow-green cap and brilliantly lemon-yellow stipe. It is southerly, rare, growing with *Fagus* (see FLO, ROUX). [Despite its violaceous gills, it is genetically identical to *C. atrovirens*, which grows with conifers ("morphospecies", see FRØ3).]

C. elotoides Moser & McKnight

Cap 50–110 mm; dark olive-brown to pale grey-brown, sometimes with a green tinge and yellowish spots or squamules at centre, older often paler; glabrous, somewhat mottled; margin with brown fibrils or patches.

Gills grey, sometimes with a faintly violet or greenish tinge.

Stipe robust with a wide, marginate bulb with a "moat"; white, sometimes thinly coated violet or entirely lilac, bulb-margin olive-brown, sometimes with a violaceous band.

Veil \pm violet, flavescent, sometimes yellow-brown, sparse; cortina yellow to yellow-white.

Flesh compact; white, sometimes violet in stipe-bulb, brown-yellow in cap, weakly marbled grey; taste possibly slightly bitter.

Reactions: NaOH intensely orange to date brown on cutis and bulb-margin, nil in flesh; lugol, guayac trivial.

Spores: $10.5\text{--}14 \times 7\text{--}8\ \mu\text{m}$, amygdaloid, coarsely verrucose.

In calcareous *Picea* and *Pinus* forests; rare. Fårskär, Kalkugnsberget, Rättviksheden, Kungshol, Vallmån.

Ref.: MOS23, and *C. pseudoglaucopus* in FLO, MOS-P, JEC2B.

The fungus is characterised by its imposing size (cap may reach 170 mm and stipe bulb 55 mm in diameter), its dark brown to olive-brown cap, and by its large spores. It may be totally lacking blue colour tones, but sometimes the stipe and bulb-margin are nicely violet. [The species has often been named *C. pseudoglaucopus* (J. Schäff. ex. Moser) Quadr.] Cf. *C. pseudoarquatus* (below), and *C. herpeticus*, which occur in forms with violet gills.

C. camptoros Brandrud & Melot

Cap 40–100 mm; hygrophanous; yellow-brown with an orange-brown centre, young with thin, white to silvery patches; more greyish tan at the margin; glabrous with isolated white fibres; often lobed or asymmetric with a thick, elastic cutis.

Gills greyish white to violet.

Stipe with a vaguely marginate, \pm napiform bulb; silvery whitish, often with a violet tinge, flushing brownish yellow; bulb margin with a brownish lilac shade.

Veil white, darkening to pale brown, very sparse; cortina white to greyish violet.

Flesh white to pale tan, faintly marbled silvery greyish violet, maculated grey-brown to yellow-brown in stipital base; taste slightly bitter.

Reactions: NaOH red on cutis, weakly red on stipital veil and in flesh, nil on gills; phenol weakly rosy; guayac blue-green.

Spores: $9-11 \times 5.3-6.3 \mu\text{m}$, citriform to amygdaloid, moderately verrucose.

In calcareous broad-leaf forests; rare, southerly. Himmelsberga, Åstad.

Ref.: FLO, MEL6, SVA36.

A rather colourless fungus, characterised by its hygrophanous and unusually elastic cap, which is sometimes of a somewhat irregular shape.

Three very rare *Phlegmacia* in southern, calcareous, broad-leaf forests are similar: *C. luhmannii* Münzm. et al. [Plate 9] is strongly fibrillose (earlier interpreted as *C. caesiogriseus* Schäff. or as *C. subarquatus* (Moser) Moser; see JEC6, SVA36, BREI5, JEC15A; Åstad). — *C. subhygrophanus* Bidaud [Plate 11] is more colourful; it is darker with an olive tinge on the cap margin and displays strongly violet stipe, gills and flesh (see REU, JUR, JEC15C). — *C. viridocæruleus* Chevassut & Henry (= *C. lepistoides* Frøslev & T.S. Jeppesen) [Plate 10] is olive-brown with violet gills and stipe (see BRA8, DM100). It is closely related to *C. camptoros*.

GROUP 16: CAP PALE, in CONIFEROUS forest

(sect. *Riederi* pp, *Calochroi* s. lato)

The stipe is usually provided with a marginate bulb. As in the preceding group the cap is often brownish, but is considerably paler or tending to orange. If the fungus grows in deciduous woods, see the following groups.

C. pseudoarquatus A.H. Sm.

Plate 5

Cap 40-110 mm; ochraceous to orange-brown; radially and densely brownish fibrillose, later more ochraceous.

Gills strikingly, saturated bluish violet.

Stipe clavate, often tall and robust with a wide bulb; shining violet when young, later grey and flushing yellow-brown, mycelial felt violet.

Veil yellow-brown to greyish ochraceous, sparse; cortina white to greyish violet.

Flesh white to grey-violet, strongly marbled violet, yellow in stipe-base.

Reactions: NaOH, formalin, lugol trivial.

Spores: $11-14.5 \times 7-9 \mu\text{m}$, elliptic to amygdaloid, rather coarsely verrucose.

In rich *Picea* forests, also with *Pinus*; uncommon.

Ref.: SMI6, and *C. fulvoochrascens* in KS16; *C. riederi* in BRA20.

A remarkable fungus with an imposing stature. It is characterised by a robust and strongly clavate-bulbous stipe of a saturated bluish-violet colour. Also the gills, stipe and mycelial coating on the stipe-bulb are bluish, while the cap is contrastingly ochraceous, sometimes even orange (cf. *C. herpeticus*). The spores are unusually wide, which may also be used as a character. [The species has been interpreted as *C. riederi* (Weinm.) Fr. s. Melot, and as *C. fulvoochrascens* Henry; *C. fuscomaculatus* Schäff. is a synonym.]

C. anomalochrascens Chevassut & Henry (Plate 5) differs mainly by a more grey-brown cap and shorter spores ($\sim 12 \mu\text{m}$). The species is uncommon in the same habitat (see BRA20, EST2; Ramstigsberget, Rådbjörka).

C. caesiostamineus Henry

Plate 10

Cap 30-75 mm; pale buff-grey to pale yellow, sometimes slightly darker at centre; radially greyish fibrillose to almost glabrous; margin finely white fibrillose.

Gills grey-violet.

Stipe with a rounded to marginate bulb; white to grey-white with a blue tint, apex often violet.

Veil white to pale yellow-brown, sparse; cortina grey-white with a blue tint.

Flesh white to yellow-white, marbled greyish violet, fragile; taste mild or slightly bitter, odour pleasant, agaricoid or fruity to honey-like.

Reactions: NaOH weakly yellowish; formalin weakly greenish yellow (<10'); guayac weakly greyish green; lugol trivial.

Spores: $7.5-9.5 \times 4.5-5.5 \mu\text{m}$, amygdaloid, weakly verrucose.

In rich *Picea* forests; rare. Fårskär, Kalkbro.

Ref.: HRY11, MOS-P, KS27, FND29.

A pale fungus with distinctly violet gills and a more or less fibrillose cap. The context may be slightly bitter, possibly only as an after-taste.

C. amarescens Moser [Plate 10] is sometimes regarded as a synonym, but is probably a distinct taxon, more frequent than *C. caesiostamineus*. It differs by a distinctly bitter taste, a glabrous cap, smaller stature, stronger ornamented spores, and by lacking blue tints (see DÄH, MOS-P, and *C. caesiostamineus* in FLO, VES2; Fårskär, Frötuna, Rättviksheden, Hamrafjäll). [This taxon may be identified as *C. cremeiamarescens* Kytöv. et al. (see KIA18).]

C. caesiocinctus Kühner

Plate 13

Cap 35-95 mm; greyish white to pale tan with a violet tinge towards margin, usually with a faint, olivaceous-green shade (see below), later turning more yellow-brown; glabrous to finely innate-fibrillose.

Gills grey with a violet tinge.

Stipe with a widely marginate, sometimes napiform bulb, often with a "moat"; white to weakly violaceous, apex darker violet, bulb-margin violet.

Veil violet, oxidising to yellow-brown, sparse; cortina white.

Flesh white to pale yellowish, sometimes marbled weakly violaceous; taste mild to slightly bitter.

Reactions: NaOH reddish pink to cherry-red on cutis, reddish on stipital veil, weaker in context; guayac green; lugol, phenol, formalin nil.

Spores: $11.5-13.5 \times 6.5-7.5 \mu\text{m}$, amygdaloid, rather coarsely verrucose.

In calcareous *Picea* forests, uncommon. Enån, Rättviksheden, Karmeråsen, Skansberget, Sörviken, Foskflon.

Ref.: AMB32, BAL4.

The species resembles *C. nymphicolor* (below), but acquires a more yellow-tan hue and grows in coniferous forest. It also recalls *C. metarius* (above) but possesses a violet veil. This veil, when superimposed on the pale-yellow parts of the cutis may give rise to a greenish colour effect.

The preceding taxon was formerly known in the country as *C. spectabilis* Moser (see MOS-P, AB30, JUR), informally as var. "*borealis*", but Moser's name refers to a different, more robust, southern species growing with *Pinus*. — The similar *C. cobaltinus* Kytöv. et al. is genetically close. It is rare, growing in rich, northerly *Picea* forests (see KIA18).

GROUP 17: CAP PALE, occasionally with a LILAC tinge, in BROAD-LEAF forest

The cap may exhibit a faint violet or olive shade. The stipe is provided with a marginate bulb.

C. amoenolens Henry

Cap 60-90 mm; pale yellow to yellowish grey, sometimes with an olive tinge, older grey-brown at the centre; glabrous; margin young with olive-grey fibrils.

Gills violet to grey-violet, crowded.

Stipe with a marginate or \pm rounded bulb, grey-violet, older yellow-brown, apex pale violet; bulb margin greyish ochre.

Veil olive-grey with a violet tinge, sparse; cortina white.

Flesh greyish blue, marbled violet; odour fruity to somewhat rubber-like; taste distinctly bitter with a disagreeable after-taste.

Reactions: NaOH pale brown-red on cutis, flesh trivial; formalin, guayac trivial.

Spores: $9.5-11.5 \times 5.5-7 \mu\text{m}$, citriform to amygdaloid, strongly verrucose.

In calcareous *Fagus* forests; southerly; fairly common.

Ref.: MAR7, HEN4, HOL, PHI, VES2, and *C. anserinus* in FLO.

The fungus is typical of calcareous *Fagus* forests in the South. It is characterised by its pale greyish-yellow cap colour and the bitter taste, which is often said to be concentrated to the cuticle. [The species has also been interpreted as *C. anserinus* (Velen.) Henry, which, however, was not described as bitter.]

C. caroviolaceus Orton is similar but the taste is mild (ORT3, JEC6). The gills are whitish, sometimes with a violet tinge. *C. aleuriosmus* Maire var. *aphanosmus* Moser is a synonym (see MOS28), while *C. aleuriosmus* type (see LAN, PHI, MOS-P) is a different taxon recognised from its strong farinaceous taste and odour. Both species are rare, growing in southern broad-leaf forests.

***C. argenteolilacinus* var. *dovrensis* Brandrud**

Plate 5

Cap 45-110 mm; grey-brown to pale tan, rather finely innate-fibrillose, later with coarser, darker fibrils; margin paler with grey-brown, sparse fibrils.

Gills greyish with a violet tinge.

Stipe clavate or with a rounded bulb; white with a faint violet tinge, young coated with thin brown fibrils.

Veil dark brown, sparse; cortina pale grey with a violet tinge.

Flesh white, marbled violet, sometimes slightly flavescent.

Reactions: NaOH, AgNO₃, lugol, guayac, formalin trivial.

Spores: 11-13.5 × 7-8.5 μm, elliptic, coarsely verrucose.

Mainly in alpine *Betula* forests, rarely southerly with *Corylus*; uncommon. Klikten, Hamra, Flatruet.

Ref.: BRA20.

A typical cortinar among *Betula* shrubs in the alpine area, characterised by a greyish-white, fibrillose cap and wide spores. The latter character is shared by the somewhat similar *C. pseudoarquatus* (above) in coniferous forests, which is closely related.

C. argenteolilacinus Moser type (Plate 6) is similar, but southerly, rare, growing mainly in broad-leaf woods. With a more glabrous, tan-coloured cap and more saturated violet gills it resembles *C. amænolens* (above), but is not bitter in taste (Gråborg; see BRA20, SMF47, MOS-P.) [These taxa belong to sect. *Riederi*.]

***C. nymphicolor* Reumaux**

Plate 13

Cap 40-75 mm; buff-grey to pale lilac, sometimes almost white, older yellow-white with a buff-yellow centre; glabrous, occasionally finely granulose at centre; sometimes with a violet-tinted margin.

Gills nicely violet.

Stipe with a widely marginate bulb, often with a "moat"; silky; pale to saturated violet, older yellowish toward the base, apex violet; bulb-margin brownish violet to ochraceous.

Veil violet, later ochraceous, very sparse; cortina greyish white.

Flesh grey to grey-violet, marbled violet, yellow-white in stipe-base.

Reactions: NaOH weakly pink to rosy.

Spores: 8.5-10 × 4.5-6 μm, amygdaloid.

In calcareous *Fagus* forests; southerly; rare.

Ref.: REU, JEC9B, and *C. rickenianus* in PHI, KS4, MOS-P, VES3.

A pale violet, sometimes almost white, tender and attractive *Phlegmacium* with a wide bulb, found with some luck in beech forest. Darker specimens may be difficult to separate from *C. amænolens* (above), which has a bitter taste and is often more robust with olive tints. More violaceous specimens, on the other hand, may be separated from *C. arcuatorum* (below) by the weak alkaline reaction as well as the spore size. [*C. rickenianus* Maire nom. inval. is a synonym.]

There exist several related species that may lend confusion, e.g. *C. platypus* Moser [Plate 13], which is smaller with a white veil and somewhat longer spores (see MAR7, KS4, FND29; Åstad). [This taxon has often been interpreted as *C. parvus* Henry or possibly as a variety of *C. calochrous* (see BER, BRE15, FLO, MOS-P).] Cf. *C. ionodactylus*.

***C. cærulescentium* Henry**

Cap 50-90 mm; pale grey to greyish buff, sometimes with a faint violet shade when young; greyish silvery from finely innate fibrils, older with sparse, thin, grey-brown fibrils; margin young violet.

Gills violet-grey.

Stipe with a wide, marginate bulb, often with a "moat", white to pale grey with a faint violet tinge; bulb margin faintly yellow.

Veil violaceous, oxidising to yellowish ochre, sparse; cortina pale violet to grey.

Flesh greyish white, marbled violet to violet-grey, yellowish near cap and stipe cortex.

Reactions: NaOH weakly yellowish to trivial; guayac, phenol nil.

Spores: 8.5-11 × 5.5-6.5 µm, elliptic to weakly amygdaloid, coarsely verrucose.

In calcareous broad-leaf forests; uncommon. Tveta, Åstad, Munkängarna.

Ref.: FLO, VES2, MOS-P, and *C. boudieri* in JEC12A.

Usually quite a robust fungus with greyish hues throughout, sometimes with diluted violaceous shades. [*C. boudieri* Henry is a likely synonym.]

GROUP 18: CAP with a VIOLET TINGE**(sect. *Cærulescentes*)**

The stipe has a distinctly marginate bulb. The cap may be intensely violet to incarnate, or merely display an evanescent, blue tinge. The species in the group are rare in Sweden, growing exclusively on calcareous soil, mainly in the South. Cf. the preceding group (*C. nymphicolor*).

***C. cæsiocanescens* (Moser) Kühner & Romagn.**

Cap 30-90 mm; greyish brown with a violet tinge, often fairly pale with an ochraceous shade at centre and a violaceous margin; smooth, finely innate-fibrillose, older yellow-ochre with adpressed squamules at centre.

Gills grey to grey-violet.

Stipe with a (often widely) marginate bulb; nicely greyish violet, apex pale violet; bulb-margin ochraceous.

Veil greyish yellow to yellow-ochre, very sparse; cortina pale greyish violet.

Flesh grey-white to pale yellow, marbled grey-violet, ochraceous in stipe-base; taste sometimes strong, unpleasant.

Reactions: NaOH yellowish in flesh, pink on cutis.

Spores: 8-10.5 × 5-6 µm, amygdaloid, moderately verrucose.

In calcareous *Picea* forests; uncommon. Tjaukle, Fårskär, Rättviksheden, Sörviken.

Ref.: MAR7, HRY15, FLO, MOS-P, JEC12B.

A fungus with grey-violet hues throughout. The cap may turn yellow quite fast, and even half-grown specimens can then be very unlike the young ones.

C. cærulescens (Schæff.) Fr. (= *C. cæsiocyaneus* Britz.) is quite similar, growing in southern, calcareous *Fagus* woods (see LAN, BON, VES2, FLO; Åstad, Laxare). Cf. *C. cærulescentium* (above). — Another rare species growing with *Fagus*, *C. suaveolens* Bat. & Joachim, differs mainly by a strong, sweetish odour (see FLO, MAR7, ZMYK3, MOS-P).

***C. eucæruleus* Henry**

Cap 60-100 mm; strongly saturated violet, later fading to grey-brown from the centre; glabrous to innately dark-lilac fibrillose; margin darker violet.

Gills saturated lilac.

Stipe with a marginate, sometimes wide bulb, pale violet, soon white, yellowish when old.

Veil violet, sparse; cortina white with a violet tinge.

Flesh white to greyish white with a violet tinge in cap, marbled violet, slightly flavescent in stipe-base.

Reactions: NaOH yellowish in flesh, elsewhere trivial; guayac green; formalin nil.

Spores: 9.5-12.5 × 6-7 µm, elliptic to amygdaloid, rather strongly verrucose.

In calcareous broad-leaf forests; southerly; rare. Himmelsberga, Tveta, Åstad, Österplana.

Ref.: JEC12A, and *C. terpsichores* in VES3, FLO, SMF47; *C. caeruleascens* in MAR7, HEN4, MOS-P.

A remarkably beautiful fungus with deeply lilac-blue cap and gills, hardly possible to confuse with other taxa. [It was earlier often misinterpreted as *C. caeruleascens* (above). *C. terpsichores* var. *calosporus* Melot is a synonym, and *C. cyaneus* (Bres.) Moser is probably to be regarded as a form (see MAR7).]

C. terpsichores Melot (Plate 9) is similar, but possesses smaller, less ornamented spores ($7.5\text{--}9.5 \times 5\text{--}6 \mu\text{m}$; see MEL7, JEC12A).

***C. sodagnitus* Henry**

Cap 35-60 mm; intensely lilac to blue-lilac, often fading to ochraceous-yellow or yellowish grey; glabrous to finely innate-fibrillose; margin often spotted darker violet.

Gills dark violet.

Stipe with a widely marginate bulb with a "moat", pale greyish tan to violaceous, with strongly lilac patches on bulb margin when young; apex silvery-violet.

Veil intensely violaceous-lilac, sparse to fairly copious; cortina greyish white.

Flesh white, violet near stipe cortex, and pale yellow near cutis; mild.

Reactions: NaOH cherry-red on cutis and stipital veil, elsewhere weakly yellow to trivial; phenol reddish brown; guayac weak.

Spores: $8.5\text{--}10.5 \times 5\text{--}6 \mu\text{m}$, amygdaloid, moderately to fairly coarsely verrucose.

In calcareous *Fagus* and *Corylus* woods; southerly; rare. Tveta, Åstad.

Ref.: BON, PHI, FLO.

A rather small *Phlegmacium* with beautiful violaceous-lilac hues, which, however, sometimes fade quickly. It is also characterised by a very wide stipe-bulb, and especially by the strongly red alkaline reaction on the outside (not inside) of the fruitbody.

Quite similar but with a more greyish or ochraceous, fibrillose cap is *C. violaceipes* Bidaud & Consiglio (= *C. parasuaveolens* (Bon & Trescol) Bidaud et al.; Plate 13). It is very rare, growing in southern *Quercus* forests (see REU, JEC15C, FND29, OGA14, FRØ13).

***C. arcuatorum* Henry**

Cap 50-120 mm; warmly buff to incarnate with a faint violet tinge, especially when young; glabrous; margin usually violet-toned.

Gills pale violet to greyish white.

Stipe with a wide, marginate bulb with a "moat", immutably white; bulb-margin violet to reddish lilac.

Veil violet to reddish lilac, later pale brown, sparse; cortina white, sometimes with a faint violet tinge.

Flesh white, sometimes faintly yellow in cap, marbled weakly violet; taste somewhat unpleasant, bitter; strongly reddish when dried.

Reactions: NaOH intensely and instantly lilac-red on cutis, context, and stipital veil; formalin, lugol, guayac, phenol trivial.

Spores: $9\text{--}11 \times 5.5\text{--}7 \mu\text{m}$, amygdaloid to citriform, moderately to rather strongly verrucose.

In calcareous broad-leaf forests; rare. Gråborg, Tveta, Halla, Fonnsänget, Munkängarna.

Ref.: FLO, DÄH, HRY11, MOS-P, VES3, AMB21.

This quite robust fungus is easy to recognise from its white stipe, contrasting against the very special, warm hue of the cap. The latter may be likened to "meat": tan with a tender violet tint from the veil. The species is also well characterised by the brilliant and spectacular red alkaline reaction in the context (cf. *C. dibaphus* below).

***C. dibaphus* Fr.**

Cap 35-80 mm; violet, sometimes with grey-brown or yellow-brown zones, reddish lilac towards margin; glabrous.

Gills pale violet to greyish white.

Stipe with a rounded to marginate bulb, intensely violet with a paler apex.

Veil saturated violet, rather sparse; cortina pale violet to white.

Flesh white, marbled violet; taste somewhat bitter.

Reactions: NaOH intensely cherry red to rosy on flesh, gills, and stipital veil; guayac yellow-green.
 Spores: $10-12 \times 6-7 \mu\text{m}$, amygdaloid, rather coarsely verrucose. Sterile cells numerous in the hymenium.
 In *Pinus* and *Abies* forests; southerly, uncommon.
 Ref.: MAR7, FLO, MOS-P, AMB21.

Shares the bitter taste and the spectacular alkaline reaction with *C. arcuatorum* (above) — a feature which is otherwise unique among comparable *Phlegmacia* — differing principally by the intensely violet stipe. It is mostly found in southern *Abies* forests, and it is uncertain whether it occurs in Sweden. [Records of *C. dibaphus* in broad-leaf forests in the country must be regarded with some scepticism; they may be ascribed either to *C. arcuatorum* (above), or possibly to another southern species, *C. nemorosus* Henry (see BER). Moreover, it is uncertain whether this is Fries' species, as he specifically states the taste as mild.]

5.4 GILLS YELLOW

The gill colour is grey-yellow to green-yellow or pure yellow. The veil is always coloured but sparse — one should examine the bulb margin of young specimens. In addition, the veil and other parts of the fruitbody of many species gradually oxidise to a red or purple shade. The cuticle, and sometimes the flesh, usually stain red with alkaline solutions. Excepting the first group, the stipe is provided with a more or less marginate bulb. Practically all have conspicuous spores with coarse, often isolated warts. Check the smell. Does the cap colour include a red component?

Most species in this chapter are rare in Sweden, and all grow in calcareous soil, many in southern beech or oak forests. Also here there are pairs of similar species (the one associated with conifers on the left, with deciduous trees on the right):

<i>mussivus</i>	<i>nanceiensis</i>
<i>sulfurinus</i>	<i>flavovirens</i>
<i>orichalceus</i>	<i>rufoolivaceus</i>
<i>aureofulvus</i>	<i>olearioides</i>
<i>elegantior</i>	<i>quercilicis</i>
<i>meinhardii</i>	<i>majusculus</i>
<i>atrovirens</i>	<i>citrinus</i>

[Species lacking a marginate bulb (sect. *Percomes*) form phylogenetic clades separated from most of the other sections. The latter (sect. *Fulvi*, etc.) have been shown by molecular analysis (GAR1, FRØ3) to nest in sect. *Calochroi* s. lato (Ch. 5.3).]

GROUP 19: ODOUR SPECIAL, DISTINCT, stipe WITHOUT a MARGINATE BULB

(sect. *Percomes*)

The odour may be likened to "lemon cake", "apples", or "boiled beets". If the stipe possesses a markedly marginate bulb, see subsequent groups where other interesting smells may occur.

C. percomis Fr.

Cap 60-130 mm; yellow to ochraceous, sometimes with a pink tinge at centre; glabrous with sparse brown tufts or fibres, later entirely buff; margin citrinous.

Gills pale citrinous; edge slightly darker.

Stipe cylindrical to clavate; pale yellow, apex citrinous; older with longitudinal brown fibres.

Veil citrinous, sparse; cortina pale greyish yellow.

Flesh beautifully citrinous; pronounced odour of "lemon cake".

Reactions: NaOH red in stipital context and veil, elsewhere trivial; AgNO₃, formalin, lugol, guayac trivial; phenol weakly orange.

Spores: $10.5-13 \times 6-7 \mu\text{m}$, amygdaloid, coarsely verrucose.

In calcareous *Picea* forests; uncommon.

Ref.: DÄH, MAR8, HOL, BON, FLO.

An attractive fungus with brilliantly yellow colours. The superb odour is unmistakable; it has been compared to various spices (e.g. marjoram), sometimes to cake, and even to urine, but a component of lemon always seems to be present.

***C. nanceiensis* Maire**

Cap 30-95 mm; yellow-brown to olive-brown with a darker disk, with a mahogany tinge when older; glabrous, later dark mottled; margin paler, olive-yellow.

Gills greenish yellow to pale grey-green.

Stipe clavate; olive-yellow to greyish yellow, apex pale citrinous-yellow, base olive-grey to purple.

Veil olive-brown, later vinaceous-brown, sparse; cortina white to greenish grey.

Flesh pale citrinous; odour of apples or of freshly-mowed grass; taste of fresh peas or corn with a bitter after-taste.

Reactions: NaOH red-brown on cutis and stipital veil, pale red or nil in context; lugol trivial.

Spores: 10-13 × 5.5-7 µm, amygdaloid to citriform, coarsely verrucose.

In calcareous broad-leaf forests; southerly; rare. Åstad, Fonnsänget.

Ref.: SMF31, MEL5, FLO, JEC12C.

Is darker, more olive-tinted than *C. percomis* (above), and the odour is different, approximately like apples or bananas, somewhat resembling that of *C. ochraceobrunneus*. The veil often forms thin girdles towards the base of the stipe; they are olive-brown at first, later oxidising to vinaceous-red or even reddish lilac. Cf. *C. majoranæ*.

***C. mussivus* (Fr.) Melot**

Cap 30-70 mm; yellowish grey to olive-grey, soon greyish red-brown, older with a copper tinge; centre with reddish brown pustules or adpressed squamules; margin citrinous with brown tufts when young.

Gills citrinous to greyish green, soon golden-yellow.

Stipe cylindrical to clavate; yellowish white, with indistinct, thin, grey-brown, later greyish violet to brownish violet (even reddish violet) girdles near base, apex citrinous.

Veil grey-brown, older brownish violaceous, sparse; cortina citrinous to yellowish grey.

Flesh yellow to citrinous, golden-yellow in stipe-base; odour usually strong, slightly acidulous, like "boiled beets" (see below); taste fetid.

Reactions: NaOH, lugol, guayac trivial.

Spores: 10.5-13.5 × 6.5-8 µm, obtusely amygdaloid to elliptic, dark, coarsely verrucose.

In calcareous *Picea* forests; rare. Bosarve, Fårskär, Bergsäng, Råbergsängarna, Foskflon.

Ref.: FLO, MEL5.

Is quite similar to *C. nanceiensis* (above), but exhibits slightly warmer hues. Young, the fungus exhales a pleasant, lemon or apple-like odour, and may be hard to distinguish from *C. percomis*. But the smell gradually turns more intense, disagreeable, finally obnoxious. *C. russeoides* Moser has been considered a synonym, but has been shown to be genetically distinct (GAR7; see also HEN4, MOS-P, AMB14, AMB21).

GROUP 20: Stipe with a MARGINATE BULB, CAP blushing PURPLISH RED
(sect. *Læticolores*)

The cap gradually turns redder, often with a copper or purple tinge. If it is orange to yellow-brown, see the next group.

C. orichalceus (Batsch) Fr.

Cap 60-140 mm; grey-buff with a green tinge, increasingly brownish red towards the centre, finally copper-red; with coarse fibres, granulose to veined at the centre; margin young pale grey-brown, sometimes with a violet tinge.

Gills grey-green to grey-yellow; crowded.

Stipe with a strongly marginate bulb, often with a "moat"; pale greenish grey to pale yellow, copper-red when older; bulb-margin brownish to brick-red.

Veil greyish green, oxidising to copper-red, sparse; cortina grey.

Flesh white, greyish green in stipe, red-brown in stipe-bulb; odour insignificant; taste weak, unpleasant.

Reactions: NaOH greenish at first, later red-brown in flesh, black on cutis; lugol nil to yellow-green; formalin, guayac trivial.

Spores: $9.5\text{--}12 \times 6\text{--}7.5 \mu\text{m}$, amygdaloid, coarsely verrucose.

In calcareous *Picea* and *Pinus* forests; uncommon. Kalkugnsberget, Rullsand, Glanshammar, Fårskär, Rättviksheden.

Ref.: DÄH, MAR8, HOL, HEN4 and *C. cupreorufus* in FLO.

The veil of this colourful fungus soon turns brownish red, making the cap look like a copper kettle when mature. The pine form is slightly darker with a violet tinge on the cap margin. The alkaline reaction is special, following the veil model: at first greyish green, darkening, after 3-5 minutes becoming red-brown, finally vinaceous. [Though its interpretation as *C. orichalceus* is well established and should be conserved, the species has also been named *C. cupreorufus* Brandrud] Cf. *C. odorifer* below, which can be rather similar but exhales a strong odour and has a distinctly coloured context.

C. rufoolivaceus (Pers.:Fr.) Fr.

Cap 50-95 mm; clay-grey to pale greyish lilac with a reddish centre and pink to red stains, when older entirely red to copper-brown; rather coarsely innate fibrous; margin sometimes with a pink tinge, young with reddish fibrils.

Gills greyish green to yellow-green, sometimes faintly violet; not markedly crowded.

Stipe robust with a strongly marginate bulb, often with a "moat"; greyish violet, apex violet; bulb-margin coated red.

Veil olive-brown, oxidising to red or vinaceous, sparse; cortina grey.

Flesh olive-grey to greyish yellow with a purple tinge in cap, sometimes marbled violet, reddish violet in stipe; odour insignificant.

Reactions: NaOH olive-yellow to olive-green in flesh and on stipital veil, on cutis greenish at first, soon blood red; formalin, lugol, guayac, phenol trivial.

Spores: $10\text{--}13 \times 6.5\text{--}7.5 \mu\text{m}$, amygdaloid to citriform, coarsely verrucose.

In calcareous broad-leaf forests; uncommon. Gråborg, Halltorp, Laxare, Munkängarna.

Ref.: BON, HEN4, HOL, FLO, MOS-P.

Another stately and spectacular fungus, much resembling *C. orichalceus* (above), but growing in broad-leaf forests. One may possibly distinguish it through a weaker green colour component, rendering the cap nicely red when mature. Certain forms display a violet cortina and cap margin, and at least partly violet gills.

