

Hygrocyboids

The hygrocyboid agarics (waxcaps and others) are recognized by their thick, waxy and mostly rather distant gills, and many species have very vivid colours. Microscopically, most hygrocyboids have unusually long and slender basidia, typically six to nine times as long as wide. The spore deposits are whitish and the spores smooth and inamyloid; as a general rule cystidia are lacking.

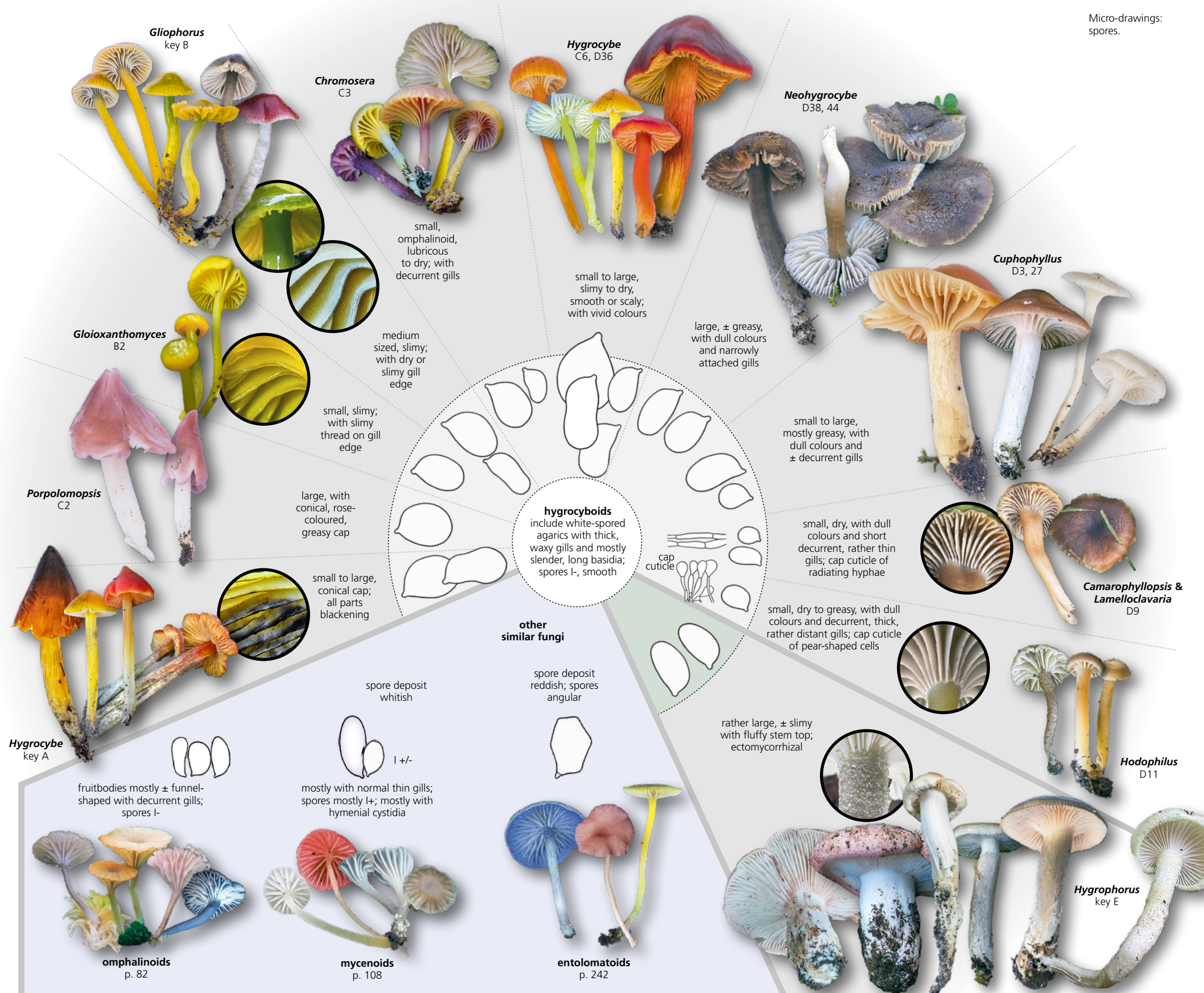
Most hygrocyboids are thought to be biotrophic, with a poorly understood symbiosis with plants. Using DNA-analysis techniques, living hyphae have been detected inside tissues and seeds of *Plantago*. Species of *Hygrophorus* are also proven to be biotrophic, but they form ectomycorrhiza with a number of woody partners. One species (*Hygrophorus exiguus*) appears to be associated with *Tricholoma* mycorrhiza.

Most hygrocyboid agarics have very demanding habitat requirements. They are particularly sensitive to fertilizers, and many favour habitats with a long continuity. Thus the hygrocyboids share habitats and preferences with a number of clavarioids, entolomatoids and earthtongues; they are all good indicators of sites of special nature conservation value.