The rare *C. prasinus* Fr. in the same habitat resembles the two preceding species: young with a greenish cap, but later with more yellow-orange tints, evoking the colours of an apple. Its spores are slightly leaner (see FLO, MOS-P; Åstad, Horn).

C. odorifer Britz.

Cap 50-120 mm; yellow-brown to copper-red with a grey to greenish yellow margin; glabrous.

Gills greenish yellow.

Stipe with a marginate bulb; pale yellow to greenish yellow, base red-brown.

Veil red-brown, sparse; cortina grey.

Flesh greenish yellow, young with a blue-green tinge; odour strong of aniseed.

Reactions: NaOH red in flesh, reddish black on cutis; lugol, guayac trivial.

Spores: $9\text{--}11 \times 6\text{--}7.5 \mu\text{m}$, amygdaloid, coarsely verrucose.

In calcareous *Picea* forests, late in the season; uncommon. Bergsäng, Rullsand, Råbergsängarna, Fårskär, Tjaukle.

Ref.: DÄH, MAR8, HOL, HEN4, FLO.

A beautiful fungus with bright colours. The strong odour recalls certain aperitif wines, possibly peppermint or aniseed ("anti-cough syrup"). This and the coloured context is what primarily separates the species from the others in the group. — The variety *luteolus* Moser (see FLO) is probably to be counted as a segregate species, *C. regis-romæ* Henry (see DM87) .

GROUP 21: CAP ORANGE to ORANGE-BROWN

(sect. *Fulvi* pp)

The stipe is provided with a marginate bulb. If the cap colour is yellow to olive-brown without a red component, see subsequent groups.

C. aureofulvus Moser

Cap 50-100 mm; beautifully orange with an orange-brown centre; margin citrinous without an olive tinge; glabrous, smooth.

Gills citrinous with a grey tinge, soon nicely egg-yellow.

Stipe with a marginate bulb; beautifully citrinous to bright yellow, bulb-margin reddish when older.

Veil orange-brown, darkening, sparse; cortina pale citrinous.

Flesh whitish with a citrinous tinge, grey above gills; compact; odour faint of apples.

Reactions: NaOH blood red on cutis and gills, pink in flesh; lugol, formalin, guayac trivial.

Spores: 9-11.5 × 6-7 µm, citriform to amygdaloid, coarsely verrucose.

In calcareous *Picea* and *Pinus* forests; uncommon, somewhat more frequent in the North.

Ref.: KS18, FLO, MOS-P.

A very attractive fungus with golden hues, found with conifers on rich soil. [The species has sometimes been interpreted as *C. fulgens* (Fr.) Fr. nom. illeg.]

C. olearioides Henry

Cap 40-90 mm; beautifully orange-yellow to orange-brown, older saturated yellow-brown; centre with purple-brown pustules, elsewhere glabrous; margin yellow to dark yellow.

Gills warmly yellow to orange-yellow, occasionally with a reddish tinge at insertion point.

Stipe with a wide, marginate bulb, often with a "moat"; yellow with a citrinous tinge, staining brown from the base, apex pale yellow; bulb-margin orange-brown.

Veil orange to orange-brown, sparse; cortina pale yellow.

Flesh pale yellow, warmly yellow to pink in stipe; blushing orange after cutting; compact; odour faint of lemon.

Reactions: NaOH red-brown on cutis and gills, reddish lilac in flesh, blood red on stipital veil; lugol, formalin, guayac trivial.

Spores: 9-11 × 5.5-6.5 µm, citriform to amygdaloid, coarsely verrucose.

In calcareous broad-leaf forests; rare. Åstad, Gråborg, Munkängarna, Herrfallsäng, Hammersta.

Ref.: FLO, JEC8C, and *C. fulmineus* in HOL, BON, VES2, HRY12, *C. subfulgens* in MOS-P.

Another beautiful fungus, which differs from *C. elegantissimus* (below) by a distinctly orange veil and a more evenly orange-yellow hue. The flesh typically blushes orange with a pink tint in larva perforations and on exposure. [The species has often been identified as *C. fulmineus* Fr., and is synonymous with *C. subfulgens* Orton.] Cf. *C. regis-romæ* (above).

C. elegantissimus Henry

Cap 50-140 mm; beautifully orange-yellow with an orange-brown centre; margin golden citrinous; glabrous; fleshy.

Gills yellow to citrinous.

Stipe robust with a very wide, marginate bulb; beautifully citrinous, sometimes paler, bulb-margin yellow, later yellow-brown.

Veil yellow to greyish yellow, darkening, sparse; cortina pale citrinous, very copious.

Flesh white to pale grey, sometimes with a faint violet shade and a citrinous tinge near cortex; compact; odour pleasant, sometimes strong, of fruit or incense.

Reactions: NaOH blood red on cutis, rosy to brownish rosy on gills, faint in flesh, red to dark brown on stipital veil; formalin, AgNO₃ trivial.

Spores: 11.5-16 × 8-10 μm, citriform to amygdaloid-papillate, dark, coarsely verrucose.

In calcareous *Fagus* forests; rare; southerly.

Ref.: BON, VES2, FLO, AMB21, and *C. auroturbinatus* in PHI, KS4.

A superb and stately species with beautiful colours, encountered with some luck in southern beech forests. Even the spores are unusually large. [The species was earlier named *C. auroturbinatus* (Secr.) J.E. Lange.]

Two species are quite similar and equally rare, but usually not as robust. They also display a more distinct violet tinge in the context, and produce smaller spores (9-11 × 6-7 μm): *C. bergeronii* (Melot) Melot (= *C. cedretorum* var. *suberetorum* Maire) grows in southern broad-leaf forests (see FLO, JEC15C). — *C. cedretorum* Maire [Plate 30] has been encountered in calcareous *Picea* forests in our country [Fårskär; see KS27, HRY12, MAR8, AMB21].

GROUP 22: CAP with NEITHER ORANGE nor RED tone FLESH conspicuously YELLOW to GREEN

(sect. *Fulvi* pp)

The cap colour normally exhibits a yellow to yellow-brown shade, occasionally with olive or green components. If the fungus lacks a marginate stipe-bulb, cf. *C. nanceiensis*. If the flesh is only pale yellow, see the next group.

C. meinhardii Bon

Cap 50-120 mm; yellow with a brownish yellow to red-brown centre; innately brownish fibrillose, centre brownish squamulose; older wholly date brown, except margin which remains chrome-yellow.

Gills greyish yellow to mustard-yellow.

Stipe with a usually marginate bulb; yellow to pale yellow, young bright, shiny, apex citrinous; base with purple-brown fibres.

Veil brown to yellow-brown; cortina white to pale citrinous.

Flesh chrome-yellow, paler in stipe centre, odour usually strong like "boiled beets".

Reactions: NaOH faintly pink; guayac blue-green; phenol violaceous-brown; lugol, formalin, AgNO₃ trivial, acid FeCl₃ greenish grey.

Spores: 10-11.5 × 6-7 μm, obtusely amygdaloid to citriform, coarsely verrucose.

In calcareous *Picea* forests; rare. Lejondal, Fårskär, Styggforsen, Råbergsängarna.

Ref.: As *C. splendens* subsp. *meinhardii* in FLO, BREI5, and *C. vitellinus* in DÄH.

A fungus with strikingly yellow hues, especially in the context. The species is suspected of being poisonous. [It has also been named *C. vitellinus* Moser nom. inval.]

C. splendens Henry is rare, growing in southern *Fagus* forests. It differs from the preceding species by a leaner habit, more uniform and brighter yellow hues, and a weaker odour (see FLO, MAR8, HEN4, BON). It may be deadly poisonous, having caused fatalities on the Continent, a claim that has, however, been challenged (JEC0A), its orellanine content being insignificant.

C. majusculus Kühner

Cap 40-100 mm; brilliantly yellow to orange-yellow, later yellow-brown, young paler with a chrome-yellow to citrinous margin; glabrous with darker brown pustules or stains at centre.

Gills yellow to greyish yellow, soon saturated yellow; edge serrate.

Stipe with a usually wide, marginate bulb; yellow to citrinous, bulb margin later date brown.

Veil brilliantly chrome-yellow, darkening to date brown or purple-brown, fairly copious; cortina white to pale citrinous.

Flesh chrome-yellow, paler in cap; odour usually faint; taste unpleasant, fetid.

Reactions: NaOH faintly brownish pink in flesh, blood red on cutis, reddish on stipital veil; guayac \pm blue-green; formalin nil.

Spores: $8.5\text{--}11 \times 5.5\text{--}6.5 \mu\text{m}$, obtusely amygdaloid to citriform, rather coarsely verrucose.

In calcareous *Fagus* and *Corylus* forests; rare. Gråborg, Halltorp, Tveta, Sunds gård.

Ref.: KÜH, JEC8C, and *C. alcalinophilus* in FLO, *C. splendens* in KS4, KS13, *C. sulphureus* in LAN.

This beautifully yellow fungus is almost identical to *C. meinhardii* (above), but yields a dramatic alkaline reaction. It is southerly, growing in broad-leaf forests. It is also similar to *C. splendens* (above) in the same habitat, which differs by being more slender and presenting a brighter yellow hue. [The species has sometimes been interpreted as *C. alcalinophilus* Henry, a taxon with larger spores. *C. sulphureus* (Kauffm.) J.E. Lange *nec* Lindgr. is a synonym.]

There exist several related, rare, southern taxa that grow with *Fagus*. *C. fulvocitrinus* Brandrud has more yellow-olivaceous hues, and the gills are brownish even when young, an almost unique feature in *Phlegmacium* (see FLO). — *C. claroflavus* Henry [Plate 15] is paler yellow with the same alkaline reaction (see MAR8). It is probably to be regarded as a morphospecies, which includes *C. xanthophyllus* Cooke. The latter presents a beautifully contrasting, violaceous cap (see FLO, MAR8, KÄR2; Halltorp).

C. citrinus Henry ex Orton

Cap 40–80 mm; olive-brown to greenish yellow, later darker greyish brown with an olive tinge; margin paler citrinous, young with thin, greenish fibrils; glabrous to minutely innate-fibrillose with thin, adpressed, brownish pustules at centre; margin long involute.

Gills greyish green, often saturated.

Stipe with a usually wide, sharply marginate bulb; greenish yellow; bulb margin coated thinly yellow, darkening.

Veil olive-brown to olive-yellow, sparse; cortina yellow-green.

Flesh greenish yellow to intensely green; taste somewhat unpleasant, acerbic.

Reactions: NaOH blackish on stipital veil, elsewhere trivial; guayac, AgNO₃ trivial.

Spores: $8.2\text{--}10 \times 5\text{--}5.7 \mu\text{m}$, citriform to amygdaloid, coarsely verrucose, fairly dark.

In calcareous *Fagus* forests; rare.

Ref.: FLO, BREI5, MOS-P.

This fungus is normally smaller than the others in the group, and distinctly greenish olive in colour, including the context.

C. xanthochlorus Henry [Plate 15], found under *Quercus*, presents a similar coloration but is generally more robust and has very large spores ($11.5\text{--}15.5 \times 7\text{--}8 \mu\text{m}$) (see ZMYK3, SMF47, JEC14B; Halltorp).

C. atrovirens Kalchbr.

Cap 50–100 mm; dark greyish green to yellow-green from a thick, glutinous layer on a yellow background; margin paler, yellowish green; glabrous with dense, minute darker pustules at centre.

Gills yellow to citrinous.

Stipe with a usually wide, marginate bulb; brilliantly lemon-yellow, bulb margin dark greyish green, later brown.

Veil saturated greyish green, \pm glutinous, copious; cortina yellow-green.

Flesh compact; brilliantly lemon-yellow, faintly marbled brownish yellow; odour faint, \pm fruity.

Reactions: NaOH dark red-brown to black on cutis, elsewhere trivial.

Spores: $9.5\text{--}11 \times 5.5\text{--}6.5 \mu\text{m}$, amygdaloid to citriform, coarsely verrucose.

In calcareous *Pinus* forests (on the Continent usually with *Abies*); very rare. Brusebo.

Ref.: DÄH, MAR8, FLO.

A spectacular fungus, not easily confused with other species, and well characterised by its saturated dark-green and yellow hues. The veil is more or less viscid, even glutinous — a character shared only with a few *Phlegmacia*. Cf. *C. ionochlorus*.

C. odoratus (Jouget ex Moser) Moser (see FLO, BON, VES4, MOS-P; Himmelsberga) in calcareous broad-leaf forests is similar, but exhales a strong, sweetish odour (cf. *C. osmophorus*).

GROUP 23: CAP YELLOWISH, FLESH PALE(sect. *Fulvi* pp)

Fruit-bodies exhibit less vivid colours than in the preceding group. Cap, gills and context are paler, duller, sometimes with a grey or greyish-green component.

***C. elegantior* Fr.**

Cap 50-140 mm; pale greyish yellow to pale yellow-brown, disc staining brownish and \pm granulose, paler when old, margin finely fibrillose and paler.

Gills yellow-grey to grey-green or pale mustard-yellow, darkening on manipulation.

Stipe with a widely marginate bulb; pale greyish yellow to grey with a greenish tinge and a white apex, darkening; bulb-margin dark brown.

Veil yellow-brown to dark brown, sparse; cortina greyish white.

Flesh whitish to greyish yellow.

Reactions: NaOH red-lilac in flesh and on gills, sometimes weakly; lugol, formalin trivial; guayac weak.

Spores: $12-15 \times 7.5-9 \mu\text{m}$, amygdaloid to citriform, coarsely verrucose.

In calcareous *Picea* forests; uncommon. Tjaukle, Glanshammar, Kalkugnsberget, Kalkbro, Österplana, Alderängarna.

Ref.: DÄH, MAR8, HEN4, BON, FLO.

This fungus, brownish yellow throughout, may become quite large and robust. Cf. *C. corrosus*, which is paler, as well as *C. olearioides* above, which grows in oak and beech forests.

Even more robust and very rare is *C. quercilicis* (Chevassut & Henry) Henry in calcareous *Corylus* thickets (see FLO, HRY17; Österplana). It produces somewhat smaller spores ($11.3-12.5 \times 7-8 \mu\text{m}$).

***C. sulfurinus* Qué.**

Cap 50-130 mm; pale greenish grey to greyish buff, later ochraceous and somewhat stained or mottled brownish at the centre, elsewhere glabrous; margin citrinous.

Gills greenish yellow with a grey tinge; edge slightly darker.

Stipe with a strongly marginate bulb; pale yellow to greenish grey with a yellow-brown bulb-margin.

Veil yellow-brown with an olive tinge, sparse; cortina pale.

Flesh pale greyish yellow with a citrinous reflex; odour faint, spicy.

Reactions: NaOH nil to weakly rosy; formalin, guayac, lugol, FeSO₄, AgNO₃ trivial.

Spores: $10.5-13 \times 6-8 \mu\text{m}$, citriform to amygdaloid, coarsely verrucose.

In calcareous *Picea* and *Pinus* forests; uncommon.

Ref.: MAR8, HEN4, FLO, AMB21, JEC19, and *C. guttatus* in DÄH, KS16.

Differs from *C. elegantior* (above) mainly by paler and greyer hues with a faintly green tinge. The fungus exhales a strange odour, reminding of parsley. It is quite similar to *C. flavovirens* (below), which, however, smells differently and does not grow in coniferous forests. [*C. guttatus* Henry. may be regarded as a variety, whose odour is more like incense. *C. personatus* Moser is a synonym.]

***C. flavovirens* Henry**

Cap 60-130 mm; olive-yellow to greyish yellow, older olive-brown; centre darker grey-brown and mottled; margin olive-yellow.

Gills olive-yellow to grey.

Stipe with a wide, marginate bulb, often with a "moat"; white, sometimes with a faint violet reflex; bulb-margin olive-brown, base red-brown.

Veil olive-yellow, very sparse; cortina white, occasionally with a faint violet tinge.

Flesh white, sometimes with a faint violet tinge in stipe; odour and taste usually strongly farinaceous.

Reactions: NaOH red-brown on cap and stipital cortex; nil in flesh; lugol, formalin trivial; guayac weak.

Spores: $9-12 \times 5.5-7 \mu\text{m}$, amygdaloid, coarsely verrucose.

In calcareous broad-leaf forests; southerly; uncommon. Gråborg, Herrfallsäng, Laxare, Åstad.

Ref.: HRY15, VES3, FLO.

One of the few *Cortinarius* that smells of flour (cf. *C. dionysæ*). On the other hand, one encounters collections where only the taste is present and that, moreover, exhibit a faint violet tinge in cortina and flesh. [It may be a question of another taxon, possibly *C. olivellus* Henry, which has been shown to be a segregate species. *C. elotus* Fr. s. Moser is a synonym (see MAR7, MOS-P; Munkängarna).]

C. majoranæ Frøslev & Jeppesen

Plate 15

Cap 40-70 mm; greyish yellow, sometimes with a citrinous tinge towards margin, glabrous except for disk, which is granulose to squamulose, later pale red-brown.

Gills pale yellow to grey-yellow.

Stipe with a \pm marginate bulb; pale yellow to white.

Veil purple-brown, later red-brown, sparse.

Flesh pale citrinous; odour of "freshly-mowed grass" or of "lemon cake".

Reactions: NaOH, phenol, guayac trivial.

Spores: $10.5\text{-}13.5 \times 6\text{-}7.5 \mu\text{m}$, amygdaloid, coarsely verrucose.

In calcareous broad-leaf forests; southerly; rare. Åstad, Tveta.

Ref.: FR05, JEC13D, and *C. nanceiensis* var. *bulbopodius* in FLO.

Differs from *C. flavovirens* (above) mainly by lacking olive hues, and in some collections the whole fruitbody is yellow. The odour is also different, approximately like that of *C. percomis*. [Because of its resemblance to *C. nanceiensis*, it has been described as the variety *bulbopodius* Henry of the latter, but was shown by molecular analysis to be a segregate species (GAR1).]

C. aurilicis Chevassut & Trescol [Plate 15], growing in southern *Fagus* forests, is very similar with a smoother cap and somewhat smaller spores ($9.3\text{-}11 \times 5.5\text{-}6.5 \mu\text{m}$; see AMB18, BAL1).

6. Subgenus *Myxacium* (Fr.) Trog

Fruit-bodies are small to medium sized. The veil is viscid to glutinous when the fungus is fresh, translucent, as is often the cortina. The cap is usually glabrous and viscid. In principle the stipe is also viscid in wet conditions, but on several species in the first two groups it is almost dry. It is usually whitish, slender and relatively tall without a bulb, and typically exhibits a gelatinous ring zone, rusty-brown from ejected spores, where the cortina was fixed (not mentioned in the descriptions). Young gills are greyish or violet. The alkaline reaction is trivial (vaguely brownish) or absent.

The grouping follows taste and colour. Sample the cuticle and cap context. [Taxa with a bitter taste and relatively short spores (the first two sections) have been shown to be genetically remote from sections *Myxacium* and *Defibulati*, forming the remainder of the subgenus as conceived here (see SEI1). The latter, however, are monophyletic; moreover *Defibulati*, is bihemispherical in distribution and assumed to be of an ancient origin.] Cf. sect. *Delibuti* (Ch. 4), which was earlier considered part of the subgenus.

GROUP 1: TASTE BITTER, CAP YELLOW to BROWNISH (sect. *Vibratiles*)

The taste of the gluten on the cap is often strongly bitter, like the context. If the cap is white to pale brown or has bluish parts, see the next group. [Sect. *Vibratiles* Melot is monophyletic and bihemispherical.]

C. vibratilis (Fr.) Fr.

Cap 20-50 mm, glutinous, hygrophanous; nicely orange-brown, sometimes paler; glabrous; margin white; rounded, later obtusely conical to convex with umbo.

Gills greyish white to greyish yellow.

Stipe cylindrical or somewhat fusoid; yellow-white, young coated white; glutinous.

Veil white, sparse; cortina white.

Flesh greyish white in cap, yellow-white in stipe; strongly bitter; odour faintly raphanoid.

Reactions: NaOH, formalin, lugol, FeSO₄, AgNO₃ trivial.

Spores: $7-8 \times 4.5-5 \mu\text{m}$, elliptic, moderately verrucose.

In *Picea* and *Pinus* forests; fairly common.

Ref.: FLO, DÄH, MAR8, ROUX.

The cap colour is handsome, reminiscent of apricot. Certain years the neat little fungus occurs abundantly in spruce forests with blueberry.

C. pluviolum (Schäff.) Moser is even smaller with a darker cap, and the stipe is almost dry, with small spores ($5.5-7 \times 3.8-4.5 \mu\text{m}$). It is a rare species, growing in *Pinus* forests (see MOS18, AGA14; Bonåsheden). [The species is closely related to *C. microspermus*, which has even smaller spores (see *Telamonia*).]

***C. duramarus* Moser ex Kuhnert & Peintner**

Plate 16

Cap 15-60 mm, fleshy, viscid, hygrophanous; orange-yellow to golden apricot, paler when old; young frosty white, then finely innate-fibrillose to glabrous; margin paler, occasionally faintly violaceous-rosy; rounded, later convex with umbo.

Gills greyish clay to pale grey-brown, crowded; edge white.

Stipe cylindrical to clavate, robust, often short; white to pale yellow-grey, thinly white silky; almost dry.

Veil white, sparse; cortina white, gelatinous.

Flesh white to pale greyish yellow; bitter, but cutical slime \pm sweetish; odour faintly raphanoid.

Reactions: NaOH, guayac, trivial; formalin trivial to slightly yellowish pink; phenol yellow-brown.

Spores: $6.5-8.2 \times 4.5-5.2 \mu\text{m}$, elliptic to \pm amygdaloid.

In *Picea* and *Pinus* forests; uncommon. Kvisttorp, Lejondal, Gesunda, Bonåsheden, Haraldsåsen, Flemingsberg.

Ref.: MOS2, KS3, KS11.

This taxon is larger than *C. vibratilis* (above) with a robust stipe and conspicuously crowded gills. The fruitbody is very bitter, except for the gluten on the cutis, which, oddly enough, is distinctly sweet in flavour. [It is possible that *C. causticus* Fr. s. Melot is a form; see FLO.] Cf. *C. galeobdolon* (below).

***C. pluvius* (Fr.) Fr.**

Cap 20-50 mm, viscid, weakly hygrophanous; yellow-buff to bright yellow; glabrous; margin young paler or white; rounded, later conical to convex.

Gills grey-white; rather crowded.

Stipe tough; white to yellow-buff, young coated white; viscid.

Veil white, sparse; cortina white.

Flesh bright to pale yellow, contrasting against stipe cortex; strongly bitter; odour faint, raphanoid to fruity.

Reactions: NaOH, formalin, trivial; guayac weakly greenish.

Spores: $6.5-8 \times 4.5-5.5 \mu\text{m}$, elliptic, rather weakly verrucose.

In *Pinus* forests, also with *Picea*; fairly common, less common in the South.

Ref.: FLO, LAN, KS11, BAL1.

Similar to the other species in the group, this fungus is significantly paler and has a distinctly yellow flesh. Cf. *C. delibutus*, *C. microspermus*, and *C. arvinaceus* (below), which all have a mild taste.

GROUP 2: TASTE BITTER, at least in CUTICLE, CAP PALE or VIOLACEOUS

(sect. *Ochroleuci*)

***C. galeobdolon* Melot**

Plate 16

Cap 30-75 mm, not hygrophanous, viscid; greyish with a buff to yellow-brown tinge, young thinly coated white, later blushing pale red-brown from the centre; smooth; obtusely conical, later convex to campanulate with a long involute margin.

Gills pale grey.

Stipe stiff, sometimes shortly radican; white, weakly viscid.

Veil white, rather sparse; cortina white.

Flesh white to pale buff, taste somewhat bitter in cap, especially in the cuticle, sweetish in stipe.

Reactions: NaOH, formalin, guayac trivial.

Spores: $6-8 \times 4-5 \mu\text{m}$, elliptic, weakly verrucose.

In rich *Picea* and mixed woods; uncommon; often late in the season. Insjön, Kvisttorp, Lejondal, Vällinge.

Ref.: MEL11, and *C. causticus* in DÄH, PHI, HEN4, BON.

The white coating or pruina on young specimens quickly disappears, and the cap turns brownish, often with a rusty tinge. Only the cuticle is distinctly bitter in this species, while the flesh may be mild, faintly bitter, or (especially in the stipe base of older specimens) sweet. [The species has also been named *C. causticus* Fr. s. Maire.]

C. emollitus Fr. (Plate 16) is similar but very rare, found under *Quercus* or *Tilia*. It has a thinner veil, leaving the cap ochraceous, and a characteristically brittle context, which is very bitter (see MAR8, MEL4, ORT3, JEC14B).

C. barbatus (Batsch: Fr.) Melot

Cap 20-40 mm, not hygrophanous, viscid; white to ivory, darkening to pale fulvous on manipulation; glabrous; margin felty white.

Gills pale grey-brown to grey.

Stipe cylindrical, tapering; white with felty, white girdles; weakly viscid.

Veil white, sparse to fairly copious.

Flesh pale yellow with a brown-yellow rim under the cuticle; taste strongly bitter throughout; odour faint, raphanoid.

Reactions: NaOH trivial, guayac weakly blue-green, phenol weakly rusty.

Spores: $6.5-8 \times 4-5 \mu\text{m}$, elliptic, pale, rather weakly verrucose.

In deciduous forests, usually with *Quercus* and *Corylus*, but also with *Picea*; rare. Rude, Hellasgården, Insjön, Myttinge, Kalkugnsberget, Gesunda, Alderängarna.

Ref.: FLO, OGA4, ROUX, and *C. crystallinus* in MAR8, HEN4.

The fungus is smaller than *C. galeobdolon* (above) and almost pure white. [It has also been named *C. crystallinus* Fr., and is sometimes interpreted as *C. eburneus* (Velen.) Henry.]

C. croceocæruleus (Fr.) Fr.

Cap 20-55 mm, not hygrophanous, viscid; blue to blue-lilac, soon fading by patches to buff or grey-buff with greyish blue regions; glabrous; margin with a pale rim.

Gills grey to pale argillaceous, sometimes with a faint violet tinge.

Stipe soft, flabby; often dilated at base, tapering to a point and \pm radicant; white; weakly viscid.

Veil white, sparse; cortina white.

Flesh yellow-white, flavescent in stipe-base; strongly bitter; odour raphanoid.

Reactions: NaOH pink on blue parts of cap, weakly pink in flesh; guayac strongly green.

Spores: $7-8.5 \times 4-5 \mu\text{m}$, obtusely elliptic; weakly verrucose.

In *Fagus* or *Tilia* forests; uncommon. Åstad, Munkängarna.

Ref.: DÄH, BON, PHI, FLO.

A neat little species in beech forests, and the only bitter *Myxaciium* we have with violet hues.

GROUP 3: Taste NOT BITTER, STIPE with a VIOLET SHADE

(sect. *Myxaciium* pp, *Defibulati* pp)

The violaceous colour of the stipe is usually distinct. Species in this and the subsequent group have *brownish caps*, and the taste is mild. The stipe is often hard and tapering. The whole fruitbody is distinctly glutinous from the gelatinous veil. Microscopically one may distinguish certain species by the absence of clamp connections on their hyphæ (sect. *Defibulati*). Most species produce large, amygdaloid spores.

C. stillatitius Fr.

Cap 40-80 mm; grey-brown with an olive tinge to pale brown (see comment below); glabrous, smooth; margin paler when young, older slightly wrinkled; rounded to conical, later campanulate to convex with a wide umbo.

Gills grey with a faint violet tinge; edge paler.

Stipe slender, cylindrical, often tall; greyish white, coated or zoned greyish violet to lilac.

Veil faintly violet; cortina whitish.

Flesh greyish white to pale yellow, sometimes marbled violet; odour distinctly melleous.

Reactions: NaOH, formalin trivial.

Spores: 12.5-16.5 × 7.5-9.5 µm, amygdaloid, rather strongly verrucose; hyphæ without clamp connections.

In acidic *Picea* and *Pinus* forests, also in alpine *Betula* habitats; very common.

Ref.: FLO, and *C. integerrimus* in MAR8, HOL.

One of the commonest fungi in spruce forests with blueberry. It is recognised from its honey odour, which develops best when scraping the base of the stipe. The cap colour is typically dark and dull, but may vary considerably between yellowish grey and umber. [*C. integerrimus* Kühner is a synonym.]

Similar, but with a beautifully yellow cap and an almost white stipe, is *C. arvinaceus* Fr. It is rare, growing in *Fagus* and *Pinus* forests, and lacks clamp connections (see KS17, AMB31, KSv10; Rullsand, Remmen, Ånn).

C. collinitus Fr. s. Lange

Cap 30-80 mm; pale to saturated brownish orange with a darker disk, margin paler and more yellow; glabrous, smooth; rounded, later conical or convex with a wide umbo.

Gills pale buff to grey, often thick and sinuate.

Stipe slender, cylindrical, often tall, stiff; brownish white, coated greyish violet to violet, base more yellow.

Veil violet to blue-violet, fairly copious; cortina white to pale violet.

Flesh greyish white, pale buff in lower part of stipe, slightly marbled darker with a violet tinge.

Reactions: NaOH, formalin, guayac trivial.

Spores: 13-15 × 7-8 µm, amygdaloid, coarsely verrucose; hyphæ with clamp connections.

In *Picea* forests; common.

Ref.: DÄH, MAR8, PHI, HOL, FLO.

The fungus is common in spruce forests with blueberry. It is similar to *C. stillatitius* (above), with which it often grows, but lacks the honey odour, and young caps display a warm, bright, apricot colour not found with the latter. The violet veil on the stipe may be quite copious, cracking into girdles when the fruitbody develops or dries. [The species is synonymous with *C. muscigenus* Peck.]

There exists a very rare form of *C. collinitus* without pigmentation. The fungus is entirely white, possibly slightly flavescent, and even the spores are hyaline and smooth. It has nevertheless been proven genetically to be cotaxic with the type and grows in the same habitat (see SMF67, and *C. "limacella"* in SMF45; Styggforsen, Sörviken). — A second taxon, apparently an albino form of another *Myxaciium*, has markedly shorter spores (10-11.5 µm), which are moreover distinctly verrucose (Sura). Its identity has yet to be resolved.

C. elatior Fr.

Cap 50-120 mm, not or weakly hygrophanous; olive-grey with a date brown to bluish grey centre; glabrous, wrinkled; obtusely campanulate, later conical to convex with a shallow umbo and a long involute margin.

Gills thick, veined, sometimes sinuate; grey-brown to olive-grey, often with a violet tinge.

Stipe fairly robust, hard, young tapering; lower half violet, white above.

Veil violet; cortina greyish white.

Flesh grey to pale ochre, violet near stipital cortex; often compact; odour of honey.

Reactions: NaOH ± trivial, weakly rusty to yellow-brown; formalin nil.

Spores: 10-14 × 6-9 µm, amygdaloid, rather strongly verrucose; hyphæ without clamp connections.

In *Quercus* and *Fagus* forests; fairly common.

Ref.: DÄH, MAR8, HEN4, BON, and *C. lividoochraceus* in FLO.

The species grows mainly in acidic broad-leaf forests. It is characterised by a robust, conical, wrinkled cap, and the stipe is typically two-coloured with a sharp limit midway. The cap of the other members of the group is smaller and flatter, even if sometimes sulcate. [The name is sometimes synonymised with *C. lividoochraceus* (Berk.) Berk.]

C. pumilus (Fr.) J.E. Lange is paler, considerably smaller, growing in *Fagus* forests (see HOL, DÄH).

GROUP 4: STIPE ENTIRELY WHITE (sect. *Myxacium* pp, *Defibulati* pp)

The stipe may exceptionally exhibit a faint, evanescent, violet tinge. Three of the treated species are restricted to alpine habitat.

C. trivialis J.E. Lange

Cap 30-100 mm; brown (see below), often with an olive tinge; smooth, glabrous; margin paler; obtusely conical to rounded, later widely conical with a sometimes wrinkled, involute margin.

Gills blue-grey to yellowish grey; edge often violet.

Stipe cylindrical, often tapering to a point; hard; white with thick, imbricate, brownish, glutinous girdles (see below).

Veil yellow-brown to grey-brown, copious; cortina white to pale grey-blue.

Flesh white to yellowish white, occasionally marbled violet, darker in stipe-base.

Reactions: NaOH trivial.

Spores: 10-14 × 6-7.5 µm, amygdaloid, rather strongly verrucose; hyphæ with clamp connections.

Under *Betula*, *Populus tremula*, *Salix*, also in alpine *Betula* forests; common.

Ref.: DÄH, MAR8, PHI, HOL, HEN4, FLO.

The fungus is common to very common in deciduous copses and among young plants at the edge of the wood. The cap colour varies considerably: greyish buff, yellow-brown, orange-brown, or date brown. The glutinous veil forms various patterns on the stipe: whitish-yellow to brown zones, girdles, coarse meshes, or "stairs". If the pattern is faint, the habitat is the best clue for identification.

C. mucosus (Bull.:Fr.) Kickx

Cap 40-100 mm; beautifully orange to red-brown with a darker centre; smooth; campanulate, later convex with a long involute margin, often fleshy.

Gills grey to grey-brown.

Stipe robust, often short, young tapering; hard, stiff; pure white.

Veil white; cortina pure white.

Flesh pure white, marbled greyish white.

Reactions: NaOH, formalin, FeSO₄ trivial.

Spores: 13.5-14 × 6-7 µm, amygdaloid, coarsely verrucose; hyphæ with clamp connections.

In *Pinus* forests, especially in sandy areas among *Cladonia*; common, more common northwards.

Ref.: DÄH, MAR8, PHI, HOL, FLO.

A characteristic, quite robust species in all kinds of pine forest, The cap colour, similar to that of *C. collinitus*, is often a brilliant rusty-orange, but the veil is white (occasionally very faintly violet).

In alpine *Betula* forests one may find *C. septentrionalis* Bendiks. et al, which looks very much like the preceding species, but displays a less vivid cap colour (see BEN4, FLO). It possesses clamp connections.

C. fennoscandicus Bendiks. et al.

Cap 40-70 mm; yellow-brown, often with an olive tinge and hygrophanous spots, centre darker yellow-brown to umber; rounded, later convex with a shallow umbo.

Gills greyish white to pale buff.

Stipe tapering, stiff in the base; white, staining brown from the base, exceptionally with a faint violet tinge.

Veil white to olive-yellow; cortina greyish white.

Flesh greyish white, flavescent in stipe-base; taste faintly sweetish, nauseating.

Reactions: NaOH trivial.

Spores: $10.5-13 \times 6.5-7.5 \mu\text{m}$, obtusely amygdaloid, moderately verrucose; hyphæ with clamp connections.

In alpine *Betula* forests; fairly common.

Ref.: BEN2, FLO.

A quite common species in the high mountains. It differs from *C. septentrionalis* (above), growing in the same habitat, by a partly hygrophanous and less brightly coloured cap, often with an olive shade.

C. grallipes Fr.

Plate 16

Cap 35-70 mm; not hygrophanous, vividly brownish yellow to orange-brown, disk later darker brown; glabrous; obtusely conical, later convex with a slightly striate margin.

Gills greyish buff.

Stipe tapering to fusoid; silky white, sometimes with an adpressed collar, staining brown from the base.

Veil white.

Flesh white, flushing brownish yellow in stipe-base.

Reactions: NaOH trivial.

Spores: $11.5-13.5 \times 6.5-7.5 \mu\text{m}$, amygdaloid; hyphæ with clamp connections.

In *Betula* forests; very rare. Røfors.

Ref.: BEN4, MOS31, REU.

This rare fungus is quite similar to *C. septentrionalis* (above), but grows in the lowlands. It differs from *C. collinitus* by more yellow colours, absence of violet, and by associating with birch (possibly also *Populus tremula*).

C. alpinus Boud.

Cap 15-30 mm; warmly dark brown, centre blackish brown; margin paler, orange-brown; widely conical.

Gills greyish white.

Stipe often short, cylindrical with a collar at the cortinal zone; white to yellow-white, staining brown, apex white.

Veil white; cortina hyaline.

Flesh greyish white, staining brown in stipe.

Reactions: NaOH trivial.

Spores: $11.5-13.5 \times 7-8 \mu\text{m}$, obtusely amygdaloid, moderately verrucose; hyphæ with clamp connections.

In alpine heaths among dwarf *Salix*; uncommon. Vassijaure.

Ref.: HOL, BEN4, FAV5, FLO.

A diminutive *Myxaciium*, and the only one found above the tree-line. Despite its smallness, the fungus is often taller than the "trees" (*Salix herbacea*, etc.) with which it forms mycorrhiza. The cap is nicely mahogany-coloured. [*C. favrei* Moser is a synonym.]

C. mucifluus Fr.

Cap 40-80 mm; pale grey-brown with a darker centre; margin greyish white, occasionally slightly wrinkled; obtusely conical, later plane with a wide umbo.

Gills greyish white, occasionally with a faint, violet tinge.

Stipe tall, slender; fibrous, zoned; white.

Veil white; cortina hyaline.

Flesh greyish white, occasionally with brown areas; odour of honey.

Reactions: NaOH, formalin, AgNO₃ trivial.

Spores: 12-15 × 6.5-8.5 µm, amygdaloid, rather coarsely verrucose; hyphæ without clamp connections.

In *Pinus* forests among *Cladonia*; uncommon; southerly.

Ref.: FLO, MAR8, PHI, HOL, LAN, MEL14.

Compared to other *Myxacia* this species is rather colourless. It exhales the same honey odour as *C. stillatitius*.

7. Subgenus *Telamonia* (Fr.) Trog

In our country this is the largest and most difficult of the subgenera with over 900 published species in Europe. The fungus is usually brownish, often with a violet shade, which may be evanescent. The cap is dry, often distinctly hygrophanous. The gills are usually distant, seldom crowded, and almost always some shade of brown or violet when young. As a rule the alkaline reaction is trivial (vaguely brown or absent).

[Non-hygrophanous species were earlier assigned to subgenus *Sericeocybe* Orton, an entity that has been shown by molecular studies to belong partly in *Telamonia*. Subgenus *Telamonia* — excluding sect. *Obtusi Camphorati*, and a few others — forms a monophyletic group that appears to be endemic to the Northern Hemisphere and probably of a relatively recent origin.]

To correctly determine a collection of *Telamonia* you need fruit-bodies in all stages, especially undeveloped and young specimens. The collection must furthermore be fresh and moist. Older specimens tend to discolour or darken, becoming more or less uniformly drab grey-brown to yellow-brown for most species in the subgenus. In the presence of a dry wind, even two days are often enough to ruin most distinguishing characters. Hygrophanity becomes difficult to establish, telltale velar patterns on the fruitbody tend to dry up or discolour, and the context pales to tan or whitish. These considerations hold for many groups of *Cortinarius*, but are especially pregnant for *Telamonia*.

The main grouping follows the hygrophanity and size of the fruitbody. Not or weakly hygrophanous species are described in the first two sub-chapters. Cap diameters may vary, but if the upper part of the stipe is thinner than 7-8 mm on most mature specimens of a collection, go to Ch. 7.4.

7.1 NON-HYGROPHANOUS fungi with a VIOLACEOUS TINGE

Fruit-bodies are medium sized, often with a dilated stipe and a well-developed veil. In particular young specimens typically have a stout shape, with a rounded cap and an involute margin, but certain species do not follow the general template. The cap shape is described only when deviating.

In principle the cap is dry, silky matt to fibrillose, not (or only weakly) hygrophanous. Violet or blue occurs at least somewhere on the exterior of the young fruitbody, including veil and gills. Veil and gills are most often white, violaceous or brown. Observe the veil remnants on the stipe. Are there bands, tufts, squamules, or just a thin ring? Cf. *C. caninus* (*Anomali*), *C. cyanites* (*Phlegmacium*), and *C. urbicus*, *subænocheilis* (Ch. 7.2).

GROUP 1: VEIL VIOLACEOUS, ODOUR STRONG

(sect. *Camphorati*, *Telamonia* pp)

C. camphoratus Fr.

Cap 50-100 mm; handsomely violet with a silvery pastel flush, later flavescent; finely innate-fibrillose, matt; broadly umbonate, fleshy.

Gills saturated violet; fairly crowded.

Stipe robust, clavate; silky white with a violet tinge, turns violet when bruised; later brownish, fibrillose.

Veil greyish white with a violet tinge, copious; cortina greyish white.

Flesh greyish violet, marbled violet, yellow-brown in stipe-base; odour mostly strong, unpleasant, acetylene-like; taste somewhat bitter.

Reactions: NaOH trivial; AgNO₃ slowly brownish yellow.

Spores: 8.5-10 × 5-6 µm, amygdaloid, weakly verrucose.

In *Picea* and *Pinus* forests; common.

Ref.: DÄH, MAR8, HOL, FLO.

The stench of this fungus has also been likened to hydrochloric acid or burnt rubber — it seems that the odour perception varies considerably from one person to another. When young a handsome species, but the cap turns yellow-brown with age. [*C. camphoratus* has been shown from molecular markers to belong to a clade outside *Telamonia* s.. str., together with a few species from North America and the South Pacific (sect. *Camphorati*).]

***C. traganus* (Fr.:Fr.) Fr.**

Cap 50-100 mm; pale blue to lilac, later silvery-grey, slightly flavescent with yellow-brown cracks; matt, silky, zoned; margin violaceous; convex, fleshy.

Gills yellow-brown to greyish brown; fairly crowded, often thick.

Stipe robust, clavate; grey to white, slightly zoned greyish brown, apex violet; woolly, often with a pronounced girdle.

Veil lilac, copious; cortina grey to greyish violet.

Flesh neatly brownish yellow, sometimes more grey-brown, marbled dark yellow-brown; odour acetous to nauseatingly sweetish; taste strong, unpleasant, bitter.

Reactions: guayac yellow-green; phenol red (10⁺); NaOH, formalin, AgNO₃ trivial.

Spores: 8-10 × 5-6 µm, elliptic; moderately to weakly verrucose.

In *Picea* and *Pinus* forests; very common.

Ref.: DÄH, MAR8, PHI, HOL.

Differs from *C. camphoratus* (above) primarily by the brown flesh and gills. Cracks in cuticle and stipe expose the brown pigment, and the cap fades to a silver-grey hue with age. The odour, which is not as obnoxious as that of *C. camphoratus*, has been likened to "fermenting fruit". A rare form in *Pinus* forests, ***ochraceus*** Moser [Plate 19], completely lacks violaceous tints (see DM100, KS31; Södra Råda, Remmen, Bonäsheden). Cf. *C. niveotraganus*, which has a more greyish context and stronger ornamented spores.

***C. calopus* Karst. nec Favre, Moser**

Cap 20-60 mm; cinnamon with yellow-brown fibres, young micaceous greyish white; margin long whitish with lilac patches and fringes; convex to conical.

Gills strikingly pale greyish yellow to brown-yellow; coarsely serrated.

Stipe tall, slender with a dilated base; pale greyish brown, zoned white with a white ring-zone, apex neatly lilac.

Veil saturated lilac under gills, elsewhere white, copious; cortina white.

Flesh pale, violet in stipe-apex; odour strong, sweetish.

Reactions: NaOH, formalin trivial.

Spores: 9-10.5 × 6-6.5 µm, elliptic, weakly verrucose.

In rich *Picea* forests, also with *Betula*; fairly common in the North, rare southwards.

Ref.: AGA10, MEL4, KS3, and *C. venustus* in FLO, BAL2.

A curiously beautiful fungus that resembles a slender *C. laniger* in habit, and smells approximately like *C. traganus* (above). The veil is sometimes two-coloured and then leaves white remnants on the lower stipe, while the upper stipe and cap margin are neatly lilac. [The species has also been interpreted as *C. venustus* Karst.] — The birch form is more red-brown and less fibrous; it can possibly be distinguished as a separate taxon, ***C. traganulus*** Orton [Plate 19] (see ORT1; Remmen, Räväs). Cf. *C. agathosmus* and *ionophyllus*, which exhale similar odours.

GROUP 2: VEIL WHITE to PALE VIOLET, ODOUR FAINT
Under DECIDUOUS trees (sect. *Sericeocybe* pp, *Malachii* pp)

Veil remnants on the stipe are distinct. If your fungus grows in a coniferous forest, see the next group, and if the veil is distinctly coloured (including brown) or invisible, see subsequent groups or sect. *Anomali* (Ch. 4).

C. alboviolaceus (Pers.:Fr.) Fr.

Cap 30-80 mm, not hygrophanous; silvery greyish violet, later grey with a faint violet tone; matt, silky, finely innate-fibrillose; slightly viscid in wet conditions; margin greyish violet fibrillose to felty; broadly umbonate.

Gills pale greyish brown with a violet tinge; edge paler.

Stipe clavate, sometimes robust but more often slender; silvery greyish violet to bluish grey, apex more violet, with greyish white, adpressed, felty bands and zones, sometimes indistinct.

Veil greyish white with a \pm violaceous tinge, fairly copious; cortina white.

Flesh pale grey to greyish brown, marbled violet.

Reactions: NaOH, formalin trivial; phenol pink; guayac greenish grey.

Spores: 8-10 \times 5.5-6.5 μ m, obtusely elliptic, moderately verrucose.

Under *Quercus* or *Betula* (also in alpine *Betula* forests); fairly common.

Ref.: DÄH, MAR8, PHI, HOL, HEN4, BON, FLO.

This rather handsome species may recall *C. camphoratus* (above), but exhales a faint, pleasant odour. The cap is sometimes weakly viscid when wet, so the fungus may be mistaken for a *Phlegmacium* (cf. *C. porphyropus*), or for an *Anomali* (cf. *C. albocyaneus* and *C. simulatus*). [There exist several closely related taxa (see REU10).]

C. argenteopileatus Nezdobjm. [Plate 18] is similar and sometimes regarded as a variety. It is white all over, violet occurring at most as marbling in the context. The spores are comparable in size to those of *C. alboviolaceus*, but amygdaloid and stronger ornamented. It is rare, growing in the same habitat (see REU; Näset, Røfors, Dropphäll, Gesunda). [*C. subargentatus* Orton and *C. kauffmannianus* Henry nom illeg. are synonyms (see MAR8, KS20, ORT4).]

C. lucorum (Fr.) Britz.

Cap 30-100 mm, weakly hygrophanous, often as darker radial streaks; grey-brown, often with a purple tinge, centre more red-brown, micaceous grey; fibrillose and slightly violet towards the margin; convex to broadly umbonate, fairly fleshy.

Gills grey-violet to purple-brown; thick, often anastomosing, fairly distant.

Stipe robust, cylindrical to weakly clavate; pale grey, sometimes with a violet tinge, in particular at the apex, zoned with a silky sheen, stained greyish brown.

Veil grey with a violet tinge, sparse to fairly copious; cortina greyish white.

Flesh grey with a violet to pale-brown tinge, brownish in stipe-base, marbled violet.

Reactions: NaOH, formalin trivial; guayac blue-green.

Spores: 8-10.5 \times 5.5-7 μ m, elliptic to obtusely amygdaloid, rather strongly verrucose.

With *Populus tremula*; fairly common, southerly.

Ref.: BRA5, FLO, and *C. impennis* in MAR8.

The fungus resembles *C. malachius* (below), but exhibits a greyer, darker hue and less crowded gills. It almost always grows with aspen in Sweden. Cf. *C. torvus*, which is rather similar but has a special odour. [The present taxon has also been described as *C. circumvelatus* Reumaux (see REU2). Lange's *lucorum* (see LAN, HOL), described as growing with *Fagus* and devoid of violet colours is probably a form of *C. subferrugineus*.]

GROUP 3: VEIL WHITE to PALE VIOLET
Under CONIFEROUS trees (sect. *Malachii* pp, *Lanigeri* pp)

Also here the veil remnants are distinct on the stipe. If they are yellowish to brownish or invisible, see later groups. The taxa in this group are often weakly hygrophanous.

***C. malachius* (Fr.:Fr.) Fr.**

Cap 50-100 mm, hygrophanous but often only weakly; argillaceous to pale grey-brown, often weakly micaceous violet, centre often slightly reddish brown; fibrillose to minutely squamulose; margin young with silky white tufts; campanulate to broadly umbonate.

Gills greyish brown, sometimes with a violet to purple tint; edge paler.

Stipe robust, cylindrical to clavate; young greyish white, apex pale violet; with greyish white, sometimes thick and woolly, fibres or girdles.

Veil white with a violet tinge, fairly copious; cortina white to pale greyish violet.

Flesh grey to pale grey-brown, marbled violet.

Reactions: NaOH, formalin, guayac trivial.

Spores: 9-11.5 × 6-7 µm, elliptic, moderately verrucose.

In *Picea* forests; fairly common.

Ref.: PHI, HOL, LAN, FLO.

A variable species that may be quite common on the needle carpet under spruce certain years. It recalls *C. alboviolaceus* (above), but normally displays a more brownish hue. The cutis is typically finely micaceous, especially on drying. This may add a violet sheen to the cap, but the fungus is seldom distinctly violaceous. Cf. *C. suberi* and *C. privignus*.

***C. poppyzon* Melot**

Plate 20

Cap 30-60 mm, weakly hygrophanous, often weakly viscid; pale tan to orange-yellow, young more grey-brown and pale greyish violet frosty; centre often slightly orange; finely innate-fibrillose; margin thinly coated white when young; rounded, later campanulate to convex.

Gills pale greyish violet to grey-brown with a purple tinge; edge paler, ± serrulate.

Stipe cylindrical to clavate; pale grey-brown, partly coated white with white to greyish girdles; apex violet.

Veil white to pale grey, occasionally slightly tinted violet, copious; cortina white.

Flesh grey to pale grey-brown, marbled violet.

Reactions: NaOH, formalin trivial; guayac blue-green; phenol reddish lilac.

Spores: 6.5-8 × 4-5 µm, elliptic, moderately verrucose.

In rich *Picea* and *Pinus* forests; rare. Blankared, Rättviksheden, Gesunda, Remmen, Vinäsgraven.

Ref.: MEL7, KS31, THM1.

This rare species recalls *C. malachius* (above), but displays a brighter, more yellow cap and the spores are considerably smaller. It possesses a remarkably light, almost airy, context. In *Pinus* forests there exists a distinctly hygrophanous form, which is devoid of violet hues. [This form is described as *C. argentum-silvæ* Melot s. Reumaux (see REU), and may possibly be interpreted as *C. dilutus* Fr.] Cf. *C. pearsonii*.

***C. quarciticus* Lindstr.**

Cap 50-130 mm, hygrophanous only towards the margin, or showing up as a pattern of small spots, fleshy; grey to buff, centre darker, sometimes orange-brown, glabrous; greyish yellow to silky greyish white towards the margin; young partly covered by thin, white fibres with a violet tinge; convex to ± campanulate.

Gills greyish violet; conspicuously crowded; edge slightly paler.

Stipe robust, clavate, usually with a rounded to slightly marginate bulb; young strongly fibrous violet, later white, bald; sometimes with white girdles.

Veil greyish white with a violet tinge, copious; cortina greyish white.

Flesh young entirely violet, later grey to greyish buff, marbled violet.

Reactions: NaOH, formalin trivial; guayac blue-green.

Spores: 6.5-8.5 × 4.5-5.5 µm, obtusely elliptic, moderately verrucose.

In sandy *Pinus* forests, often among *Cladonia*; common in the North, elsewhere uncommon.

Ref.: FLO, and *C. malachius* in ORT4, *C. pseudomalachius* in REU3, KS19.

Differs from *C. malachius* (above) by a more yellow cap colour, a typically mottled cutis structure, a stronger violet tinge, in particular in the flesh, and distinctly smaller spores. The fungus is also more robust with a stipital bulb and has frankly crowded gills, which is why it is easily mistaken for a

Phlegmacium (cf. *C. caesiocanescens* and *C. borgsjæensis*). [*C. malachius* s. Orton and *C. pseudo-malachius* Reumaux nom. inval. are synonyms.]

***C. solis-occasus* Melot**

Cap 50-105 mm, not hygrophanous; brick-red with a darker disk, violet towards the margin, young greyish violet frosty, old dark copper-brown, innate-fibrillose with minute, violet squamules; margin silky violaceous; rounded, later convex or with a shallow umbo, fleshy.

Gills dark brownish red to brown, sometimes serrulate, rather distant.

Stipe cylindrical to slightly clavate, robust; white, young shining pale violet, sometimes with pale-violet bands, apex violet.

Veil violet, sometimes pale, fairly copious; cortina white to pale violet.

Flesh buff to red-brown, marbled red-brown; odour rather strong, raphanoid.

Reactions: NaOH, formalin, guayac, phenol trivial.

Spores: 9-11 × 6-7.5 µm, obtusely elliptic, moderately verrucose.

In calcareous *Picea* and *Pinus* forests; uncommon. Fårskär, Rullsand, Rättviksheden, Vinäsgraven, Oviken, Andersön.

Ref.: FLO, BREI5.

A striking fungus with a beautiful combination of brick and violet. It is quite similar *C. laniger*, but darker with a violet veil. In cases where the veil is pale, *C. solis-occasus* can usually be distinguished by its smooth, finely squamulose cap. [The two taxa have sometimes been treated as conspecific, and have been shown by molecular markers to be closely related. Another name that has been used is *C. calopus* s. Moser, Henry.]

C. solis-amicus Bidaud [Plate 20] is macroscopically identical, but the spores are smaller (8.2-10 × 6-6.5 µm). It is very rare, growing in the same habitat (see REU; Skansberget).

***C. franchii* Soop**

Plate 20

Cap 35-60 mm, fleshy, weakly hygrophanous; greyish red-brown to pink with a purple tinge; margin violaceous to red-violet, coarsely fibrillose with thick pale grey patches and fringes.

Gills saturated violet; thick, distant, sinuous.

Stipe cylindrical to slightly clavate; white to pale grey with a faint violet tinge, fibrillose, when young almost peronate.

Veil greyish violet to white, often copious; cortina pale violet to white.

Flesh grey to grey-violet, later tan with a purple tinge, marbled strongly violet; odour faintly aromatic (± like *Lepista nuda*), taste raphanoid.

Reactions: NaOH, formalin, guayac trivial.

Spores: 8.5-10 × 5.5-6.5 µm, elliptic, moderately to rather strongly verrucose.

In calcareous *Picea* forests; rare. Mortorp.

Ref.: KS48, and KS31 as *C. violaceocinereus*.

A rather robust fungus with a peculiar and spectacular reddish-violet cap and an abundant veil. [The species was earlier interpreted as *C. violaceocinereus* (Pers.:Fr.) Fr.] Cf. *C. solis-occasus* (above) and *C. simulatus*.

GROUP 4: CAP and STIPE with BROWNISH to REDDISH SQUAMULES

(sect. *Spilomei*)

The veil is truly scaly; if it settles as adpressed, brown bands on the stipe, see the following groups. The members of this group do not display the typical sericeocyboid profile, but are more slender. They have rounded spores and a coloured veil, and (apart from the first species below) are closely related to sect. *Anomali*.

***C. pholideus* (Fr.:Fr.) Fr.**

Cap 30-80 mm, not hygrophanous; grey-brown to yellow-brown; densely covered by grey-brown squamules; convex with an obtuse umbo.

Gills violet but soon pale brown.

Stipe fairly slender, \pm cylindrical; greyish buff with grey-brown squamules forming zigzag bands, apex pale grey with a violet reflex.

Veil dark grey-brown, copious; cortina pale grey-brown.

Flesh greyish buff with a violet tinge, yellow-brown in stipe-base.

Reactions: NaOH, formalin trivial.

Spores: $6-8 \times 4.5-6 \mu\text{m}$, subglobose, moderately verrucose.

Under *Betula* on poor soil; fairly common.

Ref.: DÄH, MAR8, PHI, HOL, BON, FLO.

The species is not easily confused with others: it is the only really brown-scaly *Cortinarius* in the country, apart from *C. humicola* (Ch. 3), which has yellowish gills, and a few diminutive taxa (Ch. 7.4). [According to genetic markers, this species is not closely related to sect. *Spilomei*.]

***C. spilomeus* (Fr.:Fr.) Fr.**

Cap 20-60 mm, not hygrophanous; pale argillaceous, silky matt with a faint violet, later yellow tinge; young with tiny, dense, red to rusty-brown tufts and granules, also on the margin.

Gills pale brownish grey with a violet to purple tinge.

Stipe slender, cylindrical to weakly clavate; pale buff with tiny red to rusty-brown, sparse, adpressed squamules or tufted girdles; young apex weakly violet; base \pm tainted red by fibrils.

Veil red-brown to dark red, sparse; cortina violaceous-grey.

Flesh pale, marbled violet with a yellow tinge in stipe-base, sometimes entirely pink; often fragile.

Reactions: NaOH trivial (including the veil); formalin, guayac, AgNO_3 , FeSO_4 trivial; phenol pink to lilac (5').

Spores: $6.5-8.5 \times 5.5-6.5 \mu\text{m}$, subglobose, moderately verrucose.

In *Picea* and mixed forests, often among grass in fairy rings; fairly common.

Ref.: MAR8, HEN4, BON, LAN, FLO, KIA23.

The red to red-brown veil remnants are characteristic. They settle as squamules or as a down on the stipe, and exceptionally the entire fruitbody is red, also inside, a form that might be identified as *C. pavonius* Fr. (see REU). Contrarily to sect. *Armillati* the veil remnants exhibit none or only a brownish (trivial) alkaline reaction. Cf. *C. heterocyclus* and *C. bolaris*.

C. depauperatus (J.E. Lange) Soop [Plate 18] is similar and may be encountered in young *Picea* plantations (see KS12, REU, BEL1; Mockfjärd, Blankared, Remmen). The fruitbody is hygrophanous, lacking any violaceous tints, the veil is sparser and more greyish brown, and the spores are slightly longer. [This taxon was originally described as a variety of *C. spilomeus* (see LAN), but has been shown by molecular markers to be a distinct species.] Cf. *C. fillionii* (below) and *C. paragaudis*.

In rich *Picea* forests there exists a third, so far unravell'd taxon, which might be considered a variety of *C. spilomeus*. It is strongly hygrophanous, pale greyish in coloration, and displays sparse fibrils from a brightly red veil on the stipe (Skansberget, Snöberg).

7.2 NON-HYGROPHANOUS fungi DEVOID of VIOLACEOUS colours

Fruit-bodies are medium sized, sometimes large, often with a dilated stipe. In principle the cap is dry, silky matt to fibrillose, not (or only weakly) hygrophanous. Violet occurs, if at all, marbled in the flesh, or as a faint blue tinge at stipe-apex. The gills are mostly brownish. Observe the colour of the veil, which is almost always well developed. Cf. *C. crassus*, *argutus* (*Phlegmacium*), as well as the third group in Ch. 3.

GROUP 5: VEIL OLIVE-BROWN to YELLOW-BROWN (sect. *Brunneotincti*)

Like the preceding one, this group is characterised by a brownish veil and rounded spores. If the veil is frankly grey-brown, see *C. canabarpa* and allies. Cf. also *C. paragaudis* and *C. ectypus*.

C. raphanoides (Pers.:Fr.) Fr.

Cap 30-60 mm, sometimes slightly hygrophanous; olive-brown to grey-brown, young greener, sometimes with a red-brown tinge at the centre; finely innate-fibrillose; conical to campanulate, later convex with an umbo.

Gills pale grey-brown; margin paler.

Stipe fairly slender, cylindrical; yellow-brown with fibrillose, olive-brown to tobacco-brown bands; sometimes with a faint blue tinge at the apex.

Veil olive-brown, rather sparse; cortina grey.

Flesh pale yellow-brown to grey, slightly marbled olive-brown, sometimes with a faint violet to purple tinge; often with an odour of radish or "hospital".

Reactions: NaOH, formalin, acid FeCl₃ trivial.

Spores: 6-7.5 × 5-6 µm, obtusely elliptic to subglobose, moderately to rather coarsely verrucose.

Under *Betula* (also in alpine *Betula* forests); fairly common.

Ref.: HEN4, LAN, FLO, and *C. betuletorum* in PHI.

A dull-coloured fungus not infrequent in moist birch copses. The olive tinge has a tendency to disappear after picking, which may make the fungus hard to identify. [*C. betuletorum* (Moser) Moser corresponds to the inodorous form.] Cf. the rather similar *C. heterocyclus*, which presents a reddish veil and longer spores.

C. panellus Soop

Plate 18

Cap 25-50 mm; not or weakly hygrophanous, grey-brown to yellow-brown, rarely with an olive tinge, disk umber; rather coarsely innate fibrillose; margin with abundant yellowish to brownish tufts; obtusely conical, later convex to plane.

Gills grey-brown, sometimes with a fugacious, blue tinge.

Stipe cylindrical; grey, sometimes with a faint blue tinge, coated by yellow-ochraceous fringes, apex grey-violaceous when young.

Veil ochraceous yellow, rarely with an olive tinge, darkening to brown or red-brown, rather copious; cortina yellow-brown.

Flesh grey-brown, more yellow in stipe, marbled greyish violet when young; odour nil.

Reactions: NaOH trivial; guayac greenish blue.

Spores: 6-7.5 × 4.5-5.2 µm, ovoid, rather strongly verrucose.

In rich, sandy *Pinus* forests; rare. Bonåsheden, Storstupet, Selja.

Ref.: KS42.

A rare species that resembles *C. raphanoides* (above), but almost lacks the olive colours of the latter and presents a thicker, more yellow veil. The veil on the cap is darker and sometimes forms thick tufts giving the fungus a hirsute look. It typically grows in the pine heaths with *Cladonia* in the North.

The northerly *C. fillionii* Bidaud. et al. [Plate 17] is similar and very rare in the same habitat. It differs by larger spores (–9 µm) and a darkening, more hygrophanous cap (see REU).

C. valgus Fr.

Cap 30-60 mm, slightly hygrophanous; date brown to dark grey-brown, sometimes with a faint olive tinge, margin paler; matt, pasteboard-like, finely innate-fibrillose; convex to plane with a decurved margin.

Gills pale grey-brown, sometimes with a faint olive tinge; margin slightly paler.

Stipe cylindrical; pale grey, usually with thin, brownish fibrils and a faint blue tinge at apex.

Veil olive-grey to brown, very sparse; cortina pale grey.

Flesh pale grey-brown, often marbled violaceous; odour faint (not raphanoid).

Reactions: NaOH, formalin, guayac, acid FeCl₃ trivial.

Spores: $7.5\text{--}9 \times 5.5\text{--}6.5 \mu\text{m}$, obtusely elliptic, moderately to rather strongly verrucose.

In *Picea* forests, rare. Hamra, Ramstigsberget, Gesunda, Bonåsheden. Rättviksheden, Alderängarna, Björnrike, Njupesjär.

Ref.: FLO.

The fungus is darker brown than the other taxa in the group and has a smoother cutis, vaguely reminding of a *Hebeloma*. The species grows in both acidic and richer spruce forests, but is rare. Cf. *C. uraceus*, which differs mainly by a blackening fruitbody.

***C. ochrophyllus* Fr.**

Cap 30–70 mm, slightly hygrophanous; greyish yellow, often with an olive tinge; with radial fibres or innate-fibrillose; long conical, acutely umbonate.

Gills markedly saturated yellow-brown.

Stipe slender, tall; greyish white with yellow-buff bands; zoned.

Veil brownish yellow, fairly copious; cortina pure white.

Flesh pale yellow with brownish areas.

Reactions: NaOH olive-brown on stipital veil, elsewhere trivial; acid FeCl₃ weakly greyish; formalin, guayac, AgNO₃ trivial.

Spores: $6\text{--}8 \times 5\text{--}7 \mu\text{m}$, subglobose, moderately verrucose.

In *Picea* forests among *Vaccinium*; common.

Ref.: KS3, HOL, FLO.

A common species in acidic spruce forests. It is paler than *C. raphanoides*, and the yellowish gills provide a good character. The cap, which may exceptionally reach 100 mm in diameter, is usually fibrillose, but there is also a form with a completely smooth cutis. [According to Fries this fungus is rather robust (stipe 12 mm in diameter) and grows in deciduous woods, which casts some doubt on the name to be used. Molecular markers place *C. ochrophyllus* outside *Telamonia* s. str. in the bihemispherical section *Læti*.]

GROUP 6: VEIL RED to RED-BROWN

(sect. *Armillati*)

If the veil is grey-brown, see the next group. Cf. *C. spilomeus* (above) and *bolaris* (Ch. 3), which lack the alkaline veil reaction typical for the group, as well as *C. heterocyclus* and *fulvescens*, which are frankly hygrophanous.

***C. armillatus* (Fr.:Fr.) Fr.**

Cap 40–100 mm; not hygrophanous, yellow-brown to cinnamon, centre red-brown and minutely squamulose; finely tomentose; margin often with red tufts; convex to umbonate with a decurved margin.

Gills cinnamon-brown.

Stipe clavate; pale grey, soon greyish buff; fibrillose, with several adpressed, often thick, coral-red bands; apex almost white, base often with a pink tinge.

Veil coral-red, fairly copious; cortina white.

Flesh pale brown to greyish buff.

Reactions: NaOH lilac-red to blood red on veil, elsewhere trivial; formalin nil.

Spores: $10.5\text{--}11.5 \times 6\text{--}7 \mu\text{m}$, amygdaloid, moderately verrucose.

Under *Betula* (also in alpine *Betula* forests); very common.

Ref.: DÄH, MAR8, PHI, HOL, FLO, KIA11.

Most mushroom pickers have observed this common fungus with its brilliant red girdles on the stipe, always with birch. The alpine form is often darker and may even display an umber cap colour (this is presumed due to the increased UV radiation). *C. armillatus* was reported as edible in older mushroom guides, but has been shown to contain low quantities of the lethal toxin orellanine (see SHA1).

C. roseoarmillatus Niskanen et al. is similar but produces smaller spores ($7\text{--}9 \times 5\text{--}6 \mu\text{m}$) and a sparser veil. It is rare in the same habitat, but is easily overlooked (see KIA11, JEC19; Rävsnäs).

C. luteoornatus (Moser) Bidaud et al.

Cap 40-80 mm, usually not hygrophanous, often fleshy; pale grey-brown with a red-brown tinge at the centre, not darkening significantly with age; innate-fibrillose; margin greyish; convex to broadly umbonate.

Gills cinnamon-brown with a paler edge; distant.

Stipe clavate, robust; pale buff, with thin, brick to red-brown, adpressed, fibrillose girdles, base darker reddish brown.

Veil pink to greyish brick, rather sparse; cortina greyish white.

Flesh grey-brown, marbled darker, sometimes with a faint, violet hue.

Reactions: NaOH lilac-red to vinaceous on veil, elsewhere trivial; guayac blue-green; AgNO₃ greenish grey; formalin, FeSO₄ trivial.

Spores: 8-10.5 × 6.5-7.5 μm, obtusely elliptic, weakly verrucose.

In *Picea* and *Pinus* forests, also in alpine *Betula* forests; fairly common, uncommon in the South.

Ref.: MOS9, KS9, REU, KIA11, and *C. paragaudis* subsp. *ænochelis* in FLO.

Resembles *C. armillatus* (above), but the stipital girdles are not coral-red but greyish pink, and the cap is greyer, usually darker. The veil colour is highly variable — it can even be yellow-brown. [This taxon has been described as *C. paragaudis* subsp. *ænochelis* Lindstr., and as *C. armillatus* var. *luteoornatus* Moser, but has been shown to be a distinct species.]

C. subænochelis Kytöv. et al [Plate 17] is similar with similar spores, but the whole fruitbody is darker with a purple tinge, and context and gills are flushed violet when young. It is rare in central Sweden, more common in the north, where it grows in the same habitat as *C. luteoornatus* (see KIA11; Tyresta, Sörviken).

C. paragaudis (Bull.:Fr.) Fr.

Cap 30-70 mm, weakly hygrophanous; pale grey-brown with a red-brown tinge at the centre, young with a grey-pinkish, frosty cover, darkening; fibrous to innate-fibrillose; margin greyish; convex to broadly umbonate.

Gills pale cinnamon with a paler edge; fairly distant.

Stipe clavate to cylindrical; pale buff, with thin, indistinct, red-brown to vinaceous bands; apex pale grey.

Veil pale red-brown to greyish pink, darkening to vinaceous-brown, usually sparse; cortina greyish white.

Flesh grey-brown, marbled darker, darkening with age; odour pleasant, agaricoid.

Reactions: NaOH dark brown to purple-brown on stipital veil, intensely blue on mycelial base; formalin trivial.

Spores: 6-7 × 5-6 μm, subglobose, rather strongly verrucose; marginal elements crowded, vesiculose, protruding about 25 μm.

In *Picea* and *Pinus* forests, fairly common.

Ref.: HEN4, KS9, FLO, KIA11.

Is quite similar to *C. luteoornatus* (above), but can be separated under the microscope, the spores being smaller, subglobose. In addition, it is usually less robust, more hygrophanous, and the veil displays a duller, more brownish hue, which is reflected in a more trivial alkaline reaction. Of the two, *C. paragaudis* dominates in the southern parts of the country, whereas they are found in largely equal numbers in the North.

C. pinigaudis Niskanen et al.

Plate 17

Cap 30-90 mm, weakly or not hygrophanous; tan with a red-brown tinge at the centre; rather coarsely innate-fibrillose to granulose; margin pinkish with red-brown fibrils; obtusely conical, later convex.

Gills pale cinnamon.

Stipe clavate; pale grey-yellow to grey-brown, with reddish girdles or hazy bands; apex greyish white.

Veil red-brown, sometimes with a greyish tinge; cortina greyish white.

Flesh dark yellow-brown to grey-brown, marbled darker brown; odour nil.

Reactions: NaOH purple brown on cutis, dark violaceous on stipital veil; guayac trivial.

Spores: 5.2-6.5 × 3.8-5.5 μm, subglobose to obtusely elliptic, weakly verrucose.

In rich *Pinus* heaths, northerly, rare. Gesunda, Bonåsheden, Lomheden.

Ref.: KIA11.

This rare species preferably grows on sandy pine heaths with *Cladonia* in the North. It is quite similar to *C. paragaudis* (above), but possesses smaller spores and brighter, reddish velar bands on the stipe.

***C. craticius* Fr.**

Plate 17

Cap 30-60 mm, weakly hygrophanous; dark brown to dark grey-brown; coarsely innate-fibrillose of dark brown, usually reticulate fibres; margin with a faintly brownish red border; convex.

Gills ochraceous to olive-ochre.

Stipe \pm cylindrical, sometimes slightly attenuated; pale yellow, fully or partly coated by an intensely red veil, sometimes with braided, red fibres; apex greyish.

Veil flame-red to carmine or rosy, sparse; cortina white; mycelium white.

Flesh pale yellow-white to yellow-grey, weakly marbled cinnamon, pink in stipe-base.

Reactions: NaOH intensely violet to black in flesh and on stipital veil; fluorescence nil.

Spores: $6.5-8 \times 5-6 \mu\text{m}$, elliptic, weakly verrucose.

In mixed woods, under *Betula* and *Populus tremula*; probably boreal; very rare. Björnrike, Hamrafjäll.

Ref.: MEL7, KS25.

A remarkable species, unfortunately very rare and found mainly in the North. Observed from above it looks trivial (like *C. brunneus*), but the stipe is startlingly and intensely red-flushed. In addition, the pileic (and sometimes the stipital) fibres form a strange, braided structure, and the gills present a conspicuous, ochraceous colour. A find in alpine *Betula* habitat has significantly stronger ornamented spores and may represent a different taxon. Cf. *C. bulliardii*.

A similar and possibly related species is *C. caput-medusæ* Lindstr. in similar habitat. It differs by brighter colours and a paler veil (see FLO).

GROUP 7: VEIL GREY-BROWN

(sect. *Bovini* pp)

***C. canabarpa* Moser**

Cap 50-120 mm, not hygrophanous; clay grey, sometimes with an olive or violet tinge; young silky, later brownish fibrillose; margin with grey-brown patches and fringes; convex, fleshy.

Gills brown, sometimes with a violet reflex.

Stipe clavate, often very robust; greyish white with thick, grey-brown girdles and fibres; base often dilated, soft, with imbedded humus debris.

Veil grey, soon grey-brown, thick, copious; cortina greyish white.

Flesh greyish white, marbled dark grey to violet, later dirty grey; exsiccata rather dark yellow-brown.

Reactions: NaOH trivial; guayac pale yellow or nil; formalin, AgNO₃ trivial.

Spores: $8-10 \times 6-6.5 \mu\text{m}$, obtusely elliptic, moderately verrucose.

In rich *Picea* forests; northerly, uncommon, rare in Central Sweden.

Ref.: HOL, KS3, MOS3, FLO.

This spectacular fungus is large, thick, heavy, dull-coloured, and shaggy. The veil tends to settle as small rectangular patches, distributed around the cap margin and sometimes on the stipe. The stipe may display a blue reflex at the apex. There also exists a form with a snow-white veil, which, although it darkens with age, still gives the fruitbody a significantly paler hue (Hammerdal). The species often grows together with *C. calopus*. [*C. umidicola* Kauffm. is an antecedent synonym (see MOS26), but *canabarpa* is a well established epithet that should be conserved. Another possible synonym is *C. rusticus* Karst.]

***C. bovinus* Fr.**

Cap 25-60 mm, often somewhat hygrophanous; dark yellow-brown to grey-brown, centre more red-brown and glabrous; elsewhere fibrillose; margin with thick, pale yellow-grey to grey tufts.

Gills cinnamon; distant, rather thick.

Stipe clavate, often with a strongly inflated bulb; grey-brown to dirty brown, thinly coated greyish white, absorbing; young with a thick, greyish girdle, occasionally forming a collar.

Veil pale greyish yellow, darkening to grey-brown, copious; cortina greyish white.

Flesh grey-brown, marbled darker brown; odour and taste faintly pleasant to raphanoid; exsiccata rather pale.

Reactions: NaOH trivial; fluorescence yellow.

Spores: $8.5\text{--}10.5 \times 5.5\text{--}6.5 \mu\text{m}$, elliptic; strongly verrucose.

In calcareous *Picea* forests; rare. Södra Råda, Sjöskogen, Fårskär, Sörviken.

Ref.: MOS8, KS27, FLO.

A rather unattractive fungus with dirty-brown hues, recalling *C. brunneus*. The species is further characterised by its inflated stipe, the distant gills, and a veil, which may be almost white at first, later darkening to greyish brown. It is separated from *C. canabarbata* (above) mainly by the more yellowish and glabrous cap. [The species is interpreted in Moser's sense; regarding Lange's see *C. bulbosus*.] Cf. *C. albogaudis* and *C. fuscobovinus*, which both have white veils.

***C. fusco-peronatus* Kühner**

Cap 30–70 mm, not hygrophanous; grey-brown, sometimes with a faint red-brown tinge, young umber; covered by tiny, adpressed, thin, grey-brown squamules and tufts, centre more finely granulate and darker; margin with grey-brown fringes; fleshy.

Gills brown with a paler edge; distant.

Stipe clavate; pale grey, with several, often hazy, dark grey-brown to brownish grey bands, base darker.

Veil dark brownish grey, copious; cortina pale grey.

Flesh pale grey to pale beige, darker in stipe-base; odour slightly raphanoid.

Reactions: NaOH greyish black, black with a red-brown tinge on veil; guayac trivial; exsiccata brownish.

Spores: $10\text{--}13 \times 7\text{--}8.5 \mu\text{m}$, obtusely elliptic, coarsely verrucose.

In calcareous *Picea* forests; rare, probably northerly. Fårskär, Björnråke.

Ref.: KÜH, MOS8, FLO, JEC19.

This remarkable fungus is less robust than *C. canabarbata* (above), with a darker cap and several distinct, dark grey-brown bands on the stipe. It recalls *C. paragaudis* (above), but the veil, lacking in red pigmentation, exhibits a characteristic grey colour that contrasts against the more brownish fruitbody. The spores are grossly verrucose, which may serve to distinguish the species from the other members of the group. [*C. tigrinus* Moser is a synonym.] Cf. *C. phrygianus*.

C. fuscovelatus Kytöv. et al. [Plate 23] is a quite similar, even rarer species in the same habitat. It differs mainly by a hygrophanous cap and frankly shorter and smoother spores ($8\text{--}10 \times 5.5\text{--}6.5 \mu\text{m}$; see IXF201, JEC19, and *C. subtigrinus* in KS37; Skansberget). [The species has earlier been identified as *C. subtigrinus* Reumaux, which has been proven to be a different species.] Cf. also *C. pholideus*, *C. raphanoides*, and allies.

GROUP 8: VEIL WHITE to PALE YELLOW, CAP young BROWNISH

(sect. *Lanigeri*)

If the cap has a saturated yellow tint, cf. *C. vespertinus*. If it is, or turns, dark brown, see the last group in this sub-chapter. Cf. *C. suberi* and *C. urbicus* (below), whose caps may be brownish when the veil is thin.

***C. laniger* Fr.**

Cap 50–100 mm, not hygrophanous; pale brick-red to rusty-brown, white frosty when young, micaceous from white fibres or tiny squamules; margin silky white, often with white fringes; broadly umbonate, fleshy.

Gills saturated brick red.

Stipe clavate, often robust; pale brown, long ± covered by a white, floccose veil; often with several girdles and a collar.

Veil and cortina white, copious.

Flesh buff-brown, often with a pink shade, slightly darkening when bruised, marbled cinnamon; odour raphanoid.

Reactions: NaOH, formalin, guayac, FeSO₄ trivial; phenol rosy (5').

Spores: $8.5\text{--}11 \times 6\text{--}7 \mu\text{m}$, elliptic to subamygdaloid, moderately to rather coarsely verrucose.

In *Picea* forests; fairly common.

Ref.: DÄH, HOL, BON, FLO.

Fresh this is quite a handsome fungus, not difficult to recognise by its woolly, whitish stipe and its strikingly pink to brick gills. The fibrils convey a frosty sheen to the young cap, sometimes with a rosy reflex, and the margin may display white patches of the same shape as those found on *C. canabarb* (above). Cf. *C. solis-occasus* which is quite similar, but has a violaceous veil.

In calcareous broad-leaf forests one encounters *C. semudaphilus* Henry, which resembles *C. laniger* and produces similar spores, but is hygrophanous, slightly more robust, and blackens with age (see MAR8; Allkvi).

***C. alborufescens* Imler**

Cap 40-80 mm, not hygrophanous; greyish yellow, often with a pink tinge, later buff to brick-red, finally saturated red-brown; young micaceous or silky greyish white, often with white to cream veil patches at the margin; convex, fleshy, margin sometimes extending, involute.

Gills red-brown to saturated cinnamon.

Stipe clavate to cylindrical, often very robust and tall; pale buff with a silky to strongly fibrillose, pale-grey coating and \pm copious, pale yellow to greyish girdles.

Veil white to pale greyish yellow, somewhat flavescent and darkening, copious; cortina white.

Flesh compact; white to grey-brown, marbled darker grey to red-brown; odour at first strongly raphanoid.

Reactions: NaOH, lugol, phenol, trivial; guayac brownish lilac; formalin usually trivial (see below).

Spores: $6.5-8 \times 3.5-4.5 \mu\text{m}$, amygdaloid to oblong elliptic, weakly verrucose.

Under *Betula*; uncommon. Svartbäcken, Kalkugnsberget, Rävsnäs, Vinäsgraven, Remmen, Oviken, Funäsdalen.

Ref.: IML, STER32, FLO, and *C. cremeolaniger* in KS7, KS19, KS39, ORT1, *C. pearsonii* in PHI.

A robust fungus, occasionally enormous with a cap that can reach 150 mm. It recalls *C. laniger* (above), but possesses unusually narrow spores. Some collections show a positive (reddish) but inconsistent formalin reaction. [*C. cremeolaniger* Orton, *C. lanigeroides* Orton (with a white veil), and *C. leptosporus* Reumaux nom. inval. are synonyms.]

C. pearsonii Orton (= *C. malachius* s.. Pearson), a taxon with violet gills, is also very close (see ORT1, ORT4, KS39; Lombäcken), and may possibly be regarded as a form. The spores are elliptic and slightly shorter ($5.7-7.5 \mu\text{m}$).

***C. mattiæ* Soop**

Plate 20

Cap 40-90 mm, not hygrophanous; pale grey-brown to pale red-brown or pinkish with a tan tinge on disk, rather coarsely innate-fibrillose; margin paler, fibrillose with thin, white fringes.

Gills dark saturated red with a faint purple tinge; rather distant, fairly thick.

Stipe cylindrical to clavate, sometimes with an attenuated base and even rooted, robust; white to pale greyish, fibrillose, sometimes with white girdles; apex slightly violet when young.

Veil white, fairly copious; cortina white to faintly violet.

Flesh pale tan, faintly marbled violet when young, more grey-brown in lower stipe, not darkening; odour and taste raphanoid.

Reactions: NaOH, guayac trivial.

Spores: $7.5-9 \times 4.5-5.5 \mu\text{m}$, elliptic to amygdaloid, moderately verrucose.

In rich *Picea* forests; rare. Rävsnäs, Störvik, Tollagården.

Ref.: KS43, KIA27.

The gills are saturated and dark of a peculiar reddish hue, making this rare fungus resemble a *C. laniger* (above) with a greyish cap, or a *C. malachius* with reddish gills. *C. cinnamoviolaceus* in the same habitat has similar spores, but presents a much darker, glabrous, and strongly hygrophanous cap.

C. suillus Fr.

Plate 19

Cap 30-80 mm, not hygrophanous; red-brown brick to ochre, young sparsely coated white; finely innate-fibrillose with a vaguely granulose centre; margin long involute.

Gills cinnamon; edge somewhat serrulate.

Stipe cylindrical to clavate, sometimes with a slightly rooted, pointed base; silky white to pale greyish buff with brownish fibrils or girdles.

Veil pale ochraceous, sparse to fairly copious; cortina white.

Flesh pale brown, weakly marbled brown; odour pleasant, agaricoid.

Reactions: NaOH black to greyish blue on and inside cap, strongly orange-yellow on stipital veil; formalin, guayac, AgNO₃, FeSO₄ trivial.

Spores: 5-6.5 × 4.5-5.5 μm, globose to subglobose, fairly smooth.

In rich *Picea* forests; rare. Rönningen, Rölfors, Rönäs.

Ref.: FAV1, KS20, KS48.

Another rare species that recalls *C. laniger* (above), but is greyer and possesses rounded spores. The alkaline reaction on the stipital veil is remarkable. [The species is interpreted here according to J. Favre nec Lange.] Cf. *C. balaustinus*, which grows under *Betula*.

GROUP 9: VEIL WHITE, CAP young WHITISH, ODOUR DISTINCT(sect. *Telamonia* pp)

The cap is white to pale yellow or greyish yellow as long as the veil remnants cover it. The smell is distinct, at least partly acidulous. The species in this group are quite rare in Sweden.

C. diosmus Kühner

Plate 21

Cap 50-100 mm, not or weakly hygrophanous; buff to argillaceous but long coated white; matt, silky; margin white; convex to broadly umbonate.

Gills pale brown; distant.

Stipe clavate; coated white; silky with indistinct girdles; later dirty grey-brown.

Veil white, fairly sparse; cortina white.

Flesh greyish buff, marbled grey-brown; odour earthy to fruity, later pleasant; exsiccata grey-brown.

Reactions: NaOH, formalin, FeSO₄, AgNO₃ trivial.

Spores: 8-9 × 5-6 μm, elliptic, moderately verrucose.

In calcareous *Picea* and *Pinus* forests; uncommon. Unskarsheden, Fårskär, Lejondal, Sjöskogen, Rättviksheden, Gesunda, Storstupet.

Ref.: KS19, MAR8, KÜH, JEC8A.

This infrequent fungus is characterised by its smell and its brownish context. When freshly cut it smells approximately like *C. hinnuleus*, then after a few minutes agaricoid, but sometimes the latter smell is present from the start. [The species has been interpreted as *C. argentatus* Fr. s. Henry. The name *C. argillaceosericeus* Kytöv. et al. nom. inval. has also been used (see FUN), as it is not clear whether the above species is Kühner's, described from the Continent.] Cf. *C. suberi* (below).

C. niveotraganus Kytöv. et al.

Plate 21

Cap 50-80 mm, not hygrophanous; pale brown, young silky white, older more reddish brown; matt, finely innate-fibrillose; margin finely white fibrillose, long involute.

Gills brownish grey, sometimes with a faint, violet tinge; crowded.

Stipe cylindrical to clavate; coated white, young white peronate or with several white girdles, later pale brown.

Veil white, fairly copious; cortina white.

Flesh pale cinnamon-brown, marbled greyish brown, occasionally with a faintly violaceous tinge; odour acetous; exsiccata pale.

Reactions: phenol brownish violet; NaOH, guayac trivial.

Spores: 9-11 × 5-6.5 μm, elliptic to amygdaloid, moderately verrucose.

In rich *Betula* or mixed forests; rare; precocious (from June). Kalkugnsberget, Orminge, Klikten, Rännmyra, Björnrike.

Ref.: IXF186, BRA16.

Characterised by its acidulous odour (similar to that of *C. traganus*, or more like gooseberries), and by appearing early in the season. The fungus may exceptionally exhibit a violet marbling of the flesh. It differs from *C. diosmus* (above) by a pale context and longer spores. Cf. *C. traganus* f. *ochraceus*, whose context and gills are more yellow-brown.

C. niveoglobosus Lindstr. is almost identical but produces smaller spores ($7-9 \times 4-5.2 \mu\text{m}$). It is even rarer and grows early in the season with *Populus tremula* (see FLO; Oviken).

GRUPP 10: VEIL WHITE, CAP young WHITISH, ODOUR INSIGNIFICANT (sect. *Malachii* pp)

These species recall those of the preceding group but lack a distinct odour. Cf. *C. tabularis* (*Anomali*) and *C. argutus* (*Phlegmacium*).

C. suberi Soop

Cap 30-80 mm; weakly hygrophanous towards margin; young shining white, fibrillose, later absorbing to pale grey-brown; centre yellowish grey, later slightly flushed orange-brown to red-brown; often with radial, hyaline veins and scattered, coarse, darker fibrils outside disk; margin pale greyish, young with a white rim or tufts.

Gills pale grey brown to cinnamon, rarely with a faint bluish tinge; edge paler.

Stipe clavate, often robust; pale grey-brown to buff with a white, silky, fibrillose, absorbing coating and white girdles; base darker grey brown; apex sometimes with a bluish, evanescent tinge.

Veil and cortina pale grey to white, not darkening, copious.

Flesh grey-brown to cinnamon, marbled darker brown, sometimes with a faint violet tinge; odour and taste faint, agaricoid; more or less darkening, exsiccata often dark-grey to black, at least in gills.

Reactions: NaOH, formalin trivial; phenol slowly reddish lilac, guayac weakly greyish green.

Spores: $7-8.5 \times 4.5-5.5 \mu\text{m}$, obtusely ellipsoid to subglobose, moderately verrucose.

In rich *Picea* and *Pinus* forests; uncommon, more common in the North.

Ref.: KS9, KS14, KS30, REU, JEC9A, FLO.

Being predominantly greyish in colour, this rather common species resembles *C. diosmus* (above), but lacks its odour and has a more coloured context, sometimes with a faint, violet tinge. It resembles forms of *C. malachius* without violet tints, and is then best distinguished by its shorter and rounder spores. *C. poppyzon* differs by brighter, more ochraceous hues and leaner spores. [*C. impennis* s. Arnold is presumably a form (see ARN).] Cf. *C. albogaudis*.

C. urbicus Fr.

Cap 30-50 mm, not hygrophanous; long covered by white, silky fibres, later striate from the pale cinnamon background, sometimes with a pale violet sheen, finally dirty brown; margin with a white rim and white, often thick fringes; obtusely campanulate, later convex with a long involute margin.

Gills pale cinnamon-brown to brownish grey; edge paler.

Stipe clavate to cylindrical with a small bulb; white, sometimes with brownish stains; fibrillose with thin, white girdles or collar.

Veil white, fairly copious to sparse; cortina white.

Flesh whitish, marbled pale cinnamon to pale greyish violet; exsiccata pale.

Reactions: NaOH, formalin, guayac trivial.

Spores: $7-8.5 \times 4.5-5.5 \mu\text{m}$, elliptic, moderately verrucose.

Under *Salix* or *Corylus*, also with *Betula*; often fasciculate; southerly; rare. Gråborg, Drottningholm, Rothagen, Klikten, Rättviksheden.

Ref.: KS20, MAR8, LAN.

This uncommon species is smaller than *C. suberi* (above) and has a much paler context. It typically grows in clusters under *Salix*. The fruitbody is usually white when young, but forms with a violaceous sheen

have been reported (Rothagen). [The taxon is here interpreted s. Lange, whereas the interpretation in FLO and in FUN is clearly a different species with longer spores, possibly *C. arvalis* (below).]

***C. arvalis* (Karst.) Bat.**

Plate 19

Cap 25-90 mm, fleshy, not hygrophanous; pale greyish pink, disk gradually turning more tan; white silky, finely innate-fibrillose; margin long involute.

Gills grey-brown, sometimes with a faint, violet tinge, distant.

Stipe cylindrical, robust; greyish white, later pale tan, fibrillose with thick girdles, apex young weakly violaceous.

Veil white to pale grey, copious; cortina white.

Flesh pale grey to pale tan, sometimes weakly marbled violet; odour none, taste faintly raphanoid; exsiccata pale.

Reactions: NaOH trivial.

Spores: 8-10 × 5-6.3 μm, elliptic to subamygdaloid, moderately verrucose.

In broad-leaf forests with *Quercus* and *Corylus*; rare. Laxare, Österplana, Hammersta.

Ref.: KS39, REU, and *C. urbicus* var. *arvalis* in KAR2.

This species belongs to a difficult group of pale, fibrillose, robust fungi in deciduous forests (cf. *C. lucorum* and *C. argenteopileatus*). It differs from *C. urbicus* (above) by a more copious, white veil and larger spores. [*C. arvalis* was originally described as a variety of the latter.]

C. chevassutii Henry is not uncommon in southern *Quercus* forests. It is characterised by a bulbous stipe and a more grey-brown cutis (see HRY2, FLO, MOS28).

***C. turgidus* Fr.**

Cap 40-100 mm, weakly hygrophanous towards margin; pale brownish grey, young thinly frosty white, later pale buff with a more yellow centre; thinly silky; margin silky, grey to white; obtusely campanulate, later convex.

Gills pale brown.

Stipe robust, fusoid, slightly radicate, stiff; white, thinly silky, old greyish buff.

Veil white, sparse; cortina white.

Flesh white, remains white, marbled grey.

Reactions: NaOH, formalin, FeSO₄, AgNO₃ trivial.

Spores: 8.5-10.5 × 6.5-7.5 μm, elliptic to cylindrical.

In calcareous *Fagus* forests; uncommon.

Ref.: DÄH, MAR8, FLO.

Another southern species in calcareous beech woods. The fungus possesses a sparser veil than others in the group, and the stipe is usually tapered, rooting. In addition, it may be hygrophanous in very wet conditions and then recalls *C. duracinus*. [*C. triformis* s. Lange is probably conspecific.]

GROUP 11: CAP BROWN, FUNGUS DARKENS STRONGLY

(sect. *Brunnei* pp)

The fungus darkens during development, in the manner of *C. brunneus*. The cuticle is brownish, but may be covered by paler fibrils on young specimens, as is the case for *C. suberi* (above), which is sometimes brown even when young. Also this group consists of rare species.

***C. ectypus* Favre**

Cap 40-70 mm, weakly or not hygrophanous; grey-brown, darkening, later blackish brown; young strongly fibrillose, later glabrous to minutely squamulose, somewhat veined; obtusely conical, later convex.

Gills dark grey-brown with a purple tinge; conspicuously thick; edge paler.

Stipe robust, clavate, sometimes slightly attenuated; grey-brown, micaceous silvery-grey, sometimes with a violet tinge, especially at apex.

Veil brownish, very sparse; cortina white.

Flesh grey-brown with a violet to purple tinge at apex, marbled paler grey; odour pleasant, agaricoid; exsiccata blackish.

Reactions: NaOH, formalin, FeSO₄, AgNO₃ trivial.

Spores: 6-7.5 × 4.5-5.5 µm, subglobose to elliptic, almost smooth; conspicuously pale.

In calcareous *Picea* forests; rare. Hamra, Lejondal.

Ref.: FAV4, KS13, FLO, KIA7.

The fungus is rather similar to the closely related *C. brunneus*, but is at most weakly hygrophanous, and the spores are remarkably small. Occasionally the stipe may display a faint olive tint. Cf. *C. valgus* and *C. erubescens*.

C. procax Melot

Plate 23

Cap 50-90 mm, not hygrophanous, fleshy; tan, darkening to warmly brown, silky saturated dark brown when old; rather strongly brown-fibrillose; margin with a white rim and tufts obtusely conical, later convex with an umbo.

Gills dark grey-brown; rather distant and thick; edge paler.

Stipe robust, tall, rather stiff, cylindrical to clavate; shining silky white, gradually absorbing to grey-brown with brown stains and one or more white bands.

Veil white, rather copious; cortina greyish white.

Flesh grey, marbled dark grey-brown; odour pleasant, agaricoid; exsiccata greyish black.

Reactions: NaOH trivial.

Spores: 6-7.5 × 3.8-4.8 µm, obtusely elliptic, moderately to rather weakly verrucose..

In calcareous, sandy *Pinus* forests; very rare. Rättviksheden.

Ref.: MEL2.

This very rare species is large with a cap that can reach 110 mm in diameter, and a tall stipe (up to 140 mm). It seems endemic to a sandy pine habitat. It is larger and more fibrillose than *C. ectypus* and not as dark, and the spores are leaner, more verrucose.

C. pseudorubricosus Reumaux (Plate 23) is almost identical, including the spores, but distinctly hygrophanous with a faint red-brown tint on the cap (see REU, KIA7; Rättviksheden.)

C. albogaudis Kytöv. et al.

Plate 21

Cap 50-120 mm; not hygrophanous; pale grey-brown with hyaline veins, disk later slightly ochraceous; coated with coarse, grey fibrils; margin with pale grey to grey-brown tufts, long involute; rounded, then convex to campanulate.

Gills grey-brown, occasionally with a purple tinge; distant, thick.

Stipe clavate, very robust; pale grey-brown with a grey, fibrillose, absorbing coating and white to pale grey girdles.

Veil white to greyish white, not darkening, sparse to rather copious, cortina white to grey-white.

Flesh dark grey-brown, marbled with grey streaks, darkening; odour faint, agaricoid; exsiccata dark-grey to black.

Reactions: NaOH, guayac trivial.

Spores: 6.3-7.5 × 4.5-5.5 µm, subglobose to obtusely ellipsoid, moderately verrucose.

In *Picea* forests; northerly, rare. Röfors, Vinäsgraven, Skansberget.

Ref.: KIA7, and *C. suberi* var. *brunneogriseus* in KS30.

A large fungus, grey and lugubrious, reminiscent of *C. canabarpa* in habit and coloration. It is also characterised by a persistent, white girdle on the stipe and markedly distant gills. It is quite similar to *C. procax* (above), which has leaner spores, and to *C. suberi*, which is less robust and presents a more copious veil. [The species has been interpreted as *C. suberi* var. *brunneogriseus* (Soop) Soop, which has been shown to be genetically segregate.]

C. aprinus Melot

Cap 40-90 mm, weakly hygrophanous outside disk; red-brown to grey-brown, coated by greyish white to pale-tan fibrils, young even micaceous, later darkening; glabrous; margin young with a paler rim and thick, pale-grey tufts; convex, fleshy with a long involute margin.

Gills cinnamon to saturated dark brown; distant; edge paler.

Stipe robust, clavate to slightly bulbous, sometimes shortly radicate; grey-white to dirty tan, darkening from below, with grey to grey-brown fibrils; apex sometimes violet.

Veil pale grey, darkening, copious; cortina greyish white.

Flesh cork-brown to tan, sometimes marbled faintly violet; odour and taste pleasant; darkening, exsiccata greyish.

Reactions: NaOH, formalin trivial; guayac greyish green.

Spores: 8-10.5 × 6-7 µm, elliptic to subamygdaloid, moderately verrucose.

Under *Corylus* or *Tilia* on calcareous soil; southerly; rare. Åstad, Munkängarna.

Ref.: MEL7, FLO, MAH1.

Differs from other taxa in the group primarily by its thicker veil, which gives the fungus a paler hue when young, and by the large spores. In addition, it grows in a different biotope. Cf. *C. arvalis* (above).

A similar taxon in the same habitat, *C. sordescens* Henry [Plate 21] is darker, chocolate-brown with a violet tinge on the veil (see *C. strenuipes* Henry s. Marchand in MAR8; Åstad).

7.3 MIDDLE-SIZED, HYGROPHANOUS SPECIES

As generally in the subgenus, the fruitbody is usually brownish, often with a violet shade, which may be evanescent. The cap is dry, relatively thin, and distinctly hygrophanous, sometimes with a pattern of concentric rings, but a few taxa only exhibit a weak hygrophanity. The gills are often distant, never really crowded, and almost always some shade of brown. Observe the brown hue on young gills, as well as on other parts of the young fruitbody.

The grouping follows the colour of stipe and flesh. Cut a few young, fresh, humid specimens, and observe the context near the cap centre and in the upper half of the stipe.

GROUP 12: STIPE or FLESH predominantly VIOLET In CONIFEROUS forest

(sect. *Everni*)

Several species in the group have characteristic odours. If young specimens exhibit a mere faint shade of violet, or grow in deciduous woods, go to the subsequent groups.

C. evernius Fr.

Cap 30-100 mm, strongly hygrophanous; purple-brown, later umber, young micaceous from white fibrils; margin long white; conical with an involute margin, later convex, often with a narrow umbo.

Gills saturated violet to purple-brown, rather thick, distant, edge somewhat paler.

Stipe tall, tapering, stiff when young; violet, young coated or zoned white, apex strongly violet.

Veil white, copious; cortina white to greyish violet.

Flesh greyish white in cap, nicely violet in stipe, somewhat marbled; odour sometimes raphanoid.

Reactions: NaOH, formalin trivial; guayac dark green; phenol weakly red-brown.

Spores: 9-11.5 × 5-6.5 µm, oblong elliptic to amygdaloid, fairly coarsely verrucose.

In moist, acidic *Picea* forests, especially in *Sphagnum*; common.

Ref.: MAR8, PHI, HOL, MOS4, FLO.

A common species in spruce forests with blueberry, in and around swampy areas. The stipe is typically stiff and tapering to a point. The violet coloration is sometimes visible only after scraping the stipe. Moreover, it disappears with age and the entire fungus becomes vaguely brownish. Cf. *C. tortuosus*, which is markedly leaner, and *C. cinnamoviaceus*.

C. ionophyllus Moser

Cap 30-80 mm; only weakly hygrophanous; purple-brown, soon grey-brown, sometimes with a yellow-brown centre; margin greyish violet, silky, sometimes with pale yellow patches; obtusely rounded, later plane to convex with a shallow umbo and a long involute margin.

Gills saturated dark violet with a grey-brown tinge; edge greyish white.

Stipe weakly clavate, often slender and hard; silky greyish white, zoned white to greyish yellow; fibrillose with an evanescent, whitish ring.

Veil greyish white to grey-yellow, usually membranous; cortina white to grey.

Flesh violet to grey-violet, marbled, later pale grey-brown; odour peculiar, fruity or resinous.

Reactions: NaOH, AgNO₃ trivial; formalin reddish lilac (<10').

Spores: 9.5-10.5 × 6-6.5 μm, elliptic to obtusely amygdaloid, moderately verrucose.

In *Picea* forests, also in alpine *Betula* forests; uncommon.

Ref.: MOS4, MEL2, FLO, MOS31.

The best character is the typical odour, recalling that of *Fomitopsis pinicola*. *C. torvus* (below) has a similar smell, but is more robust and only weakly violaceous. The veil often displays a yellowish, sometimes even buff, hue, and may be very dense, almost membranous. The cap is typically circular and flat as a coin, and the species is the only one in the group that is not distinctly hygrophanous. [It has sometimes been interpreted as *C. scutulatus* Fr. (cf. MOS31).]

C. agathosmus Brandrud et al.

Cap 40-80 mm, hygrophanous; nicely greyish violet, later purplish brown with a date brown centre; margin white micaceous, often sulcate, young with a broad, white border or adpressed, white patches; rounded, later campanulate to obtusely conical.

Gills saturated violet with a grey-brown tinge.

Stipe cylindrical; silky greyish white to pale violet, with a membranous, erect, white collar; base grey-brown.

Veil white with a violet tinge, copious; cortina pale blue.

Flesh nicely violet to greyish violet, marbled, grey-brown in stipe-base; odour acidulous like fermenting fruit.

Reactions: NaOH, formalin, guayac, AgNO₃ trivial.

Spores: 8-10.5 × 6-7 μm, elliptic to obtusely amygdaloid, moderately verrucose.

In rich, mossy *Picea* forests, also in alpine *Betula* forests; uncommon.

Ref.: FLO.

Differs from *C. ionophyllus* (above) mainly by the veil colour and the odour, which is approximately that of *C. traganus*, and by being frankly hygrophanous. [The species has also been interpreted as *C. subviolascens* Henry s. Moser]

C. carneinatus Soop

Plate 25

Cap 35-80 mm, hygrophanous; dry to waxy or slightly viscid; brick to red-brown, later buff; young white to violet frosty, then glabrous to finely innate-fibrillose; margin long violet; obtusely rounded, later convex without a distinct umbo.

Gills violet; edge slightly paler.

Stipe clavate, often with a rounded bulb, fairly robust; white to pale brownish grey with a violet shade; sometimes zoned or girdled white; apex violet.

Veil white to grey-violet, sparse; cortina white with a violet tinge.

Flesh whitish to pale brown, young marbled dark violet; taste faint, pleasant, ± like fresh vegetables.

Reactions: NaOH, formalin, lugol trivial.

Spores: 6.5-8.5 × 4.5-5.5 μm, obtusely elliptic, moderately verrucose.

In rich *Picea* forests; rare. Frötuna, Kvistorp, Vinäsgraven.

Ref.: KS33, and *C. impennis* in KS17.

This very rare species is characterised by a pinkish cap, intensely violet gills and sometimes context, and does not exhale any particular odour like the preceding two species. It resembles *C. quarciticus*, which is

less hygrophanous with a mottled cap, and found in sandy *Pinus* habitat. The fungus also appears close to *C. privignorum* Henry in the *C. biformis* complex, which, however lacks violet gills.

GROUP 13: STIPE and FLESH PALE or BROWNISH, partly VIOLACEOUS
Under DECIDUOUS trees (sect. *Telamonina*)

If the fungus grows in a coniferous forest, see the adjacent groups.

***C. saturninus* Fr.**

Cap 30-80 mm, strongly hygrophanous; chestnut-brown with a purple to violet tinge, centre sometimes red-brown; silvery shining; margin with white patches and fibres; obtusely conical, later convex, sometimes with a shallow umbo.

Gills cinnamon to purple-brown, often with a violet tinge, edge paler.

Stipe cylindrical, often slender; silvery whitish to greyish violet, apex violet.

Veil white with a faint violet tinge, fairly copious; cortina white.

Flesh pale brown to grey, usually marbled violaceous, darker in stipe-base.

Reactions: NaOH, formalin trivial.

Spores: 7-9 × 4-5 µm, oblong elliptic, moderately verrucose.

Under *Salix*, rarely with *Corylus*, mostly fasciculate; fairly common.

Ref.: MAR8, HEN4, BRA5, FLO.

One of the few *Cortinarius* one may encounter outside forests: in copses, parks, etc. The fasciculate growth is also characteristic (sometimes even forming fairy rings), and virtually always with *Salix*. Cf. *C. biformis* (below).

Growing with dwarf *Salix* on alpine heaths is *C. subtorvus* Lam., which is smaller and provided with a copious, peronate veil (see FLO, LAM1).

***C. cagei* Melot**

Cap 30-55 mm, strongly hygrophanous; date brown (drying almost white), young white micaceous with a violet tinge, older buff; matt, smooth; conical, later convex with a ± narrow umbo to campanulate.

Gills purplish brown; distant; often thick; edge conspicuously white.

Stipe slender, often tapering to a point; pale violaceous, shiny or zoned white.

Veil and cortina white with a violet tinge; sparse.

Flesh greyish with a violet tinge.

Reactions: NaOH trivial; guayac greenish grey.

Spores: 8-10 × 4.5-6 µm, amygdaloid, moderately verrucose.

In rich deciduous or mixed woods; uncommon. Södra Råda, Frötuna, Näset, Ramstigsberget.

Ref.: FLO, KIA27, and *C. bicolor* in DÄH, LAN.

Resembles a slender *C. saturninus*, but the cap is paler. The species normally grows with deciduous trees, but may also appear with *Picea*. [It has also been named *C. bicolor* Cooke nom. illeg.] Cf. *C. leiocastaneus*.

***C. torvus* (Bull.:Fr.) Fr.**

Cap 50-110 mm, only weakly hygrophanous; grey-brown to chestnut-brown, young covered by greyish white fibrils; innate-fibrillose, sometimes coarsely with adpressed squamules; margin greyish white to greyish violet; obtusely rounded, later convex.

Gills cinnamon with a paler edge; distant.

Stipe robust, clavate, sometimes slightly pointed and radicant; greyish white, apex grey-violet, lower half peronate from a thick, membranous, grey veil forming a collar.

Veil greyish white, flushing yellow, copious; cortina white with a violet tinge.

Flesh grey to pale brown, marbled grey-violet; odour acidulous, fruity.

Reactions: NaOH, formalin trivial; guayac weakly greenish yellow.

Spores: 9-11 × 6.5-7.5 µm, obtusely elliptic, rather strongly verrucose.

In *Quercus* and *Corylus* copses; fairly common.

Ref.: DÄH, MAR8, PHI, HOL, BON, FLO.

Resembles *C. lucorum* in shape and colour, but is easy to identify from the stipital sheath and the odour, which evokes plum or gooseberry with a component of ethyl acetate. The species is more common in the South.

A similar, so far unravelled taxon, which is smaller and devoid of violaceous tones, has been encountered in alpine *Betula* forests (Funäsdalen).

GROUP 14: STIPE and FLESH BROWNISH, partly VIOLACEOUS In CONIFEROUS forest

(sect. *Privigni*)

Cf. *C. erubescens*, *depressus*, and the group of *C. malachius*.

***C. biformis* Fr.**

Cap 20-60 mm; yellow-brown, sometimes with an orange or red-brown tinge, silvery micaceous when young; glabrous, but often irregularly zoned; margin young with a white rim; obtusely conical, later convex to campanulate.

Gills pale buff to cinnamon, sometimes with a fugacious, violet or purple tinge.

Stipe cylindrical to clavate; pale buff, with a white, sometimes thick and wide, band near the middle, young coated white; apex often violet.

Veil white to pale violet, fairly copious; cortina white.

Flesh pale buff, sometimes with a brick tone, flushing brown, often marbled grey-brown or violet.

Reactions: NaOH, formalin, lugol trivial.

Spores: $7-8.5 \times 4.5-5.7 \mu\text{m}$, obtusely elliptic, moderately verrucose.

In *Picea* and *Pinus* forests; common.

Ref.: HEN4, KS6, KS13, LAN, FLO.

The species is fairly common in all kinds of *Picea* forests, especially in young plantations. It is characterised by the white band on the stipe, which is generally visible (at least in oblique light) even on older fruit-bodies. The cap colour is often lively, tending to orange, but the violaceous tint in the flesh may be absent. [The species occurs in a host of forms: the form with a clavate stipe may be identified as *C. privignorum* Henry.]

In *Pinus* forests one sometimes encounters a stouter and taller, more intensely violaceous form, which may be separated as a distinct taxon [var. *robustior* Soop ined.; = *C. dissidens* Reumaux?]. The young fruitbody is then dark purple-brown with an intensely violaceous flesh, but the colour quickly disappears during development, and it is hard to relate young and mature carpophores growing from the same mycelium (see KS22, REU2).

***C. cinnamoviolaceus* Moser**

Cap 35-80 mm; dark grey-brown with a blackish brown disk, later dark red-brown; evenly glabrous to finely innate-fibrillose; margin umber with thin, white fibrils and tufts, sometimes with a violet tinge; rounded, later extended with a shallow umbo.

Gills saturated brown, sometimes with a purple tinge.

Stipe cylindrical to clavate; white with thin, white zones, young with a violet tinge at least at apex, yellowish grey towards base.

Veil white, sometimes with a violet tinge, sparse to fairly copious; cortina white.

Flesh grey to pale brown, yellowish grey in stipe-base; odour faint of "wine cellar".

Reactions: NaOH trivial.

Spores: $7.5-9.5 \times 4.5-5.5 \mu\text{m}$, amygdaloid to elliptic, weakly verrucose.

In mature *Picea* forest; uncommon. Oviken, Frötuna.

Ref.: MOS4, JEC6, KIA27, and *C. imbutus* in FLO; *C. parevernus* in BEN.

Characterised by the dark cap, dark gills, and its odour, reminding of "old wine". The stipe is white, often partitioned violet. [*C. parevernus* Henry is a synonym.] Cf. *C. dolabratus*, which is quite similar but possesses more red-brown gills, and *C. mattiae*, which has a paler, non-hygrophanous cap.

The similar *C. imbutus* Fr. (see KIA27) grows mainly with deciduous trees. — The very rare *C. vilior* (Karst.) Garnier, is significantly smaller and exhales a strong, acidulous odour (see ARN; Orminge).

***C. tortuosus* Fr.**

Cap 20-60 mm; dark purple-brown to umber; smooth, glabrous to finely innate-fibrillose; margin young pale violet with a white rim and pale tufts; rounded to conical, later campanulate to plane with a decurved margin.

Gills saturated red-brown, soon purple to chocolate-brown; distant.

Stipe cylindrical, slender, often tall, fragile; dark brownish violet to violet-grey; fugaciously coated white to pale violet; young with thin, whitish girdles.

Veil and cortina pale violet to white, fairly copious to sparse.

Flesh brownish violet to violet in stipe, more red-brown in cap, odour \pm raphanoid.

Reactions: NaOH, FeSO₄, AgNO₃ trivial; guayac strongly blue-green.

Spores: 8-10 \times 5-6.5 μ m, elliptic, moderately verrucose.

In moist *Picea* forests, often in *Sphagnum*; fairly common.

Ref.: MEL4, AGA16, FLO, SVL2, ARN.

Differs from the other taxa in the group by its slender profile and saturated gill colour. The cap is typically flat and circular like a coin. Cf. *C. cinnamoviaceus* (above) and *C. testaceofolius*.

GROUP 15: STIPE and FLESH GREY-BROWN to UMBER

(sect. *Brunnei*, *Uracei*)

If the flesh and stipe exhibit a yellow-brown to orange-brown tinge, or if the veil is yellow, see the next group. If flesh and stipe are merely watery, pale brown, see *C. biformis* above or groups further along. The members of the present group all have dark caps, stipe, and flesh, and they darken even further with age. The exsiccata turn dark grey to blackish — dry a few specimens and observe the colour. A number of species in other groups also have darkening fruitbodies; cf. *C. paragaudis*, *suberi*, *ectypus*, *neofurvolæsus*, *subferrugineus*.

***C. brunneus* Fr.**

Cap 30-80 mm; dark brown to blackish brown; margin white to greyish yellow when young; obtusely conical, later campanulate to convex with an obtuse umbo.

Gills chestnut-brown, sometimes with a purple tinge; fairly distant.

Stipe \pm clavate; grey-brown, often with a white to grey-brown band, or \pm coated shiny, greyish white.

Veil white to pale yellow-brown, darkening, fairly copious; cortina white.

Flesh grey, marbled blackish brown, young often with a purple tinge; darkening to brownish black.

Reactions: NaOH trivial.

Spores: 7.5-9 \times 5.5-6.5 μ m, elliptic, moderately verrucose.

In *Picea* forests; very common.

Ref.: HOL, HEN4, FLO.

One of our most common *Cortinarii*. It is frankly brown everywhere: cap, stipe, gills, flesh, but the living fruitbody gets paler grey-brown in dry conditions. Certain collections display a distinctly white veil, forming white girdles on the stipe even on mature specimens, while the veil of others is grey to grey-brown, covering the entire stipe or merely settling as hazy bands.

C. glandicolor Fr. differs by a sparse veil, a more slender stipe, and a more conical cap (see FLO, DÄH, KIA7). This taxon, found in *Pinus* forests, exhibits approximately the same hues as *C. brunneus*. [It is probably synonymous with *C. rubricosus* Fr. s. Moser, Favre, &c (see HEN4, LAN, KS3, FAV1).] — *C. flos-paludis* Melot is a more diminutive taxon with multiple white, stipital bands, which occurs in moist habitats among *Sphagnum* (see MEL2, FLO). [It may be interpreted as *C. stemmatus* Fr. (see KS6).] — *C. cæsiobrunneus* Kytöv. et al. is difficult to separate from *C. brunneus*, but young specimens are usually darker, often with a violet or purple tinge on cap and gills. It may be rather common but overlooked in rich *Picea* forest (see KIA7; Alderängarna).

C. clarobrunneus (Lindstr. & Melot) Niskanen et al.

Cap 30-50 mm; evenly yellow-brown with a darker, date brown disk, darkening; glabrous to very finely innate-fibrillose; margin sometimes with a thin, white rim; conical, later campanulate to plane with a pointed umbo.

Gills cinnamon-brown, sometimes rather thick; fairly distant.

Stipe cylindrical to slightly clavate; grey-brown, \pm zoned darker, young coated with a thin, white, darkening layer that soon absorbs.

Veil white to greyish white, darkening, sparse; cortina white.

Flesh dark grey-brown, darkening.

Reactions: NaOH trivial.

Spores: $7-8 \times 5-6 \mu\text{m}$, subglobose, weakly verrucose.

In *Pinus* forests; fairly common in the North, uncommon elsewhere.

Ref.: KIA7, and *C. brunneus* var. *clarobrunneus* in FLO, *C. brunneofulvus* Fr. in KS23.

A rather common element in northern pine heaths that may be difficult to separate from *C. brunneus* (which grows with spruce). It is somewhat slimmer and paler, the colour being remarkably even and smooth on the cap, and the veil is distinctly thinner, hardly leaving any remnants on the fruitbody. Also the spores are of a different shape. Cf. *C. suberi*, and (with deciduous trees) *C. disjungendus*.

C. uraceus Fr.

Plate 30

Cap 30-60 mm; cinnamon with a red-brown to almost black centre; innate-fibrillose, matt; darkening, finally all black and glabrous; conical, later convex, often with a small pointed umbo.

Gills saturated brown, soon blackish brown; distant.

Stipe cylindrical, fairly slender; grey-brown, young dirty white above, darkening to grey-brown all over, sometimes with a distinctly green tinge, finally black.

Veil grey-brown, occasionally with an evanescent green tinge, sparse; cortina very sparse.

Flesh dirty brownish grey, darkening to umber.

Reactions: NaOH \pm yellowish green on stipital veil, elsewhere trivial; fluorescence distinctly greyish yellow (methanol extraction).

Spores: $8-10 \times 5-6 \mu\text{m}$, elliptic, coarsely verrucose; certain basidia encrusted with a greenish yellow pigment.

In calcareous *Picea* and mixed woods; often precocious; uncommon.

Ref.: HEN4, MEL4, LAN, MOS10, ARN.

A lugubrious species with a brownish-grey hue that darkens on maturation (note: not when bruised) to entirely black. The green tinge on the stipe soon disappears after collecting. Cf. *C. aurantiomarginatus*, which occasionally has a sparse veil. [*C. viridipes* Moser is a synonym.]

C. rigidipes Moser [Plate 24] is quite similar, but presents more olive-brown to olive-yellow colours. It is very rare, growing in *Quercus* and *Corylus* woods (see MOS12, KIA14, *C. cf. subnotatus* Fr. in KS8, *C. uraceus* in FLO; Karlsund) — [The latter couple of species are unique among *Telamonia* in containing a primitive anthraquinonic pigment (cf. ARN). Moreover, *C. rigidipes* was placed by its author in subgenus *Cystogenes* Moser & Horak, a taxon with a predominantly South American distribution (SYD19).]

C. nolanæformis (Velen.) Dima et al.

Plate 24

Cap 20-70 mm; dark grey-brown to umber, older sometimes with a reddish shade at centre; glabrous, sometimes as if lacquered; young faintly micaceous; margin with a thin, paler rim; obtusely conical, later \pm plane, wavy, fragile.

Gills chocolate-brown to grey-brown, sometimes with a purple tint; edge pale.

Stipe cylindrical to somewhat tapering; slender, fragile; dirty brown, dark brown at base, very sparsely coated greyish white when young.

Veil grey-brown to grey-white, very sparse; cortina white.

Flesh dirty brownish grey to buff, darkening from stipe-base, very fragile, odour faint, raphanoid.

Reactions: NaOH greenish on stipital veil and sometimes in flesh.

Spores: $8-10 \times 5-6.5 \mu\text{m}$, elliptic to obtusely amygdaloid, coarsely verrucose, fairly dark; certain basidia encrusted with a yellowish pigment.

In deciduous woods, primarily with *Corylus*; precocious; uncommon. Hellasgården, Järna, Källängen.
Ref.: VEL1, KIA14.

Another lugubrious species, slender and fragile with grey-brown, sombre hues, that may appear in hazel thickets as early as June. The interesting yellowish incrustations in the basidia are shared with *C. uraceus* (above). [This taxon has been identified as *C. irregularis* Fr. nom. dub., as well as *C. paruraceus* Melot, a different species in coniferous forest with larger spores (see MEL4, MEL5, BAL1).]

***C. depressus* Fr.**

Cap 30-50 mm; purplish brown to dark grey-brown, centre almost black; micaceous from greyish white fibrils; margin greyish white; conical, later convex, often with a small pointed umbo.

Gills ochraceous to pale grey-brown, edge grey.

Stipe fairly tall, hard, stiff, often tapering; grey-brown to silky white, zoned greyish white, sometimes with an evanescent, rosy tinge, darkening from base.

Veil white to greyish, occasionally with a pink shade, fairly copious; cortina white to greyish white.

Flesh dirty grey, marbled brown, darkening; taste weakly farinaceous.

Reactions: NaOH, formalin trivial.

Spores: 6-7.5 × 3-4 µm, oblong elliptic to amygdaloid, moderately verrucose.

In mossy *Picea* forests; fairly common.

Ref.: MEL4, FLO, BAL2, and *C. adalberti* in SVL2.

This is one of the smaller taxa in the group, though larger fruit-bodies are sometimes encountered (cap reaching 80 mm in diameter). Its pale gill colour and the stiff, silvery stipe are typical, as well as the unusually narrow spores. [*C. adalberti* Favre ex. Moser is a synonym.]

GROUP 16: STIPE and FLESH bright YELLOW-BROWN to RUSTY-BROWN (sect. *Hinnulei*, *Renidentes*)

The fruitbody is brighter than in the preceding group, with a yellow or rusty colour. If the flesh colour is duller, more tawny buff, see the group *C. bivelus*.

***C. hinnuleus* Fr.**

Cap 30-70 mm, hygrophanous; dirty orange-brown; glabrous; margin young pale yellow; obtusely rounded, later convex to campanulate with a decurved margin.

Gills cinnamon to red-brown; conspicuously distant.

Stipe cylindrical; red-brown, with brown-grey to yellow-white, often hazy, bands.

Veil greyish white to pale yellow, darkening, copious; cortina white.

Flesh rusty-brown to grey-brown; odour ± of "sour kitchen cloth".

Reactions: NaOH, formalin, FeSO₄, AgNO₃ trivial; guayac greyish green.

Spores: 7-9 × 5-6 µm, obtusely elliptic, coarsely verrucose, dark.

In *Quercus* and *Corylus* copses; common.

Ref.: DÄH, MAR8, PHI, HOL, HEN4, BON, FLO.

A common species in deciduous woods. The veil often has a distinctly yellow component. The odour, which is also called "terreous" but is not always distinct, and the distant gills are the best characters.

C. roseonudipes Henry & Moëne-Locc. [Plate 24], with a somewhat darker red-brown cap, is almost identical. It is mainly distinguished by longer spores (-10 µm) [see FUN; Saltarö]. — Another similar taxon is darker brown and may be confused with *C. brunneus*. It is possibly identified as *C. sordidus* (Velen.) Henry [Plate 24; see VEL1, HRY6; Källängen, Hellasgården, Rothagen]. — A related taxon, *C. safranopes* Henry, is smaller and has a blackish-violet alkaline reaction in the context of the stipital base (see MAR8, OGA3; Drottningholm, Ormkärr). These fungi all grow in deciduous woods.

C. hinnuleoarmillatus Reumaux

Cap 40-80 mm, often weakly hygrophanous; grey-yellow to yellow-brown, sometimes with an orange tinge; matt, glabrous to innate-fibrillose; obtusely conical, later campanulate to convex, often fleshy. Gills diluted cinnamon to pale grey-brown or ash grey, soon brown-red; conspicuously distant and thick, anastomosed.

Stipe fusoid, often tough; pale greyish yellow with multiple thick, orange to brick-red girdles, sometimes with only a yellowish sheath, darkening from base to umber or blackish, apex pale grey.

Veil butter-yellow to orange or brick-red, copious; cortina greyish white.

Flesh yellow-grey, marbled grey-brown, rusty-brown towards stipe-base; odour sour; taste fetid.

Reactions: NaOH, formalin, acid FeCl₃ trivial.

Spores: 8.5-10 × 5-6 µm, elliptic, moderately to rather coarsely verrucose.

In deciduous woods, in particular under *Populus tremula* and *Corylus*; uncommon. Hellasgården, Gräsvreten, Ormkärr.

Ref.: KIA4, SMF71, FLO, and *C. helvolus* in KS3, HRY16.

This fungus resembles *C. hinnuleus* (above) and grows in similar habitats, but is usually more robust, less hygrophanous. The veil is reddish, leaving orange to brick-red girdles on the stipe, similar to those of *C. armillatus*, sometimes merely dark yellow. [*C. hinnuleus* var. *medius* Henry is probably a synonym, as well as *C. fulvaureus* Henry (see HRY18, BSMF51). The form with a golden veil may be identified as *C. hinnuleus* var. *speciosus* Fr., whereas the form with a brightly red veil is most likely identical to *C. rubellus* Cooke (see notes on *C. speciosissimus*).]

C. gentilis (Fr.) Fr.

Cap 15-50 mm, strongly hygrophanous; dark orange-brown to date brown, when young frosty from sparse yellow fibrils; glabrous to finely innate fibrillose; margin bright yellow; rounded, later convex with an obtuse umbo.

Gills saturated yellow-brown, conspicuously distant, often thick, with a yellow edge.

Stipe tall, slender; dark yellow-brown, darkening from base, with one or more brightly yellow bands or partly coated yellow; apex yellowish.

Veil pure yellow, rather copious; cortina pale yellow.

Flesh yellow-brown, occasionally marbled yellow, darker in stipe-base.

Reactions: NaOH dark red to blackish all over, rarely blood red; formalin trivial; acid FeCl₃ brownish black.

Spores: 6.8-8.7 × 5.5-6.5 µm, subglobose to obtusely elliptic, moderately verrucose.

In *Picea* and *Pinus* forests; common.

Ref.: MAR7, PHI, HOL, FLO, KIA7.

This species is common to very common in all kinds of coniferous forests. The yellow cap margin and the bands on the stipe must be observed on young specimens. They quickly disappear, and the fungus then resembles one of the many "nondescript" *Telamoniae*. Certain specimens can become quite large, but the stipe is always slender. [The species belongs to sect. *Brunnei*.]

C. renidens Fr.

Cap 40-70 mm, concentrically hygrophanous; sometimes smaller; apricot to intensely orange-brown; glabrous, waxy; margin with a yellow rim when young; conical, later convex with a shallow umbo, often irregularly lobed.

Gills cinnamon to greyish yellow; fairly crowded.

Stipe cylindrical, fairly slender; pale greyish yellow, older more yellow-brown and somewhat zoned; apex grey.

Veil absent; cortina very sparse or absent.

Flesh cinnamon with an orange tinge; after-taste slightly bitter.

Reactions: NaOH, formalin, guayac, AgNO₃ trivial.

Spores: 6.5-7.5 × 4.5-6 µm, obtusely elliptic to subglobose, rather strongly verrucose.

In calcareous *Picea* forests, sometimes under *Quercus*; uncommon.

Ref.: BEN, KS3, KS13, KS23, ARN, FLO, JEC15B.

The only *Cortinarius* known entirely without a veil, which often causes the cap margin to stand free from the stipe even on the undeveloped fruitbody. [The relationship to *Cortinarius* has therefore been questioned; it has, e.g., been named *Gymnopilus terrestris* Hesler in North America. In fact, sect. *Renidentes* has been found from molecular markers to be true *Cortinarius*, but belong to an ancient clade outside *Telamonia* with relatives in the South Pacific.]

GROUP 17: STIPE and FLESH PALE; STIPE TOUGH, NAKED (sect. *Duracini*)

The stipe is tenacious, more or less stiff, and often fusoid (ventricose) in shape. It is usually radicant, that is, tapering to a root-like extension below ground. The veil is sparse and difficult to perceive. Cf. *C. disjungendus*.

C. duracinus (Fr.) Fr.

Cap 30-80 mm, strongly hygrophanous, often concentrically; pale brown to apricot-yellow; glabrous, smooth; margin with a thin, white border when young; obtusely conical, later conical to convex with an umbo.

Gills cinnamon; broad; edge somewhat paler.

Stipe slender, often tall; stiff, tough, radicant; whitish; smooth.

Veil white, very sparse; cortina white.

Flesh pale buff; odour sometimes faint like "hospital".

Reactions: NaOH, AgNO₃, phenol, trivial; acid FeCl₃ greenish black.

Spores: 8.5-11 × 4.5-6 µm, elliptic to cylindrical, weakly verrucose.

In *Picea* forests, often on the needle carpet, also in broad-leaf woods; fairly common.

Ref.: MAR8, HEN4, LAN, BON, FLO, and var. *raphanicus* in DÄH.

This fungus may be common in all kinds of spruce forests certain years, and is recognised mainly from the tough, greyish-white, bald, more or less rooted stipe. It is a variable species: large or small, cap exhibiting various brown tones, though always pale. [One is probably confronted here with a complex of taxa.]

C. dolabratus Fr.

Cap 30-60 mm; warmly red-brown to chocolate brown with a purple tinge; glabrous to finely innate-fibrillose; margin paler, long with a white rim; obtusely conical, later convex with a shallow umbo.

Gills saturated brown-red, sometimes with a purple tinge; rather crowded.

Stipe cylindrical to tapering, fairly hard; white, slightly flushing brownish; with thin, white zones.

Veil white, sparse; cortina white.

Flesh pale brown to tan, occasionally with a reddish tinge; odour insignificant.

Reactions: NaOH trivial to blackish.

Spores: 7.5-9.5 × 4.5-5.5 µm, elliptic to subamygdaloid, moderately to weakly verrucose.

In rich, mossy *Picea* forest; fairly common, probably northerly.

Ref.: FLO, KS27, and *C. imbutoides* in REU.

This fungus is easily distinguished from *C. duracinus* (above) by its darker, chocolate-brown cap, and in particular by the saturated brick hue of the gills (cf. *C. tortuosus*, *testaceofolius*, *mattiæ*). The rather similar *C. cinnamoviaceus* differs chiefly by its odour and a duller gill colour. [*C. imbutoides* Bidaud & Carteret is a synonym.]

C. hircinosmus Moëgne-Locc. [Plate 30] is similar with similar spores, but smaller with a glabrous cutis, looking almost varnished. It is rare, growing under *Betula* (see REU; Borrberg). Cf. *C. leiocastaneus*, which has paler gills.

C. acetosus (Velen.) Melot

Plate 23

Cap 30-80 mm, strongly hygrophanous; saturated red-brown; smooth, glabrous; margin whitish; obtusely conical, later convex with an obtuse umbo to campanulate.

Gills thick, distant, waxy, often anastomosed or bifurcate; cinnamon; edge usually conspicuously pale.

Stipe fairly short, hard, somewhat fusoid, stiff, radicate; white to yellow-white, sometimes chalky white; smooth.

Veil white, very sparse; cortina white.

Flesh white, somewhat flavescent when bruised, darkening; odour like "hospital".

Reactions: NaOH, formalin trivial.

Spores: 8-10.5 × 5-6 µm, oblong elliptic, moderately verrucose; marginal elements vesiculose.

Under *Quercus* or *Populus tremula*, also in alpine *Betula* habitat; precocious; uncommon. Gräsvreten, Hellasgården, Källängen, Garphyttan, Flatruet.

Ref.: MEL5, and *C. rigens* in MAR8, LAN, *C. candelaris* in DÄH.

May be recognised by the saturated, red-brown cap, which, however, quickly dries to pale yellow-brown or almost white. The stipe is white, rooted, hard, but more brittle than tough. The fungus exudes a strong odour of iodine ("hospital"), and the thick, distant gills recall a *Hygrocybe*. [It is possibly identical to *C. candelaris* Fr. It has often been named *C. rigens* Fr., which, however, grows in coniferous forest and has a more grey-brown cap according to its author. Molecular markers place *C. acetosus* outside *Telamonia* s. str.]

Another tough, rooted species, *C. damascenus* Fr., is rare, growing in deciduous woods, usually fasciculate (Näset). It is more diluted grey-brown in colour, and also differs by a ± bitter taste (see MAR8).

GROUP 18: STIPE PALE, NOT TOUGH, CAP YELLOW-BROWN
In CONIFEROUS forest

(sect. *Firmiores*)

If the cap is more red-brown to dark brown or the fungus grows in a deciduous forest, see subsequent groups. The stipe is whitish, often with a pale brown tinge or flushing brown. Cf. *C. oulankaënsis*.

C. armeniacus Fr.

Cap 30-70 mm, concentrically hygrophanous; saturated apricot-yellow to red-brown, sometimes paler yellow; when young finely white micaceous; margin paler with fine, white fibrils; rounded, later convex with a wide umbo.

Gills pale cinnamon, edge finely serrulate.

Stipe clavate or with a triangular profile; young often bulbous; white, silky shining with thin, white zones.

Veil white, fairly sparse to copious; cortina white.

Flesh immutably white, sometimes marbled pale grey, rarely slightly violaceous.

Reactions: NaOH, formalin, AgNO₃ trivial; guayac green; phenol reddish brown.

Spores: 7.5-9.5 × 5-6 µm, obtusely elliptic, moderately verrucose.

In *Picea* forests, especially on the needle carpet, also in *Pinus* forests; common.

Ref.: PHI, HOL, FLO.

The fungus often presents a strikingly handsome apricot tint and a pure white stipe. It is the only hygrophanous *Telamonia* in the country that possesses a virtually immutable, white context (at most slightly marbled grey), although the form found in pine heaths is often marbled violet. Cf. *C. microspermus* (below).

A rare variety *badius* (Schum.) Soop (= *C. triformis* Fr. s. Moser) [Plate 25] has a date brown cap, and is then distinguished from members of the subsequent groups primarily by the white context (Röfors, Skansberget; see KS17, *C. triformis* in MAR8, BREI5, and *C. fuscopallens* s. Arnold in ARN). [This variety is possibly identical to *C. caesioarmeniacus* Kytöv. et al. (see IXF201, JEC19).]

C. triformis Fr.

Plate 26

Cap 30-60 mm, concentrically hygrophanous, often viscid in humid conditions, soon drying, waxy; brightly yellow-ochre, often with a warm, yellow-brown tint; glabrous; margin with a thin white rim when young; obtusely conical, later \pm plane with a small, shallow umbo.

Gills pale buff to yellow-brown.

Stipe slender, often tall, cylindrical to weakly clavate; coated white, absorbing to buff in areas, sometimes with thin, white girdles.

Veil white, sparse; cortina white.

Flesh diluted greyish buff to pale brown.

Reactions: NaOH, formalin, guayac trivial.

Spores: $6.5\text{--}8.5 \times 4\text{--}5.5 \mu\text{m}$, elliptic, weakly verrucose.

In rich *Picea* forests; fairly common, more common in the North.

Ref.: KS22, KS33, and *C. melleopallens* in LAN, *C. privignofulvus* in HRY8.

A slender fungus with a brightly yellow-brown cap, which is often slightly viscid, and a white stipe, recalling a *Myxadium*. The species differs from *C. armeniacus* (above) primarily by its coloured context and smaller spores. Cf. *C. poppyzon*, which is paler and more fibrillose, as well as *C. biformis*, which is darker, often with a violet tinge.

[This interpretation of *C. triformis* agrees best with the type variety, described by Fries from *Fagus* forest, but is probably synonymous with the variety *melleopallens* s. Lange. Concerning *triformis* in Moser's sense, see the variety of *C. armeniacus* (above), and in Lange's sense, see *C. turgidus*. *C. privignofulvus* Henry (*nec* Reumaux) is a synonym, possibly also *C. subversicolor* Henry (see REU).]

E. Fries also describes a var. *fuscopallens*, which is more grey-brown. It is uncommon, growing primarily in *Pinus* forests, possibly to be counted as a separate species [Vinäsgraven, Remmen]. — *C. castaneopallens* Henry [Plate 30] has an orange to brick-red tinge on the cap and reddish gills. The spores are $7.5\text{--}9 \times 5\text{--}5.7 \mu\text{m}$. It is rare, growing with *Picea* (see HRY21; Tollagården).

C. melleopallens (Fr.) Britz. s. Brandrud et al.

Cap 30-80 mm, dry; yellow-brown to grey-brown with a \pm red-brown centre, often with an olive tinge, young more date brown and finely frosty; glabrous; margin grey with a thin, white rim, fibrillose when young; obtusely conical, later conical to convex.

Gills yellow-brown with an olive tinge to cinnamon with a paler edge.

Stipe slender, cylindrical or tapering, often tough in base; coated white, absorbing to yellow-brown or greyish citrinous, sometimes with white girdles or thin bands.

Veil white, fairly copious to sparse; cortina white.

Flesh grey-brown, marbled yellow-brown with an olive tinge.

Reactions: NaOH, formalin trivial; guayac blue-green.

Spores: $6\text{--}8.5 \times 3.5\text{--}4.5 \mu\text{m}$, elliptic, almost smooth, pale.

In *Picea* forests; fairly common.

Ref.: FLO.

The species resembles *C. triformis* (above), but the cap is paler, of a colder, more honey-like hue, often with an olive shade, and the spores are distinctly leaner. It grows foremost in poor, acidic spruce forests. [This interpretation of *C. triformis* var. *melleopallens* Fr. *nec* J.E. Lange is clearly specifically separated from other taxa in the group, but it is uncertain whether it is really Fries' taxon.]

C. melitosarx Soop

Plate 26

Cap 20-60 mm, dry; yellow-brown to orange-brown, later more red-brown; glabrous to minutely innate-fibrillose; young with a thin, greyish white frost; margin paler, often white or with white tufts; obtusely conical, later campanulate to convex.

Gills pale cinnamon to saturated yellow-brown.

Stipe cylindrical to slightly clavate; white to dirty white, flushing grey-brown to yellow-brown; with thin, white, absorbing bands.

Veil white, fairly sparse; cortina white.

Flesh grey-brown to pale tan.

Reactions: NaOH, formalin, phenol trivial; guayac weakly green.

Spores: $6-8 \times 4.5-5.2 \mu\text{m}$, elliptic, moderately to finely verrucose, pale.

In rich *Pinus* forests; uncommon, more common in the North.

Ref.: JEC1A.

Appears endemic to sandy, rich pine heaths in the North. The species resembles *C. melleopallens* (above), but the cap colour is warmer, more reddish. It is also smaller and the spores are slightly wider.

C. redactus Britz. [Plate 26] is similar, growing in the same habitat, where it is rare (see KS43, REU; Selja, Vinäsgraven, Rättviksheden). It differs mainly by a somewhat viscid cap (cf. *C. triformis* above) with a dark-brown disk, and by its longer spores ($8-9.5 \times 4.5-5.5 \mu\text{m}$).

***C. microspermus* J.E. Lange**

Plate 26

Cap 25-45 mm; weakly viscid to dry, concentrically hygrophanous; nicely apricot-yellow to yellow-brown with a white margin; glabrous; campanulate, later convex with a wide umbo, often lobed.

Gills pale buff, yellowish.

Stipe cylindrical to slightly tapering; hardly viscid but waxy, moist; entirely white; smooth.

Veil white; cortina white.

Flesh pale yellow-buff; mild, cuticle sometimes faintly bitter.

Reactions: NaOH brown; formalin, lugol, FeSO_4 , AgNO_3 trivial.

Spores: $3.5-5 \times 3-4 \mu\text{m}$, obtusely elliptic, fairly smooth, pale.

In rich, mixed woods; rare. Hamra, Kvisttorp, Röfors, Bonäsheden, Foskflon.

Ref.: LAN, REU, and *C. vespertinus* in KS6, KS10, HRY5.

The fungus recalls a slender *C. armeniacus*, but is best determined through the exceptionally minute spores. In addition, the faint viscosity and weakly bitter taste point to sect. *Vibratiles* (*Myxadium*), an affinity which is confirmed by molecular markers.

GROUP 19: CAP YELLOW-BROWN to ORANGE-BROWN In DECIDUOUS wood

(sect. *Bivelii*)

The stipe is usually pale brown and the cap may be merely weakly hygrophanous in this group. If the cap is grey-brown or dark red-brown to umber, see subsequent groups.

***C. bivelus* (Fr.:Fr.) Fr.**

Cap 30-80 mm, \pm hygrophanous; warmly yellow-brown to orange-brown with a red-brown disk; smooth, glabrous; margin more greyish brown with a white border when young; \pm rounded, later convex with a long involute margin.

Gills saturated cinnamon, sometimes more brick-brown; edge paler.

Stipe clavate; buff, coated white when young, often with a lasting, wide, white band, apex white.

Veil white, fairly copious; cortina white.

Flesh pale buff to pale brown, marbled cinnamon.

Reactions: NaOH, formalin, lugol, AgNO_3 trivial; guayac blue-green.

Spores: $8-10 \times 5-6 \mu\text{m}$, elliptic, weakly to moderately verrucose.

In *Betula* forests; fairly common.

Ref.: MAR8, HOL, HEN4, LAN, FLO.

This fungus is not infrequent under birch, also in gardens. The cap is glabrous, leather-coloured, often only weakly hygrophanous. In the literature it is sometimes considered close to *C. laniger*, based mainly on the saturated gill colour, but the cap is smooth and thick girdles on the stipe are missing. [In fact, any close kinship is illusory, as borne out by molecular evidence.]

C. biveloides Henry

Plate 25

Cap 30-50 mm, \pm hygrophanous; evenly pale tan to greyish yellow with a darker disk; smooth, finely innate-fibrillose; margin finely white frosty; rounded, later convex.

Gills very pale brown to greyish white.

Stipe slightly clavate; coated white when young, later pale grey-brown with a thin, white band.

Veil white, sparse; cortina white.

Flesh pale brown or greyish, marbled pale grey-brown.

Reactions: NaOH, formalin, phenol, AgNO₃ trivial; guayac weakly green.

Spores: 7-8.5 \times 4.5-5.5 μ m, elliptic to subamygdaloid, moderately verrucose.

In *Betula* copses, possibly with *Populus tremula*; rare. Klikten, Utanmyra, Alderängarna.

Ref.: HRY8, HRY21, REU, KS42.

Resembles *C. bivelus* (above) and grows in the same habitat, but presents less vivid hues with pale gills and smaller spores. It appears to be rare, but could have been confused with the latter.

C. balaustinus Fr.

Cap 30-70 mm, weakly hygrophanous; intensely red-brown to orange-brown, young pale buff, \pm zoned by dark, innate fibrils; margin grey-white; obtusely rounded, later convex.

Gills cinnamon, soon brick-red, edge paler.

Stipe cylindrical to weakly clavate; greyish white to pale buff, soon dirty yellow-brown, zoned reddish brown.

Veil white, sparse; cortina white.

Flesh brownish buff with a pink tinge, pale buff when young.

Reactions: NaOH trivial.

Spores: 5.5-7 \times 4.5-6 μ m, globose to subglobose, moderately verrucose.

Under *Betula* (also in alpine *Betula* forests), less often with *Corylus* or *Quercus*; uncommon.

Ref.: HEN4, KS13, FLO.

Resembles *C. illuminus* and possesses similar spores, but one should note the red-brown, irregular pattern on the cap, and especially on the stipe. Also see *C. russus* (*Phlegmacium*) and *C. suillus*, which are rather similar but grow in coniferous forests.

C. subbalaustinus Henry

Cap 30-80 mm, strongly hygrophanous; saturated orange-brown to dark yellow-buff with a red-brown disc; often radially brown striate, young finely silvery-frosty; margin with a thin, white rim; rounded to obtusely conical, later campanulate with a decurved margin.

Gills pale cinnamon, soon brick-red; sometimes slightly decurrent; edge paler.

Stipe cylindrical to slightly tapering; brown-buff but thinly coated white, sometimes with a thin, adpressed, white band or white zones; apex white.

Veil white, sparse; cortina white.

Flesh pale tan to greyish buff, marbled yellow-brown; odour faintly raphanoid.

Reactions: NaOH, acid FeCl₃ trivial.

Spores: 8-10 \times 4.5-5.5 μ m, oblong elliptic, moderately verrucose.

Under *Betula* (also in alpine *Betula* forests), sometimes with *Corylus* and *Quercus*; often fasciculate; uncommon.

Ref.: PHI, HEN4, FLO, ARN, and *C. balaustinus* in LAN.

May be hard to separate macroscopically from other members of the group and grows in the same habitat, but it is the only frankly hygrophanous species. The fungus is not as fibrillose as *C. balaustinus*, and the spores are of a different shape.

GROUP 20: CAP GREY-BROWN, VEIL WHITE(sect. *Bovini* pp)

This group contains a number of dull-coloured, anonymous, yet typical, middle-sized *Telamonia*.

C. subferrugineus Fr.

Plate 22

Cap 30-50(100) mm, hygrophanous; grey-brown to grey-buff, centre darker red-brown to umber, darkening, when young thinly white frosty, innate-fibrillose; margin with a greyish white rim when young; rounded, later convex, sometimes with a shallow umbo to campanulate.

Gills pale grey-brown to brown, rather distant.

Stipe cylindrical to slightly clavate; greyish buff to pale grey-brown, coated greyish white when young.

Veil white to grey, sparse; cortina white.

Flesh greyish white to pale grey-brown, marbled grey-brown; exsiccata greyish black.

Reactions: NaOH, formalin, guayac, AgNO₃ trivial.

Spores: 9-11 × 5.5-6.5 µm, elliptic, moderately verrucose.

Under *Quercus* and *Corylus*, also with *Betula*; uncommon, more common in the South. Hellasgården, Insjön, Kråkeboberget.

Ref.: HEN4, BREI5.

A rather colourless fungus, grey-brown all over, and the exsiccata are dark. It is a typical element in broad-leaf forests. [The species may be conspecific with *C. rubricosus* Fr. nec J.E. Lange.] Cf. *C. nolanæformis* and *C. sordescens*.

C. disjungendus Karst.

Cap 35-80 mm; hygrophanous, grey-brown to yellow-brown, young thinly frosty-white, later pale red-brown to orange-brown on disk; matt with sparse, coarse, grey to brown fibres; margin thin with a greyish white border when young; obtusely conical, later campanulate to convex.

Gills cinnamon.

Stipe often tall, slender, hard, cylindrical to weakly clavate; white to pale grey-brown, fibrillose, sometimes with a thin, white band or zones.

Veil white to grey-white, fairly sparse, not darkening with age; cortina white.

Flesh pale grey-brown, marbled darker brown or occasionally pale violet, darkening with age; exsiccata blackish.

Reactions: NaOH trivial to blackish on gills and cutis, else trivial.

Spores: 10-12 × 6-7 µm, elliptic to subamygdaloid, rather strongly verrucose.

Under *Betula* or *Quercus* (also in alpine *Betula* forests), often in meadows; uncommon.

Ref.: KS23, KAR2, FLO, KIA19, and *C. brunneofulvus* in DÄH.

This fungus has longer spores than the others in the group and paler hues, typically with a red-brown flush on the disk of the cap. The stipe is rather slender, and sometimes hard, recalling that of *C. duracinus*, which possesses a sparser veil and a non-darkening context.

C. privignus Fr.

Plate 22

Cap 30-55 mm, strongly hygrophanous, sometimes slightly viscid; grey-brown with a yellow-brown to red-brown disk, young frosty-white, later glabrous to finely innate-fibrillose; margin paler, white fibrillose when young; conical, later conical to convex.

Gills pale grey-brown to pale cinnamon.

Stipe often tall, slender, cylindrical; coated by a white layer that absorbs, with thin, white girdles.

Veil white, sparse; cortina white.

Flesh grey-brown, not darkening; taste slightly raphanoid.

Reactions: NaOH trivial.

Spores: 7.5-9.5 × 5.5-6.5 µm, elliptic to ovoid, weakly to moderately verrucose.

In rich *Picea* forest, rare, northerly. Alderängarna, Sörviken, Klumpen, Skansberget.

Ref.: FAV1, possibly PHI2; *C. licinipes* in CKE.

A rare species in mature spruce forests, which may recall a hygrophanous and glabrous *C. malachius*. Many references to *C. privignus* in the literature pertain to *C. biformis*, which differs by warmer cap colours, a frequent presence of violaceous tints, and somewhat smaller spores. [This interpretation of the (often considered enigmatic) Friesian name is in accordance with J. Favre's, who quotes *C. licinipes* Fr. s. Cooke, whose icon might represent this fungus. It is also probable that the North American *privignus* (see KAU, PHI2) represents the present taxon, as well as *C. brunneifolius* Kytöv. et al. (see KIA6).]

C. anisatus Lindstr. et al. in the same habitat is quite similar, but exhales an odour of aniseed and the cap is more glabrous (see KIA2, FLO; Svartbäcken, Rothagen). — In northerly *Picea* forests one encounters *C. ionosmus* Moser et al. [= *C. jubarinus* Fr. nec J.E. Lange?], which is leaner and smells more or less like flowers (see MOS19, FLO, JEC2B).

***C. privignatus* Soop**

Plate 25

Cap 30-55 mm, hygrophanous; frosty pale grey from thin, radial, white fibrils, later grey to grey-brown, finely innate-fibrillose, central nipple with a red-brown or orange tinge; margin paler with a white coating.

Gills red-brown.

Stipe cylindrical to clavate; coated by a white to pale grey layer that absorbs to a pale brown hue, apex sometimes violet.

Veil white, fairly copious; cortina white.

Flesh greyish tan to pale brown, marbled violet when young, not darkening; odour and taste slightly raphanoid; exsiccata pale.

Reactions: NaOH, guayac trivial.

Spores: 6.5-8 × 5-6.5 µm, subglobose, moderately verrucose.

In rich *Picea* forest, uncommon. Vinäsgraven, Gesunda, Gryvelå, Bergkarlås, Lövsberg, Kroktjärn.

Ref.: KS43, JEC19.

The species is well characterised by the overall greyish colours, reddish gills, and the mostly spherical spores. Superficially it gives the impression of a member of sect. *Anomali*, mainly because of its habit. *C. privignatus* also evokes *C. privignus* (above) but this has paler gills and longer, elliptic spores. Cf. *C. poppyzon*, which presents paler, violaceous gills and leaner spores.

***C. fuscobovinus* Kytöv. et al.**

Plate 22

Cap 30-75 mm, strongly hygrophanous; grey-brown to umber with an orange to reddish tinge on disk; innate-fibrillose; margin greyish-white fibrillose; rounded, later convex.

Gills pale grey-brown to brown.

Stipe cylindrical to clavate; grey to grey-brown, coated by a white, absorbing layer or thin, white girdles.

Veil white, sparse to rather copious; cortina white.

Flesh pale brown, marbled darker brown; not darkening; exsiccata pale.

Reactions: NaOH trivial.

Spores: 9-11.5 × 6-7.5 µm, obtusely amygdaloid to subelliptic, finely verrucose.

In calcareous *Picea* forest, rare, northerly. Rävsnäs, Helvetesfallet, Sörviken, Harsa, Foskflon.

Ref.: KIA12.

A rare species in mature spruce forests, darker and more robust than *C. privignus* (above) and characterised by its large spores. *C. disjungendus* (above) differs mainly by a warmer cap colour and growth with deciduous trees.

C. oulankaënsis Kytöv. et al. (Plate 22) also produces fairly large spores, but they are strongly verrucose and the cap is paler (see KIA12; Städdjan).

GROUP 21: CAP RED-BROWN to DARK BROWN, VEIL WHITE

In CONIFEROUS forest

(sect. *Illumini*, *Bovini* pp.)

The stipe is whitish, often with a pale-brown tinge or flushing brown as its white coating gets absorbed into the cortex. Cf. *C. melitosarx*, and if birch is present, *C. balaustinus*.

***C. illuminus* Fr.**

Cap 30-70 mm, often concentrically hygrophanous; saturated red-brown to date brown; glabrous, shining from fine, white fibrils; margin white when young; obtusely conical, later plane to convex, sometimes campanulate.

Gills cinnamon.

Stipe cylindrical to slightly clavate, sometimes slightly fusoid, other times slender; zoned silky white, flushing grey-brown to red-brown.

Veil white to greyish white, rather sparse; cortina white.

Flesh pale brown to pale buff, darker when wet.

Reactions: NaOH trivial.

Spores: $5.5-7 \times 5-6 \mu\text{m}$, globose to subglobose, moderately to rather strongly verrucose.

In *Picea* forests; fairly common.

Ref.: FLO, and *C. saturatus* in HEN4.

The cap colour is quite variable, but bright and saturated in the common form, almost brilliantly red-brown on fresh, moist specimens. The spores are almost spherical, an important character. [The species has sometimes been named *C. dilutus* Fr. s. auct. and *C. saturatus* J.E. Lange s. Moser] Cf. *C. biformis*, which is more yellow-brown. [The species is the type of sect. *Illumini*, which is placed outside *Telamonia* s. str. (see PEI10, BRA16).]

***C. bulbosus* Fr.**

Plate 27

Cap 25-80 mm, strongly and concentrically hygrophanous; saturated red-brown to orange-brown; glabrous to finely innate-fibrillose; margin buff with a white, micaceous rim; obtusely conical, later convex with a wide umbo, fleshy.

Gills pale cinnamon; fairly distant; edge whitish.

Stipe robust, clavate; brownish buff but thinly coated white when young, darkening, with thin, white girdles.

Veil white, sparse; cortina white.

Flesh pale brown, marbled cinnamon, somewhat darkening with age; exsiccata pale.

Reactions: NaOH trivial to faintly greyish green in context, elsewhere trivial; guayac strongly blue-green.

Spores: $8.5-11 \times 5.5-6.5 \mu\text{m}$, elliptic to subamygdaloid, moderately verrucose.

In calcareous *Picea* forests, also with *Betula*; rare. Sjöskogen, Ivana, Remmen, Haraldsåsen.

Ref.: MAR8, PHI, KS6, KS13, and *C. bovinus* in LAN.

An imposing fungus with a nicely red-brown cap, similar to that of *C. illuminus* (above). It may darken considerably with age, but never turns blackish brown like the taxa in sect. *Brunnei*. [The species is identical to *C. bovinus* Fr. s. Lange, and *C. pæcelipus* Henry is another possible synonym.] Cf. *C. armeniacus* var. *badius*, which, however, presents a white context.

***C. neofurvolæsus* Kytöv. et al.**

Cap 30-90 mm, concentrically hygrophanous; orange-brown to saturated dark red-brown or even date brown, young slightly frosty white, centre often maculated reddish; glabrous, sometimes with brownish, coarse fibres outside disk; young margin with a thin, white rim; obtusely conical, later convex to campanulate.

Gills pale cinnamon; distant.

Stipe cylindrical to clavate; dark greyish brown, thinly coated or zoned white; apex greyish white.

Veil white, sparse to fairly copious; cortina white.

Flesh rather dark greyish brown, marbled darker brown; odour faint, pleasant; exsiccata grey-brown.

Reactions: NaOH trivial; guayac greenish in stipe context.

Spores: $7.5-8.5 \times 4.5-6 \mu\text{m}$, obtusely elliptic, moderately verrucose.

In rich *Pinus* forests; northerly, uncommon. Näset, Rättviksheden, Vinäsgraven, Bonåsheden, Foskflon.

Ref.: KIA2, FLO, and photo (not description) of *C. bulbosus* in KS22.

This species is rather similar to *C. clarobrunneus*, but is stouter and presents more vivid red-brown to orange-brown hues. The cap is remarkably smooth, almost shining. Cf. *C. bulbosus* (above).

C. sordidemaculatus Henry (= *C. furvolæsus* Lindstr.) in *Picea* forest is similar with similar spores, but somewhat less robust and with less vivid hues (see KIA2, FLO; Kalkbro, Borrberg, Alderängarna, Sörviken).

C. testaceofolius Lindstr. & Soop

Cap 30-70 mm; saturated red-brown to nicely brick-coloured, young grey-white micaceous, disk more orange-brown; finely innate-fibrillose, matt; margin pale grey with white fringes when young; conical, later convex to campanulate.

Gills saturated brick to red-brown; edge a trifle paler.

Stipe cylindrical to slightly clavate, slender; pale brick-brown to yellow-brown, fugaciously coated silvery white, somewhat zoned; apex white, rarely with a violet flush.

Veil white, rather sparse; cortina white.

Flesh pale grey-brown to buff, sometimes with a pink tinge; odour raphanoid.

Reactions: NaOH, guayac, phenol, AgNO₃ trivial.

Spores: 7.5-9.5 × 5-6 µm, elliptic, weakly to moderately verrucose.

In *Picea* forests, also with *Pinus*; uncommon, more common in the North.

Ref.: KIA1, FLO, and *C. tortuosus* var. *insignis* in KS22.

The species is fairly common in the North, characterised by its slender stipe and saturated, often brick-red gill colour, which recalls that of *C. tortuosus*. It may be difficult to separate from *C. cinnamoviaceus*, but one should note the brighter cap colour and slimmer stipe of the present species.

GROUP 22: CAP BROWN, VEIL RED to WINE-coloured

(sect. *Fulvescentes* pp, *Cinnabarin*)

Occasionally one must look for the veil remnants far down on the stipe; they may be blood red to vinaceous. On some species the veil blushes red only at maturity.

C. badiovinaceus Moser

Plate 27

Cap 40-70 mm; red-brown to greyish buff with an amber centre, sometimes with a pink tinge; innately fibrillose, matt, smooth; margin paler, brownish pink to faintly orange, not striate; conical, later campanulate, often with an small pointed umbo.

Gills saturated ochraceous to cinnamon.

Stipe ± cylindrical; pale grey to dirty pale brown, sometimes with a rosy to violet sheen and one or more thin, hazy, vinaceous bands or tufts, usually positioned low; base often with a vinaceous-red tinge.

Veil red-brown to vinaceous-brown, sparse to rather copious; cortina white.

Flesh buff to cinnamon with a pink tinge, marbled yellow-brown.

Reactions: NaOH reddish lilac on stipital veil, elsewhere trivial.

Spores: 5.5-7.5 × 4.5-6 µm, subglobose, moderately to rather weakly verrucose.

In poor *Pinus* and *Picea* forests; uncommon.

Ref.: DÄH, AGA14, MOS9.

Sometimes the veil is so sparse that the girdles at the stipital base are missing. When seen from above the fungus looks like a *C. illuminus* (above) with a pink cap margin. The gills may be nicely ochraceous like those of a *Dermocybe*. The species seems to prefer open, scrubby, poor forest habitats, especially in the border area between spruce and pine.

C. erubescens Moser

Cap 20-55 mm; dark grey-brown to dark red-brown, later almost blackish, innate-fibrillose to glabrous; margin paler, more orange-brown with pale red fibrils, somewhat striate; convex with a low umbo.

Gills pale cinnamon to pale grey; rather distant.

Stipe cylindrical to slightly tapering, slender; pale incarnate to vinaceous-brown with a thin, silky, whitish coating, base pale reddish, blushing with age and manipulation, apex violaceous.

Veil whitish, blushing red, very sparse; cortina whitish.

Flesh watery tan to wine-brown, reddish towards stipe-base; taste occasionally slightly bitter.

Reactions: NaOH nil.

Spores: $6.5\text{--}8.5 \times 3.5\text{--}5 \mu\text{m}$, elliptic to subamygdaloid, weakly to moderately verrucose.

In *Picea* and *Pinus* forests; rare. Klövsjöhöjden, Rättviksheden, Alderängarna, Bergkarlås, Vinäsgraven.

Ref.: FLO, MOS4, AGA14.

An interesting and rare species, somewhat resembling *C. depressus*, including the spores. It is characterised by its blushing stipe, contrasting against the dark cap. The reddish tone on the stipe is sometimes weak, but may be precipitated by manipulation or storage. Cf. *C. craticius*.

***C. heterocyclus* Soop**

Plate 27

Cap 25–60(–80) mm; grey-brown to dark orange-brown, often with an olive tone; innately fibrillose to dark-brown fibrous, later glabrous with a red tinge at centre; margin pale grey-brown to greyish yellow or greyish green, sometimes with reddish fibrils; obtusely conical, later campanulate to plane, often with a small pointed umbo.

Gills pale cinnamon, sometimes with a faint olive shade.

Stipe slender, cylindrical; pale grey-brown with several hazy, ochraceous to olive-brown girdles that later turn red to vinaceous (see below), base sometimes red-vinaceous.

Veil ochraceous, sometimes with an olive tinge, blushing red (see below), finally vinaceous-red, fairly copious; cortina pale grey.

Flesh grey-brown to greyish yellow with an olive tinge, seldom marbled violet.

Reactions: NaOH purple-brown in flesh, red on cutis, reddish lilac on veil remnants (even while ochraceous); formalin, guayac nil.

Spores: $7.5\text{--}9.5 \times 5\text{--}6 \mu\text{m}$, elliptic, moderately verrucose.

In rich *Betula* forests (also in alpine *Betula* habitats); northerly; uncommon. Arvselen, Rävsnäs, Gesunda, Vinäsgraven, Hede, Remmen, Rönäs.

Ref.: KS12, KS21, KS25.

This species is probably overlooked and more common than one might think in the birch forests of the North. The change in veil colour is striking if the collection is fresh and moist: ochraceous on young specimens, red-brown to brick red, even blood red on mature fruit-bodies, vinaceous on the oldest. In some collections the veil is reddish even when young. Collections in a bad shape or dry merely display vaguely dark-brown veil remnants, and are then easy to confuse with *C. raphanoides*, which is closely related and grows in the same habitat, but has rounded spores.

A form of *C. heterocyclus* has a violet tinge in stipe-apex and is overall more purplish brown. Cf. *C. fulvescens* below, which does not react with alkaline solutions. [*C. francescae* Reumaux is probably a late synonym (see REU).]

***C. fulvescens* Fr.**

Plate 27

Cap 30–50 mm; dark red-brown with an umber disk, when young finely greyish frosty, later glabrous to finely innate fibrillose; margin grey with a pink tinge; conical, later broadly conical to convex with a narrow umbo.

Gills saturated brown to cinnamon; edge paler, yellowish.

Stipe tall, slender, cylindrical, shining grey to pale yellow-buff, sometimes with a pink tinge; with multiple brownish red to pink bands, or merely sparse, brownish fibrils.

Veil pale red to rusty-red, sparse; cortina white.

Flesh yellow-brown.

Reactions: NaOH trivial, including stipital veil.

Spores: $7.5\text{--}9.5 \times 4.5\text{--}5.5 \mu\text{m}$, elliptic to subamygdaloid; moderately verrucose.

In *Picea* forests, often in moist places near *Sphagnum*, mainly late in the season; fairly common.

Ref.: KIA26, LAN, KS25, possibly ARN; *C. fasciatus* in MAR8.

Usually a tall, slender and fragile fungus. The bands on the stipe may be distinct, reddish, but sometimes the veil is sparse, and the stipe merely blushes to more or less "meat colour". Cf. *C. erubescens* (above), which is sometimes of a slender habit, as well as *C. redactus*, which differs mainly by a white veil. [The described form appears to be part of a poorly studied complex of very similar taxa, differing mainly in spore size (see KIA26).]

C. bulliardii (Pers.:Fr.) Fr.

Cap 40-70 mm, concentrically hygrophanous; saturated red-brown; finely innate-fibrillose, matt; convex with a shallow umbo.

Gills brown with a violet tinge.

Stipe \pm cylindrical; white to greyish white, young faintly violet at apex, base coated cinnabar-red.

Veil cinnabar-red, fairly sparse; mycelium cinnabar-red.

Flesh pale grey-brown, darker in stipe, marbled darker brown.

Reactions: NaOH dark purplish brown in flesh, nicely lilac on stipital veil; formalin nil.

Spores: $9-11 \times 5-6 \mu\text{m}$, elliptic, moderately verrucose.

In broad-leaf forests; southerly; uncommon. Österplana.

Ref.: MAR8, BON, DÄH, PHI, FLO.

When fresh a conspicuous and beautiful fungus with the particular combination: hygrophanous, brown cap and an intensely red stipe-base. Cf. *C. craticius*.

C. cinnabarinus Fr. is smaller and entirely cinnabar-red. It grows in southerly *Fagus* forests (see FLO, BON, DÄH, HOL).

7.4 SMALLER SPECIES

Fruit-bodies are rather small (cap diameter usually up to 40 mm, stipe at most 7 mm thick; see the *Telamonia* introduction), and they sometimes resemble *Inocybe* or *Galerina*. Unless stated otherwise, the stipe is slender and cylindrical. If the cap is not hygrophanous and young gills are not brownish or violaceous, see *Dermocybe*.

The grouping follows the colour and distribution of the veil. Are there reddish, ochraceous or white girdles on the stipe, or is it more or less naked without distinct remnants?

GROUP 23: STIPE partly REDDISH from veil (sect. *Anthracini*, *Saniosi* pp.)

Some part of the stipe is coloured orange-red, red, or red-brown, possibly from tufts or scales. All species in the group are uncommon. Cf. *C. spilomeus* and *C. anomalellus* (*Anomali*), as well as *C. cinnabarinus* and *C. heterocyclus* (above). Also see *C. bayeri*, *coleoptera*, *heterosporus*, whose veil may blush (subsequent groups).

C. anthracinus (Fr.) Fr.

Cap 10-30 mm; dark red-brown with a purple to umber tinge, young purplish black with a rosy to orange margin; innate-fibrillose; conical, later campanulate to plane.

Gills brick-red to rosy; triangular, conspicuously distant, edge paler.

Stipe brittle; semi-opaque, grey-brown to dark rosy, zoned grey, apex darker rosy-brown; with several thin, orange bands near base.

Veil orange to orange-brown, darkening, fairly copious; cortina greyish rosy.

Flesh brick-red to purplish brown, darker in cap, pink in stipe-base; fragile.

Reactions: NaOH purplish black to red on flesh and stipital veil, blood red on gills; formalin, lugol nil.

Spores: $7.5-8.5 \times 4-6 \mu\text{m}$, obtusely elliptic, moderately verrucose.

In calcareous, mixed woods with *Quercus* or *Corylus*; rare, more common in the South. Insjön, Fagerås, Ramstigsberget, Sura, Nyckelviken.

Ref.: MAR7, HOL, MEL3, HØI, LAN, FLO.

A diminutive species, primarily identified from its brownish-rosy stipe with orange bands. [The pigment contains anthraquinones, and the taxon was earlier placed in *Dermocybe*. It is probably identical to *C. purpleobadius* Karst. s. Lange (see BON, LAN).]

C. aurantiomarginatus (Schäff.) Moser

Cap 10-40 mm; date brown to dark red-brown, later \pm orange-brown; glabrous to finely innate-fibrillose or micaceous orange; margin with a thin orange to pink rim when young; obtusely conical, later convex, mostly without an umbo.

Gills dark cinnamon to brick-brown; edge paler, yellowish, fairly distant.

Stipe relatively robust, pale grey-brown, reddish brown towards the base; with thin, yellow-brown to intensely red fibres, sometimes distinctly blackening from base; apex sometimes with a faint blue shade; mycelial felt yellowish to orange.

Veil orange-red to yellow-brown, sometimes blood red, fairly copious to sparse; cortina grey to greyish yellow.

Flesh pale grey-brown, orange-brown in stipe base, often blackening, sometimes marbled faintly violaceous; odour distinct like "paint" (see comment below).

Reactions: NaOH greyish violet in flesh, red-brown to black on cutis, reddish lilac on stipital veil; AgNO₃, formalin, FeSO₄ trivial.

Spores: 6.5-8.5 \times 4.5-5.5 μ m, elliptic; moderately verrucose.

In rich *Picea* and *Pinus* forests; rare. Kvisttorp, Alderängarna, Rättviksheden, Oviken.

Ref.: MOS2, FLO, and *C. præstigosus* in KS6.

Differs from *C. colus* (below) by warmer tints and a more orange-coloured veil. The veil is sometimes very sparse, and the cap then appears glabrous, shiny like polished mahogany, and the orange-red bands on the stipe are missing, which leads to wrong identification. Sometimes the stipe blackens, and the fungus then resembles *C. uraceus*, to which it is probably affine. The odour of "house paint" or "wall-paper" is typical (cf. *Russula pseudointegra*). [The form in pine habitats corresponds to *C. aurantiomarginatus* in the strict sense; it has somewhat smaller spores than the spruce form.] Cf. *C. saniosus* and allies (below).

C. aureovelatus Bendiks. et al.

Cap 20-45 mm; saturated orange-brown to red-brown with an umber disk; shining, finely innate-fibrillose; margin with thin, sparse, yellow to orange squamules or fibrils; expanded with a narrow umbo.

Gills brownish yellow to orange-brown.

Stipe golden-yellow to brownish yellow, zoned orange-brown, base with thin, adpressed golden yellow to red bands or a sheath, occasionally forming a small collar.

Veil yellow-orange to red, fairly sparse to copious; cortina greyish white.

Flesh yellow-brown.

Reactions: NaOH, phenol, AgNO₃, acid FeCl₃ trivial; fluorescence nil.

Spores: 7-8.5 \times 3.5-4.5 μ m, oblong elliptic to amygdaloid, weakly verrucose.

In *Pinus* and mixed woods; rare. Ramstigsberget, Rothagen, Nyvallen.

Ref.: BEN11, FLO.

A handsome fungus with vividly orange to red colours, evoking a *Dermocybe*, and exceptionally narrow spores (cf. *C. heterosporus*). It can be distinguished from *C. aurantiomarginatus* (above) by the intensely yellow stipe and the narrow spores.

C. colus (Fr.) Fr.

Cap 10-30 mm; brown-yellow to orange-brown with a red-brown, sometimes almost red disk; finely innate-fibrillose; margin often striate, with reddish fibrils; pointed conical to campanulate.

Gills yellow-brown; distant.

Stipe yellow-white to pale cinnamon, lower half conspicuously coated or zoned by cinnabar to orange-red, often sparse fibrils and tufts.

Veil cinnabar-red, sparse; mycelium white.

Flesh pale red-brown to orange, sometimes marbled yellow-brown; odour faint, like "hospital".

Reactions: NaOH red-violaceous on stipital veil; elsewhere trivial.

Spores: 7.5-9.5 \times 4.5-5.5 μ m, elliptic, moderately verrucose.

In *Picea* and *Pinus* forests; rare. Gräsvreten, Bonåsheden, Styggforsen, Sörviken.

Ref.: BON, AGA16, MOS9, FLO, JEC4B, and *C. miniatopus* in LAN.

Looks inconspicuous when observed from above (approximately like *C. obtusus*), but the stipe exhibits a beautiful, almost fiery red tinge towards the base. [*C. miniatopus* J.E. Lange is a probable synonym.]

C. miraculosus Melot is a tiny species with fibrillose veil remnants that are white on very young specimens, but turn brightly red, and spores $7.5\text{--}8.5 \times 5\text{--}6 \mu\text{m}$. It is rare, growing in *Picea* forests (see MEL2; Harsa, Mortorp).

GROUP 24: STIPE with YELLOW to YELLOWISH-PINK GIRDLES

(sect. *Saniosi* pp., *Læti*)

The fungus has a yellowish veil that settles as girdles on the stipe. If the veil is more grey-brown, see the next group. Cf. *C. fulvescens*.

C. saniosus (Fr.) Fr.

Cap 5–35 mm; saturated yellow-brown to orange-brown, young umber with an almost black centre; innate-fibrillose, margin somewhat striate, paler greyish yellow with a yellow rim and yellow fibres when young; conical, later convex to campanulate with a small pointed umbo.

Gills brown-yellow to cinnamon; rather thick; edge paler.

Stipe slender; yellow-brown to grey-brown, zoned yellow or with multiple, indistinct, yellow to orange-brown girdles; darkening.

Veil yellow to orange, fairly copious; cortina pale yellow.

Flesh pale grey-brown to orange-brown.

Reactions: NaOH, FeSO₄, AgNO₃, acid FeCl₃ trivial; fluorescence nil or very weak.

Spores: $8\text{--}9.5 \times 5\text{--}6 \mu\text{m}$, elliptic, rather strongly verrucose.

In moist, deciduous woods, preferably under *Betula*; uncommon, precocious.

Ref.: MAR7, PHI, HEN4, BON, FLO, HØI4 (the picture in HOL probably shows *C. colymbadinus*).

Resembles a miniature *C. gentilis*. The fungus often grows in parks and thickets, typically early in the season. Discounting the season, it may be difficult to separate the species from *C. aurantiomarginatus* (above) without a microscope.

C. detonsus (Fr.) Fr.

Cap 20–50 mm; nicely yellow to yellow-brown with an orange or apricot-brown disk; smooth, finely yellow velvety, young yellowish frosty; margin paler, silky from yellow fibrils; conical to hood-shaped, later convex with a narrow umbo to campanulate, often pointed.

Gills saturated or pale yellow-brown.

Stipe pale yellow to yellow-grey, coated dark yellow or with multiple butter-yellow girdles.

Veil yellow, darkening, fairly copious; cortina yellow to yellowish grey.

Flesh pale buff to yellow, marbled yellow-brown.

Reactions: NaOH, lugol, formalin trivial; fluorescence nil.

Spores: $8.5\text{--}10.5 \times 4.5\text{--}6 \mu\text{m}$, elliptic, weakly to moderately verrucose.

In rich *Picea* and mixed woods; uncommon.

Ref.: MOS2, KS3, FLO, MOS31.

Resembles *C. saniosus* (above), but is more apricot-yellow, making it difficult to distinguish the veil girdles against the stipe. Cf. *C. lux-nymphæ*, *safranopes*, *renidens*. The latter may be quite similar, but lacks velar bands. [*C. ceraceus* Moser is a synonym (see MOS2, MOS4).]

C. lætus Moser is similar, but is more robust and produces larger spores (see MOS4, BRA2, MOS31). [It is the type of sect. *Læti* (see *C. ochrophyllus*).]

C. bayeri (Velen.) Reumaux & Moënné-Locc.

Plate 29

Cap 10-30 mm; yellow-brown to orange-brown with a darker centre, darker rusty when young; densely micaceous from thin ochraceous to greyish fibrils and squamules, sometimes rapidly becoming \pm glabrous; margin somewhat paler, sometimes slightly striate; long conical, then expanded with a narrow umbo.

Gills cinnamon to yellow-brown with a paler edge.

Stipe slender; pale greyish yellow with thin, ochraceous girdles that sometimes blush pale reddish.

Veil ochraceous to grey-buff, often with a faint, pink shade; fairly copious; cortina white to greyish yellow.

Flesh buff; odour faint, fruity (like "gooseberries") or like cedar wood.

Reactions: NaOH \pm trivial, greyish brown with a purple shade on stipital veil and flesh.

Spores: $9.5-11.5 \times 5-6 \mu\text{m}$, amygdaloid to \pm elliptic, weakly verrucose.

In rich *Pinus* forests, preferably with *Cladonia*, but sometimes with *Picea* or in mixed woods; fairly common.

Ref.: VEL2, REU, JEC1A, and *C. fasciatus* in LAN, ARN, BREI5.

A small fungus, not rare in boreal pine forests, but also sometimes encountered in spruce or mixed forests in the lowlands. The fibrous or squamulose cap makes it look superficially like an *Inocybe*, or like a smallish *C. angelesianus* (below). The veil is always present on the stipe, where it forms pale ochraceous zones, usually with a faint, but distinct pink component. [The species is often named *C. fasciatus* (Scop.) Fr. (s. Lange, Arnold, *nec* Moser, Reumaux), and may well be the Friesian taxon, though difficult to interpret.]

GROUP 25: STIPE with YELLOW-BROWN to GREY-BROWN GIRDLES(sect. *Incrustati* pp, *Helvelloidi*)

The veil is impure yellow-tinted, occasionally almost grey-brown or brown. Cf. *C. bayeri* above. The last few species in the group are bound to *Alnus*.

C. angelesianus A.H. Sm.

Cap 15-40 mm; orange-brown to dark yellow-brown or umber; densely covered by tiny yellow to grey-brown scales and pustules; margin grey-yellow, fibrillose; narrowly conical, later conical to convex with a pointed umbo.

Gills umber with a pale edge; fairly distant.

Stipe pale grey-brown to yellow-brown with grey-brown to yellow-brown girdles.

Veil dark yellow to grey-brown, sometimes with an orange tinge, copious; cortina pale grey.

Flesh yellow-brown to dark brown.

Reactions: NaOH trivial.

Spores: $7-9 \times 4.5-5.5 \mu\text{m}$, elliptic to amygdaloid, moderately to weakly verrucose.

In *Pinus* and *Picea* forests; uncommon.

Ref.: FLO, and *C. strobilaceus* in DÄH, MOS4.

The cap has a mottled look until the scales disappear with age. In this the species resembles those in the next group, which, however, have white scales. [*C. strobilaceus* Moser is a synonym.]

C. psammocephalus (Bull.) Fr. is almost identical but rare, growing under *Quercus* and other deciduous trees in parks and thickets (see LAN, FLO, ARN; Drottningholm).

C. fusisporus Kühner

Plate 28

Cap 15-35 mm; chestnut-brown to dark red-brown; glabrous with sparse fibrils, faintly micaceous when young; margin brownish yellow, striate; obtusely rounded, later convex.

Gills yellow-brown to red-brown; edge paler yellowish; fairly distant.

Stipe cylindrical; grey-brown to buff, \pm coated by coarse, ochraceous fibrils, usually with a small, adpressed collar.

Veil ochraceous to greyish buff, copious; cortina greyish yellow.

Flesh cinnamon to dark yellow-brown.

Reactions: NaOH trivial (including veil).

Spores: $9-11 \times 4-5 \mu\text{m}$, oblong elliptic to slightly reniform; moderately verrucose.

In *Picea* forests; uncommon. Orminge, Rude, Rättviksheden, Gesunda, Selja.

Ref.: KUH, MOS26, REU, and *C. semivestitus* in MOS4.

An anonymous little *Telamonia*, best identified by the combination of a glabrous cap, ochraceous veil, and spruce habitat, as well as by its oblong spores. [*C. semivestitus* Moser is a synonym.]

C. helobius Romagn.

Cap 10-30 mm; umber to date brown, almost black at centre; silky matt to finely innate-fibrillose; margin grey-brown, young with sparse, white fibrils; pointed, later broadly conical.

Gills saturated yellow-brown to brown.

Stipe cylindrical, sometimes tapering; dirty brown to buff, weakly zoned yellow-brown to grey-brown, apex whitish; darkening.

Veil yellow-brown to grey-brown, sometimes pale, sparse to fairly copious; cortina white.

Flesh pale brown to buff.

Reactions: NaOH black on cutis.

Spores: $8-10 \times 4.5-6 \mu\text{m}$, elliptic, moderately verrucose, fairly dark.

In broad-leaf forests or with *Salix* (also with dwarf *Salix* in alpine heaths); precocious; uncommon.

Ref.: MEL4, BEN7, FLO.

A tiny, blackish-brown fungus with yellowish gills, probably overlooked but widely distributed, even into the subarctic area. In the South it typically grows in mossy *Fagus* forests where it is among the first *Cortinari* to appear (it has in fact the author's record for precocity: March 7 in Belgium). [It may be regarded as a synonym of *C. romagnesii* Henry, if the sporal variation is included.]

C. helvelloides (Fr.) Fr.

Cap 10-30 mm; grey-brown to ochraceous; yellow squamulose to fibrillose; margin grey with a yellow rim; obtusely conical, later campanulate with a pointed umbo.

Gills grey-brown with a purple tinge to grey-violet; very distant; thick.

Stipe pale brown to grey with yellow girdles, young with a violet tinge above, base red-brown.

Veil saturated yellow-brown, copious; cortina brown-grey.

Flesh yellow-brown to olive-brown with a violaceous tinge in upper stipe.

Reactions: NaOH trivial.

Spores: $8-10 \times 4.5-6 \mu\text{m}$, elliptic, rather coarsely and distantly verrucose

In *Alnus* swamps; rare. Kröklings Hage, Åva, Vinäsgraven.

Ref.: MAR8, BON, LAN, FLO, JEC3A.

A tiny species with conspicuously distant gills, which always grows under alder. The colour combination on the stipe: grey, yellow, violet, is a good character.

C. bavaricus Moser

Plate 28

Cap 10-30 mm; yellow-brown with a date brown to umber disc; finely innate-fibrillose, young weakly micaceous, later glabrous; margin with a yellow rim; conical, later expanded with a ± acute umbo.

Gills pale brown to dark tan; edge paler; distant.

Stipe cylindrical; grey-brown to dark yellow-brown, young with brownish yellow tufts and fibrils, sometimes forming a tiny collar; pale grey above, base dirty brown to blackish.

Veil brownish yellow, fairly copious; cortina pale grey.

Flesh yellow-brown, dark grey-brown in stipe-base.

Reactions: NaOH trivial.

Spores: $7-8.5 \times 4.5-5.5 \mu\text{m}$, elliptic, moderately verrucose.

With *Alnus*; rare. Fagerås, Femsjö, Röfors, Klikten.

Ref.: MOS11, JEC3B.

Grows in the same habitat as *C. helvelloides* (above) but differs mainly by its darker hues that lack a violaceous shade, as well as by the spore size.

There exist a number of similar taxa that also grow with *Alnus*. *C. atropusillus* Favre resembles *C. bavaricus* with spores of the same size, but is even smaller and presents a greyish to white veil (see HK1, JEC3A). It is described from alpine habitat, but has been found in the lowlands with *Alnus incana* (cf. JEC3B; Vinäsgraven). — *C. badiovestitus* Moser (see MOS11, JEC3A, JEC3B) has a purple-brown cap, greyish-ochre veil, and longer spores ($8.5\text{--}10 \times 5.5\text{--}6.5 \mu\text{m}$; Alderängarna).

GROUP 26: CAP with WHITISH VEIL remnants

(sect. *Paleacei*)

The veil remnants are conspicuous, covering the young cap with tiny, white dots and squamules. Also see *C. alnetorum*.

C. flexipes (Pers.:Fr.) Fr.

Cap 10–40 mm; dark brown, often with a purple tinge, later grey-brown with a black centre; innately fibrillose, densely covered by tiny greyish white squamules and fibrils, often persistently; margin white squamulose; conical, later campanulate with a pointed umbo.

Gills dark brown, often with a violet tinge; edge paler.

Stipe often stiff, grey-brown with white girdles, squamules and zones, sometimes ending in a tiny collar, flushing yellow from base; young apex often violaceous.

Veil white to grey, often with a faint, violet tone, copious; cortina white to grey-violet.

Flesh yellow-brown to dirty brown, sometimes marbled grey-violet; odour usually strong of *Pelargonium*.

Reactions: NaOH, guayac trivial.

Spores: $7\text{--}9 \times 5\text{--}6 \mu\text{m}$, elliptic, moderately verrucose.

In acidic *Picea* forests, also under *Pinus*; common.

Ref.: FLO, ARN, and *C. paleaceus* in MAR8, PHI, HOL, HEN4, *C. paleiferus* in DÄH, MAR8.

May be very common in poor *Picea* forests, often in swampy grounds. This neat little fungus is quite variable, but the odour is unmistakable. [The species has often been called *C. paleaceus* (Fr.) Fr., a name that is difficult to interpret. *C. paleiferus* Svrcek is usually regarded as a form with more purple tones on cap and stipe.] — In the same habitat, but also in deciduous forests, one encounters the var. *inolens* Lindstr., which lacks the odour, is more glabrous, and often larger (see FLO).

In broad-leaf forests one may find a similar, rare species, *C. diasemospermus* Lam. with the same odour but paler (see FLO, and *C. tiliaceus* Arnold in ARN; Munkängarna). — *C. flabellus* Fr.:Fr. possesses a more glabrous cap and grows in mossy *Picea* forests. It is sometimes considered a variety of *C. flexipes* (see FLO), but has been shown to be a segregate species. — Another similar species in the same habitat, *C. pilatii* Svrcek, lacks the odour and produces somewhat shorter spores (see FLO).

C. comptulus Moser

Cap 10–35 mm; grey-brown to red-brown with a darker orange-brown disc; innately fibrillose, often covered by fine, white squamules and fibrils; margin with white tufts and rim; pointed-conical, later convex with a small umbo.

Gills cinnamon to saturated red-brown.

Stipe pale brown, coated \pm dirty-white with felty, white bands, often ending in a tiny collar; sometimes with weakly reddish tufts at the base.

Veil white, copious; cortina white to greyish violet.

Flesh pale brown to yellow-brown; odour none or weakly raphanoid.

Reactions: NaOH \pm blackish, trivial; guayac trivial.

Spores: $6.3\text{--}7.5 \times 5\text{--}6 \mu\text{m}$, subglobose to ovoid, moderately to weakly verrucose.

In *Pinus* and *Picea* forests; uncommon.

Ref.: FLO, MOS4.

A small brown *Telamonina* with white dots on the cap, that may be difficult to distinguish from the inodorous variety of *C. flexipes* (above), which presents darker gills. Under the microscope, it is easily identified, however, by its rounded spores.

***C. hemitrichus* Fr.**

Cap 20-50 mm; grey-brown with a dark brown centre; with white dots and tufts; conical, later convex, often with a pointed umbo.

Gills pale grey-brown; edge paler.

Stipe grey-brown with a thick white ring or girdles, coated white above the ring; young with a purple tinge.

Veil and cortina white, fairly copious.

Flesh grey, occasionally marbled grey-brown.

Reactions: NaOH trivial.

Spores: 7-9 × 4.5-5 µm, obtusely elliptic, weakly verrucose.

Under *Betula* (also in alpine *Betula* forests); fairly common.

Ref.: DÄH, HEN4, BON, FLO.

Resembles *C. flexipes* and relatives (above) but is considerably paler, has no particular odour, and always grows with birch. Exceptionally the fungus may become quite robust. When mature, the veil remnants on the cap sometimes disappear, with risk for confusion.

GROUP 27: CAP OCHRACEOUS to pale RED-BROWN, ± GLABROUS
(sect. *Obtusi*, *Incrustati* pp)

The veil is white but scantily developed so the stipe normally lacks conspicuous bands and girdles. The cap is often pointed and the margin translucently striate from the gills. The fungus may then evoke a *Galerina*. Certain species have a gill edge with well differentiated sterile elements. If the cap is darker reddish brown, see the next group. [Section *Obtusi* has been shown genetically to form an ancient clade outside *Telamonia* s. str. (HØI8, PEI5), present also in the South Pacific.]

***C. obtusus* Fr.**

Cap 10-40 mm; red-brown to ochraceous (drying pale brown); glabrous to innately fibrillose; margin white when young, usually distinctly striate; rounded, later conical to convex with a pointed umbo.

Gills cinnamon, edge slightly paler.

Stipe pale brown, young thinly coated white, later zoned, sometimes with white tufts.

Veil white, usually sparse, rarely copious; cortina white.

Flesh pale brown; odour ± of "hospital".

Reactions: NaOH trivial.

Spores: 6.5-8 × 4-5 µm, elliptic, weakly to moderately verrucose; gill edge with barely differentiated marginal elements.

In all kinds of *Picea* forest, sometimes with *Pinus*; very common.

Ref.: DÄH, MAR8, HEN4, FLO, and *C. scandens* in DÄH.

Is common to very common in most coniferous habitats, and occurs during the entire season. The smell is usually described as "iodoform", but a more comprehensible association is "hospital" or "adhesive plaster"; it sometimes develops only some time after collection. Exceptionally the stipe displays copious, white veil bands. [The frequency and wide variation of this species has given rise to a host of "new" taxa (see the list in ARN).]

C. scandens* Fr.*Plate 28**

Cap 10-35 mm; brownish yellow to greyish yellow; matt, glabrous to very finely innate-fibrillose; margin paler, white when young with white tufts, not striate; convex with an obtuse umbo.

Gills pale cinnamon, edge markedly paler, whitish.

Stipe white, young thinly coated white, sometimes with white to pale yellow tufts or an adpressed collar.

Veil white to yellowish, rather sparse.

Flesh white, yellow in cap and near stipital cortex; odour none or faintly waxy.

Reactions: NaOH trivial.

Spores: 6-8 × 4.5-5 µm, elliptic to cylindrical, weakly verrucose; marginal elements trivial.

In *Betula* or *Picea* forest, rare. Röfors, Båthusravinen, Vinäsgraven, Dalsvallen.

Ref.: PHI2, BREI5, LAN.

This rare species is rather similar to *C. obtusus* (above), but presents a nicely yellow cap. Cf. *C. detonsus*, which has a markedly yellow veil and longer spores.

***C. acutus* Fr.**

Cap 8-20 mm; pale ochraceous to light brown, white micaceous to frosty; finely innate-fibrillose; often sulcate or striate outside disc; margin with thin, white fibrils; long conical, later convex with a pointed umbo.

Gills pale ochraceous to cinnamon; distant.

Stipe lean; pale ochraceous, zoned by white, hazy bands.

Veil white, sparse; cortina very fugacious.

Flesh pale brown to yellow-brown, almost transparent; odour faint like "hospital".

Reactions: NaOH trivial.

Spores: $7.5-9 \times 4.5-5.5 \mu\text{m}$, elliptic, weakly verrucose; gill edge with crowded, balloon-shaped to fusoid cheilocystidia, protruding 20-50 μm .

In *Picea* forests; uncommon.

Ref.: FLO, ARN, JEC4B, and *C. acutovelatus* Henry in MAR8, DÄH.

One of the tiniest *Cortinarii* we have, but not impossible to detect when diligently inspecting the mosses in an acidic spruce forest. Because of its tenuous habit, the fruitbody becomes almost translucent in moist conditions. The cheilocystidia are an important character.

***C. odhinnii* Melot**

Cap 20-60 mm; warmly yellow-brown, more orange-brown at centre; finely innate-fibrillose to glabrous; young frosty white; margin grey-white to buff; conical, later campanulate.

Gills ochraceous to grey-brown; edge paler; fairly thick.

Stipe cylindrical, rather tough; pale yellow-brown, young partly coated white; apex white, occasionally with a faint, greyish blue tinge.

Veil white to pale yellow, sparse; cortina pale grey to white.

Flesh pale yellow; odour strong of cedar or "freshly-cut wood".

Reactions: NaOH trivial.

Spores: $7.5-9.5 \times 4-5 \mu\text{m}$, amygdaloid, almost smooth.

In (preferably rich) *Pinus* forests; northerly; fairly common.

Ref.: FLO.

Occurs here and there among *Cladonia* in the pine forests of the North. The species is characterised by its lively, orange-brown hues and the strong smell of "wood chips". Cf. *C. renidens*, of which there occurs a diminutive form, as well as *C. parvannulatus* (below), which has a similar odour.

***C. lux-nymphæ* Melot**

Cap 20-40 mm; red-brown to dark yellow-brown, often zoned paler orange-brown; when young fibrillose to squamulose, later finely innate-fibrillose; margin more yellowish, young fibrillose, older often lacerate.

Gills cinnamon, rarely \pm purple-brown; edge distinctly paler.

Stipe cylindrical; grey-brown to yellow-brown, young \pm coated white to pale grey-brown, forming floccose, diffuse bands.

Veil white to pale grey-brown, rather copious; cortina grey.

Flesh yellow-brown to yellow-grey; odour insignificant.

Reactions: NaOH black on stipital veil, otherwise trivial.

Spores: $6-7.5 \times 3-4 \mu\text{m}$, elliptic to amygdaloid, weakly verrucose.

In *Pinus* forests, often along tracks, also with *Picea*; fairly common.

Ref.: MEL7, FLO.

A fairly anonymous species that resembles *C. odhinnii* (above) and is found in the same habitat, but exhibits duller hues and lacks a special odour. It is also well differentiated by its exceptionally narrow spores. There exists a form, possibly a separate taxon (*C. umbrino-nymphæ* nom. prov.), with an umber to almost black cap. [The species was earlier interpreted as *C. incisus* Fr. s. auct.]

***C. parvannulatus* Kühner**

Cap 10-25 mm; yellow-brown with an orange shade at centre; margin greyish, young with sparse, white fringes; conical, later pointed to bonnet-shaped.

Gills brownish yellow.

Stipe lean; pale brown to yellowish with sparse, white to pale violaceous fringes, or with a sheath that usually forms a tiny collar; apex and base often pale blue.

Veil white to pale blue, fairly sparse; cortina white.

Flesh pale grey-brown to yellow-brown, darker in stipe-base, often violaceous in upper stipe; odour distinct of "freshly-cut wood" or "leather".

Reactions: NaOH inconsistently yellow to reddish in context, elsewhere trivial.

Spores: 6.5-8.5 × 4.5-5.5 µm, elliptic, moderately to rather weakly verrucose.

In *Picea* forests or under *Populus tremula*; uncommon. Svartbäcken, Arvselen, Skräddar Djurberga, Oviken, Erikslund.

Ref.: AGA16, KÜH, FLO, and *C. cedriolens* in MOS11, MOS12.

This neat little species is characterised by the odour of cedar wood or leather ("pencil, "shoe-shop"). It differs from *C. odhinnii* (above) by its tenuous size and by the stipital collar. The collar — when present — makes the fungus resemble a *Pholiotina*. The occasional alkaline reaction is an interesting character that needs to be further investigated. [*C. cedriolens* (Moser) Moser is a synonym for the form without a distinct collar.]

GROUP 28: CAP RED-BROWN to DARK RED-BROWN

(sect. *Hydrocybe* pp, *Obtusi* pp)

If the cap colour is dark grey-brown to black or purplish, see the next few groups. Cf. *C. lux-nymphæ* (above).

***C. albovariegatus* (Velen.) Melot**

Cap 10-40 mm; saturated date brown; thinly frosty when young; margin with a white, evanescent rim when young; obtusely conical, later convex to ± plane with a small, pointed umbo.

Gills saturated yellow-brown to dark brown; edge paler, even white.

Stipe pale brown, grey-brown above, young thinly coated white, later weakly zoned.

Veil white, sparse; cortina white.

Flesh cinnamon to orange-brown; odour and taste faint, raphanoid.

Reactions: NaOH trivial.

Spores: 7.5-9 × 5-6 µm, elliptic; gill edge with crowded, vesiculose cheilocystidia, protruding 20-40 µm.

In *Picea* forests along moist tracks, often in *Sphagnum*; precocious; uncommon.

Ref.: FLO, BAL2, and *C. junghuhnii* in LAN.

Is rather similar to *C. obtusus* (above), but lacks the smell, is frankly darker, and the gill colour is often saturated ochraceous. To make certain one should check the balloon-shaped cheilocystidia. The species normally comes early in the season. [*C. junghuhnii* Fr. is probably a priority synonym.]

***C. trossingenensis* Melot**

Cap 15-25 mm; dark umber, later more red-brown, finely and persistently white frosty to innate-fibrillose; margin young with a thin, white rim; conical, later convex without a distinct umbo.

Gills dark, saturated red-brown to dark orange-brown; edge paler.

Stipe brown, young thinly coated white.

Veil white to greyish white, sparse; cortina white.

Flesh yellow-brown to red-brown; odour faint of "hospital".

Reactions: NaOH trivial.

Spores: $4.5\text{--}5.5 \times 4.5\text{--}5 \mu\text{m}$, globose, weakly verrucose.

In rich, undisturbed *Picea* forests; rare. Tyresta.

Ref.: MEL2, FLO.

This very small *Telamonia* is characterised by its dark colours and exceptionally small, globose spores.

C. leiocastaneus Niskanen, Liimat. & Soop

Plate 28

Cap 20-50 mm, concentrically hygrophanous; red-brown to chocolate-brown, sometimes more yellow-brown; smooth, glabrous with very sparse, white fibrils; margin with a thin, white rim and white fibrils when young; obtusely conical, later convex with a decurved margin.

Gills pale argillaceous to cinnamon or pale red-brown; edge white.

Stipe often \pm robust; pale incarnate with an absorbing white coating and silky, white bands; apex white, sometimes violaceous.

Veil white, rather sparse; cortina white.

Flesh pale buff to greyish buff, slightly marbled darker.

Reactions: NaOH, guayac trivial.

Spores: $7.5\text{--}9.5 \times 4.5\text{--}5.5 \mu\text{m}$, oblong elliptic to subamygdaloid, moderately verrucose.

In *Betula* or mixed forests; uncommon.

Ref.: KIA6; *C. erugatus* in KS23, KAU; *C. jubarinus* in DÄH; *C. leucopus* Fr. in KS6.

The conspicuously pale gills and the glabrous cap with a white margin evoke a *Psathyrella*. The fungus also resembles *C. ionosmus* or a miniature *C. illuminus*. [The species has been interpreted as *C. erugatus* Fr. sec. Hymen. Europ., nec Monographia. *C. jubarinus* Fr. s. Moser is a probable synonym.]

C. coleoptera Lindstr. & Soop

Cap 10-40 mm; warmly umber to dark red-brown; young finely micaceous, later glabrous and shiny; margin young greyish pink with pale reddish fibrils.

Gills saturated reddish brown to dark brick-brown; distant, fairly thick; edge whitish.

Stipe grey-brown to red-brown; young with a thin greyish white frost, later blushing from base; with thin, greyish to reddish bands; apex paler.

Veil red-brown to pale greyish, blushing pink, sparse; cortina greyish.

Flesh grey-brown, red-brown in cap.

Reactions: NaOH trivial or possibly fading the reddish veil to pale yellow.

Spores: $7\text{--}8.5 \times 5\text{--}6 \mu\text{m}$, obtusely elliptic to subglobose, moderately verrucose.

In calcareous *Pinus* forests; northerly, uncommon. Bonäsheden, Rättviksheden, Gesunda, Remmen, Sörviken.

Ref.: JEC1A, FLO, and probably *C. uraceus* in LAN.

Recognised by its saturated red-brown gills, this species may be found occasionally in the rich pine forests of the North. It recalls a miniature *C. glandicolor*, which often grows in the same habitat but differs by the dull-coloured gills and elliptic spores.

GROUP 29: CAP DARK BROWN; STIPE WITHOUT a distinct VIOLACEOUS TINGE

(sect. *Hydrocybe* pp)

The stipe may exceptionally exhibit an evanescent, rosy to bluish tinge. Cf. the adjacent groups, as well as *C. erubescens*.

C. alnetorum (Velen.) Moser

Cap 10-30 mm; dark grey-brown to umber, occasionally with a purple tinge; micaceous from fine, pale fibrils or tiny squamules; margin with a thick, grey, finely floccose border; obtusely conical, later convex to campanulate with a pointed umbo.

Gills dark grey-brown to purplish brown; distant, broad; edge conspicuously pale.

Stipe lean; dark grey-brown, partly coated greyish white, with grey to greyish violet girdles, sometimes with an adpressed collar.

Veil grey to greyish white with a faint, violet tinge when young, copious; cortina white.

Flesh brown to greyish black, young with a blue tinge in stipe-apex.

Reactions: NaOH trivial.

Spores: 9-11 × 5-6 µm, elliptic, rather strongly verrucose.

In *Alnus* swamps; uncommon.

Ref.: FLO, ARN, JEC3B.

A neat little fungus under alder, throughout with dark-brown colours. The stipe presents distinct, greyish girdles. Cf. *C. atropusillus*.

C. violilamellatus Pearson ex Orton, rare in *Pinus* forests, is similar but exhales a *Pelargonium* odour (see FLO, ORT7).

C. umbrinolens Orton

Cap 20-40 mm; umber with an almost black centre; silky matt; margin with a pale rim; conical, later campanulate with a pointed umbo.

Gills grey-brown with a conspicuously pale edge.

Stipe umber with a blackish brown base, coated or zoned greyish.

Veil grey, sparse; cortina grey.

Flesh umber (drying grey); odour strong of "sour kitchen cloth".

Reactions: NaOH trivial.

Spores: 8-9.5 × 5-6 µm, elliptic to amygdaloid, moderately verrucose.

Under *Betula*, often in swampy grounds; uncommon. Hede, Vinäsgraven.

Ref.: FLO, and *C. rigidus* in DÄH, HEN4, LAN.

Characterised by the strong odour, similar to that of *C. hinnuleus*. [The species has earlier been interpreted as *C. rigidus* (Scop.) Fr. s. Moser]. Cf. *C. casimiri* (below).

C. carabus Kytöv. et al.

Plate 29

Cap 7-20 mm; umber to saturated brown, almost black on disc, young white-frosty; finely innate-fibrillose; margin purple-grey with thin brownish fibrils; conical, later convex with a pointed umbo.

Gills date brown to saturated red-brown; distant; edge slightly paler.

Stipe pale brown, red-brown to pinkish towards the base, partially white coated with sparse, white fibrils; apex pale greyish.

Veil young pale grey-brown, darkening to red-brown, rather sparse; cortina white.

Flesh brown to grey-brown, sometimes slightly marbled violet; taste weakly unpleasant.

Reactions: NaOH inconsistently yellowish on stipital veil, elsewhere trivial.

Spores: 7.5-10 × 4.5-5.5 µm, elliptic to subamygdaloid, moderately verrucose.

In sandy, calcareous *Pinus* forests; precocious; uncommon. Rättviksheden, Kungshol, Säs.

Ref.: FUN, KIA7.

A tiny fungus, often the first cortinar of the year to appear in rich pine forests. *C. coleoptera* (above) is similar but larger with subglobose spores and a more pronounced red tinge on the gills.

C. cicindela Kytöv. et al., rare in the same habitat, is similar but larger and has commensurate, but coarsely verrucose spores (see KIA7; Holmudden). [This species, along with *C. carabus*, belong genetically to sect. *Brunnei*.]

C. heterosporus Bres.

Plate 29

Cap 10-35 mm; dark umber to dark red-brown, centre almost black; finely squamulose to innate-fibrillose; margin coarsely fibrous, paler grey-brown; rounded, then often nummulate with a decurved margin.

Gills grey to pale grey-brown.

Stipe cylindrical, sometimes with a small, rounded bulb; grey-brown, darker towards base, darkening, apex greyish, sometimes with a faint violaceous flush.

Veil grey-brown, sometimes reddening, sparse; cortina very sparse.

Flesh grey-brown.

Reactions: NaOH trivial.

Spores: $8.5\text{--}10.5 \times 2.5\text{--}3.5 \mu\text{m}$, oblong fusoid, practically smooth.

In sandy *Pinus* forests, typically in coastal dunes; very rare. Bonäsheden.

Ref.: BRES1, LAN, ARN, MOS21, JEC2A.

A small *Telamonia* that is easily taken for an *Inocybe* (cf. *I. subcarpta*) due to its dark, finely squamulose cap which is often coin-shaped. Some forms have been reported to exhibit a reddish veil (see ARN, and the discussion in JEC2A). Its most remarkable feature, however, is the spores of a shape and lack of ornamentation that recall those of a *Boletus* (cf. *C. aureifolius*).

GROUP 30: CAP BROWN to VIOLACEOUS; STIPE with a ROSY to VIOLACEOUS TINGE (sect. *Decipientes*)

This group consists of almost identical deciduous-wood species that differ mainly microscopically, but also by the colour of gills and veil. Most specimens in a fresh collection should exhibit a distinct, rosy to violaceous tinge on the stipe.

C. vernus Lindstr. & Melot

Cap 20-40 mm; dark purplish brown to umber; silky matt, innate-fibrillose; margin pale grey to greyish rosy when young, greyish fibrillose, sometimes weakly striate; obtusely conical, later campanulate with a pointed umbo.

Gills pale cinnamon to brown.

Stipe pale brown to greyish pink, apex greyish white with a violet tinge; coated greyish violet with fibrillose, greyish bands, sometimes even peronate, or entirely rose-coloured.

Veil pale grey to grey-brown with a violet tinge, blushing, sparse to fairly copious; cortina white.

Flesh pale brown to grey with a rosy to purplish tinge.

Reactions: NaOH, formalin, FeSO₄ trivial.

Spores: $7\text{--}8.5 \times 5.5\text{--}6.5 \mu\text{m}$, subglobose, rather strongly verrucose.

In *Betula* forests, often in pastures, also with *Picea*; precocious; fairly common.

Ref.: FLO, BAL1, JEC2B, and *C. erythrinus* in HEN4, SMF8, LAN.

One of the few species that normally appear as early as summer, usually in birch copses. The rosy shade on the stipe gets stronger with age and on bruising. Superficially the fungus might be confused with an *Inocybe*, of which several possess a rosy stipe. [The species has also been named *C. erythrinus* Fr. s. Ricken]

It has been observed that *C. vernus* often grows together with *C. saniosus* early in the season. Other precocious, smaller species are: *C. carabus*, *C. helobius*, and *C. colymbadinus*.

C. decipiens Fr.

Cap 10-40 mm; dark violet to purplish brown or chestnut brown, later grey-brown with a dark-brown centre; young frosty, finely innate-fibrillose, micaceous; conical, sometimes pointed.

Gills purplish brown to date brown with a pale edge; fairly distant.

Stipe greyish violet, soon grey-brown; micaceous, zoned white to pale violaceous; young with a blue tinge at apex.

Veil greyish violet to white, fairly copious; cortina greyish violet.

Flesh greyish violet to purplish brown, sometimes marbled violet.

Reactions: NaOH trivial.

Spores: 8-10 × 5-6 µm, elliptic to cylindrical, moderately verrucose.

Under deciduous trees, primarily *Salix* and *Corylus*; fairly common.

Ref.: MAR8, HEN4, LAN, FLO, ARN.

A typical brown and violet *Telamonia* with *Salix*. The cap may be convex, broadly umbonate, or pointed. [*C. sertipes* Kühner is closely related and possibly a synonym (see KÜH, KS4).] Cf. *C. depressus*, *cagei*, *fulvescens*. — The variety *atrocaeruleus* (Moser) Lindstr. in the same habitat, is darker with somewhat smaller spores. It is often regarded as a separate species (see FLO, MOS31, JEC4B).

C. casimiri (Velen.) Huijsm.

Cap 10-40 mm; chestnut-brown to purplish brown, centre blackish brown; young finely white fibrillose towards the margin; obtusely conical, later convex with a small umbo.

Gills cinnamon; edge paler; distant.

Stipe tall, slender, often with a small bulb; purplish brown with a violet tinge, coated or zoned grey-violet to rosy or white, occasionally with multiple thin, white bands.

Veil white to grey-violet, sparse; cortina weakly rosy.

Flesh dark brown, pale near stipital cortex.

Reactions: NaOH trivial.

Spores: 10.5-13 × 5.5-7 µm, amygdaloid, moderately verrucose.

Under deciduous trees, primarily *Betula* and *Populus tremula*, toward the North also in *Picea* forests; fairly common.

Ref.: FLO, and *C. subsertipes* in DÄH, MAR8, HEN4, ARN.

It may be difficult to distinguish this fungus from other species in the group without a microscope: the spores are conspicuously long, while *C. vernus* has rounded spores. [The species has often been named *C. subsertipes* Romagn., and is possibly identical to *C. microcylus* Fr.] Cf. *C. pilatii*.

C. roseipes (Velen.) Garn.

Plate 29

Cap 10-35 mm; grey-brown to umber, finely innate fibrillose; margin paler, white fibrillose; obtusely conical, later broadly conical with a small point or umbo.

Gills cinnamon; distant.

Stipe cylindrical; violet to pale greyish violet, blushing, sometimes with a thin, white band; apex violet.

Veil pale grey-violet, rather sparse; cortina white.

Flesh dark purple-brown, blushing to brownish red, white in stipital cortex.

Reactions: NaOH trivial.

Spores: 9-11 × 5.7-6.5 µm, elliptic, coarsely verrucose.

In calcareous *Quercus* and *Corylus* copses, or in parkland and pastures with *Helianthemum*, rare. Gråborg, Broby Äng.

Ref.: VEL2, JEC1A.

Rather similar to *C. casimiri* (above), this interesting species is recognised by the stipe context blushing dark red within a few seconds after slicing, a hue that is sometimes present from the start. As the stipital coating absorbs with age, also the stipe blushes. Like a few other southern cortinars, it has been found to form mycorrhiza with small *Helianthemum* herbs.

C. bibulus Qué.

Cap <15 mm; violet to greyish violet when young, soon purplish brown; finely white fibrillose; membranous, sulcate; obtusely conical, later convex with a pointed umbo and an up-turned margin.

Gills violet; very distant.

Stipe violaceous-brown to translucently rosy; zoned white, some-times with a white band.

Veil violaceous to white, sparse; cortina white.

Flesh rosy, young violaceous; taste slightly bitter.

Spores: 8-10.5 × 5.5-6.5 µm, elliptic, moderately verrucose.

Under *Alnus*; rare. Rude, Bergsäng, Skölesbodarna.

Ref.: FLO, BGB16, JEC3A, and *C. pulchellus* in LAN.

This diminutive species is beautifully violet everywhere when young, but the colour often fades rapidly and the fruitbody turns brown. It may be found, with some luck, in rich alder thickets. [It has also been named *C. pulchellus* J.E. Lange.]

List of Localities

The left column contains code-words for the localities referenced in the species descriptions. The right column gives an approximate location. On a large-scale map of Sweden a visitor should be able to find the county, stated in the right column, where he also usually finds the name of a nearby urban centre. When on site, he will then hopefully be able to find the locality from signposts, or after inquiry. All localities may be accessed by road, sometimes after a few minutes walking.

- "Reserve" stands for localities with a varying degree of protection, either voluntary or by law. They are usually signposted, and provided at the entrance with an information board showing a detailed track map.
- "Fäbod" is an agglomeration of small, ancient farm houses in the forest, with adjacent pastures for various livestock, open to the public. They are part of the traditional, rural culture in the Central-Northern part of the country.
- "Ruined" means that the locality has been clear-cut or otherwise damaged since the taxon was observed. With some luck, the taxon might perhaps still be found in the neighbourhood.

Alderängarna	reserve, NW of Mora, Dalarna
Allkvi.....	Allkvi Änge reserve, Endre, Gotland
Andersön	reserve, Östersund, Jämtland
Anga	Anga Kyrkänge, Gotland
Arvselen	fäbod, NE of Malung, Dalarna
Bergkarlås	W of village, Mora, Dalarna
Bergsäng.....	S of hamlet, S of Rättvik, Dalarna
Billudden.....	coastal reserve near Älvkarleby, Uppland
Björnrike	pine heath and river bank below ski area, Härjedalen (partly ruined)
Blankared	Timmele, Västergötland (partly ruined)
Bonåsheden.....	pine heath at Bonäs, N of Mora, Dalarna
Borrberg	fäbod and surrounding areas S of Gesunda, Dalarna
Bosarve.....	reserve, Garde, Gotland
Broby Äng.....	reserve, Örebro, Närke
Brusebo	N of Visby, Gotland
Båthusravinen	Styrsjöbo, W of Leksand, Dalarna
Dalsvallen	5 km NW of hamlet, S of Sånfjället, Härjedalen
Djurgårdsön.....	W of Djurgårdsbrunn, Stockholm
Dropphäll	4 km S of Arbrå, Hälsingland (partly ruined)
Drottningholm.....	park around Kina castle, Stockholm
Enån	along river, Jarlstugan, Rättvik, Dalarna
Eriksberg	S of Hällekis, Kinnekulle, Västergötland
Erikslund	Borgsjö, Medelpad
Fagerås	Fristad, Västergötland
Fanthyttan.....	W of township, Västmanland
Femsjö	near rectory, Halland
Fettjan.....	reserve, W of Klövsjö, Jämtland
Flemingsberg	forest near Visättra, Huddinge, SW of Stockholm
Fonnsänget	Viklau, Gotland
Foskflon.....	reserve, Idre, Dalarna
Frötuna	forest S of Fellingsbro, Närke
Funäsdalen	5 km N of township, Jämtland
Fårskär.....	1km E of Gårdskär, Älvkarleby, Uppland
Garphyttan.....	near and beyond W border of reserve, Närke
Gesunda.....	several <i>Picea</i> woods near village, Mora, Dalarna
Glanshammar.....	S of village, Örebro, Närke
Gryvelå.....	reserve, near Älvdalen, Dalarna
Gråborg	reserve, Algotsrum, Öland
Gräsvreten	S of Länna, Haninge, Stockholm area
Grötningen	<i>Betula</i> wood, N of Bräcke, Jämtland
Halla	Halla Klosteränge, Roma, Gotland

Halltorp.....	Halltorps Hage reserve, Öland
Hammerdal	4 km NW of township, Jämtland, largely ruined
Hammersta	reserve near road 73, N of Ösmo, Södermanland
Hamra	NW of Tumba, Stockholm area
Hamrafjäll.....	alpine area near Tänndalen, Härjedalen
Haraldsåsen	2 km S of Hede, Härjedalen
Harsa	SW of Järvsjö, Hälsingland
Hede.....	area around golf course, Härjedalen
Hellsgården.....	reserve, Nacka, SE of Stockholm
Helvetesfallet	Orsa, Dalarna
Herrfallsäng.....	reserve, S of Arboga, Närke
Himmelsberga	pasture near hamlet, Långlöt, Öland
Holmudden	reserve, Fårö, Gotland
Holmvallen	alpine area near Funäsdalen, Härjedalen
Horn	Löttorp, Öland
Igeltjärn	forest E of Domnarvet, Borlänge, Dalarna
Insjön	E entrance to Velamsund reserve, Värmdö, Stockholm area
Ismantorp.....	Ismantorp Borg, reserve, Långlöt, Öland
Ivana	reserve, Torsby, Värmland
Järna.....	woods S of township, Södermanland
Johannesdal	Ingarö, SE of Stockholm
Kalkbro	7 km S of Åker, Södermanland
Kalkugnsberget	reserve, Jäder, Arboga, Västmanland
Karlslund	N of Länna, Uppland
Karlslund	N of Länna, Uppland
Karmeråsen	Idre, Dalarna
Klacknäset	S Ingarö, Stockholm area
Klikten	reserve, Sollerön, Dalarna
Klockhammar	Kilsbergen, Närke
Klumpen	reserve, Hammerdal-Föllinge, Jämtland
Klövsjöhöjden	uphill from Klövsjö, Jämtland
Kroktjärn	Stigsjön, Härnösand, Ångermanland
Kråkeboberget.....	Tvärred, S of Ulricehamn, Västergötland
Kröklings Hage	Fristad, Västergötland
Kungshol	Rättvik, Dalarna
Kvarnån	6 km S of Hede, N of Sånfjället, Härjedalen
Kvisttorp.....	9 km W of Arboga, Västmanland (now ruined)
Källängen	4 km W of Arboga, S of river, Västmanland (now ruined)
Laxare	Laxare änge, Slite, Gotland
Lejondal.....	reserve, Bro, Uppland
Limberget	Grangärde, Dalarna
Lombäcken	pine heath, Ånge, Medelpad
Långå Skans	Långå, Härjedalen
Lövberg	fäbod, near Gesunda, Dalarna
Maggås	woods around hamlet, Orsa, Dalarna
Mockfjärd	wood N of hamlet, Djurås, Dalarna
Mortorp.....	NW of Fagerdala, Värmdö, Uppland
Munkängarna	reserve, Kinnekulle, Västergötland
Myttinge	forest N of hamlet, N Värmdö, Uppland
Mångberg	fäbod, Mora, Dalarna
Njupesjär	reserve, Särna, Dalarna
Nyckelviken	Nacka, E of Stockholm
Näset	woods N of township, Lidingö
Näsudden.....	N of Funbo, Uppland
Orminge.....	forest and recreation area NW of township, Värmdö, Uppland
Ormkärr	woods around township, S of Stockholm
Oviken	riverbank E of Borgen, Jämtland
Penningby.....	beech forest at Penningby castle, 8 km S of Norrtälje, Uppland
Puttängesbäcken.....	near Torrberg, NE of Leksand, Dalarna
Ramstigsberget.....	S of river, Jäder, Arboga, Västmanland
Rastaset.....	Vindelsälv reserve, Lapland
Remmen	4 km SE of Hede, S of river, Härjedalen
Rothagen.....	mixed woods on island of Sollerön, S of Mora, Dalarna
Rude.....	Rude Hage reserve, Tvärred, S of Ulricehamn, Västergötland

Rullsand.....	N of camping ground, Skutskär, Uppland
Råbergsängarna.....	reserve near Rättvik, Dalarna
Rädbjörka.....	reserve Orsa, Dalarna
Rännmyra	pastures E of Rävsnäs, Sollerön, Dalarna
Rättviksheden.....	various localities in reserve, Rättvik, Dalarna
Rävsnäs	S of Bodarna, Sollerön, Dalarna
Röfors	forests S of hamlet, Arboga, Västmanland (partly ruined)
Rönningen	forest E of Grangärde, Dalarna (ruined)
Rönäs	alpine heath, Tärnaby, Lapland
Saltarö.....	reserve, Värmdö, E of Stockholm
Selja	sandy pine ridge, E of Mora, Dalarna
Silverknuten	S of Lesjöfors, Värmland
Sjöskogen	spruce forest S of Hällekis, Kinnekulle, Västergötland
Skansberget	forest E of shooting range, N of Långå, Härjedalen
Skogskyrkogården	various parks in cemetery, S of Stockholm
Skräddar Djurberga	fäbod, N of Orsa, Dalarna
Skärmarö	reserve, E of Hemmesta, Värmdö, Stockholm archipelago
Skölesbodarna	W of Matfors, Medelpad
Snöberg	W of Alby, Ånge, Medelpad
Storuman	woods in Luspholmen area, Lapland
Storvik	ab. 5 km W of township, Gästrikland
St Botvid	area near chapel, Flemingsberg, Södermanland
Styggeforsen	reserve, Boda, Dalarna
Städjan	reserve, Idre alpine area, Dalarna
Sunds gård.....	pasture, Ängsvik, Värmdö, Uppland
Sura.....	NW of township (Elingsbo), Västmanland
Svartbäcken.....	near Tyresta reserve, S of Stockholm
Svedsjorna	Görtsbo, S of Bollnäs, Hälsingland
Säs.....	fäbod, 10 km W of Mora, Dalarna
Södra Råda	NE of Gullspång, Västergötland
Sörviken	2 km S of hamlet, Hedeviden, Härjedalen (mostly ruined)
Tjaukle.....	reserve, Viklau, Gotland
Tollagården	Gesunda, Dalarna
Tubbobäcken	2 km NW of Ljungaverk, Medelpad
Tveta	various pastures, Algotsrum, Öland
Tyresta.....	reserve, S of Stockholm
Tuna Fäbod(stig).....	Timrå, Medelpad
Ulricehamn.....	city park, Västergötland
Unskarsheden	quarry, N of Rättvik, Dalarna
Utanmyra	near lake, Sollerön, Dalarna
Vallmån	E entrance to Sänfjället reserve, Härjedalen
Vassijaure.....	alpine heath W of Abisko, Lapland
Vickleby	reserve, along W shore, Öland
Vinäsgraven	canyon and pine heath, Mora, Dalarna
Vuollerim	forests around township, Lapland
Vällinge	reserve, N of Södertälje, Södermanland
Yttre Tjäresten	Storuman, Lapland
Ånn	20 km W of Duved, Jämtland
Åstad	W of hamlet, Långlöt, Öland
Åtorp	9 km W of Arboga, S of river, Närke
Åva	N of Dalarö, Södermanland
Östbjörka	reserve, N of Rättvik, Dalarna
Österplana	Österplana Hed reserve, Kinnekulle, Västergötland

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