In most of Europe the typical habitat for hygrocyboids, except *Hygrophorus* and *Hodophilus*, is old, unimproved grassland – a habitat that has declined dramatically over the past 50 years. In other parts of the world, the hygrocyboid agarics are predominantly to be found in forests with long continuity. Species of *Hodophilus* tend to prefer thorny thickets on clay soils but may also occur in open, grassy habitats.

OTHER SIMILAR FUNGI:

- omphalinoids may also have thick, fleshy gills; many are parasites on mosses or are lichenized, but some are saprotrophs (p. 82).
- mycenoids generally have more “typical” gills, and most have cystidia and amyloid spores. They are all believed to be saprotrophs (or endophytes) (p. 108).
- entolomatoids may be similarly colourful, but have angular, pinkish spores (p. 242).



Micro-drawings:
spores.

Key to groups of hygrocyboids

1. Stem with prominent floccules at the top; usually with a slimy universal veil; ectomycorrhizal. *Hygrophorus* – **key E**
Stem without prominent floccules at the top, but may appear pruinose; with or without a slimy surface; not ectomycorrhizal. 2
2. Fruitbodies blackening (→ ) at maturity and when bruised; cap conical. *Hygrocybe conica* group – **key A**
Fruitbodies not blackening and/or cap not conical. 3
3. Cap and stem with a thick layer of slime (in wet weather with an obvious slime coating and almost impossible to pick); in some species also with slimy gill edge. **slimy hygrocyboids** – **key B**
Cap and/or stem not distinctly slimy (but may be sticky, greasy or wet); never with slimy gill edge. 4
4. With brightly coloured (yellow, orange, red, pinkish, green or violet) () cap, stem or gills. **brightly coloured, dry to sticky hygrocyboids** – **key C**
With more muted colours (whitish, cream, greyish, pinkish buff, yellowish brown, orange-brown or reddish brown) () ; some with yellowish stem. **whitish to dull coloured, ± dry hygrocyboids** – **key D**

Key A – the *Hygrocybe conica* group

1. Cap straw yellow, greyish yellowish brown to ± greyish brown (); stem whitish; spore Qav. ≈ 2.3; with 30–50 µm long, spindle-shaped cheilocystidia. Cap 30–50 mm wide; spores 12–15 × 4.5–6.5 µm; Q 1.9–3.1; in dunes by the coast; rare. *Hygrocybe olivaceonigra*
Cap with bright yellow, orange or red () colours that soon blacken; stem at least in places coloured; spore Qav. 1.5–2.2; without cheilocystidia (but protruding flesh-hyphae may be present on the gill edges). 2
2. Young fruitbodies ± reddish (); gills usually somewhat orange to reddish () basally; in white and grey dunes; spores on average 10–12.5 × 5–6 µm, Q 1.6–2.7, Qav. 2–2.2. Cap 25–50 mm wide; scattered along exposed coasts. *Hygrocybe conicoides*
Young fruitbodies reddish, orange, yellowish, yellowish brown (); gills rarely red; in grassland, including dunes, in scrub, old gravel pits etc.; spores on average 8.5–11.5 × 5–7.5 µm, Q 1.3–2.2, Qav. 1.5–1.9. 3
3. Stem 8–20 mm thick, strikingly fibrous; gills yellow towards the edge. Cap 30–100 mm wide; mostly on better soils; scattered. *Hygrocybe pseudoconica*
Stem up to 8 mm thick, not strikingly fibrous; gills whitish to greyish. Cap 5–40 mm wide; common. *Hygrocybe conica* s.l.¹

1. Studies of DNA sequences have shown that *Hygrocybe conica* consists of a number of closely related species, some of which currently have status as forms or varieties:

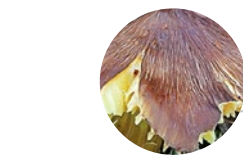
- Small and gracile, in mires and bogs: *Hygrocybe conica* var. *conicopalustris*.
- Fleshy; with yellow colours, and almost or entirely without orange: *Hygrocybe conica* var. *chloroides*.

Key B – slimy hygrocyboids

1. Gill edge slimy; gills decurrent. 2
Gill edge not slimy; gills notched, broadly attached to shortly decurrent. 3
2. Fruitbodies yellow () ; without striking smell. Cap 3–20 mm wide; spores 6.5–8 (–9) × 5–7.5 µm; on unimproved, dry to moist grassland, amongst *Juniperus* (even on a juniper sticks), in old *Salix* carrs, etc.; rare to scattered, mainly W–NW (oceanic). *Gloioxanthomyces vitellinus*
Fruitbodies brownish orange or pale reddish brown, sometimes also with green and bluish colours (); smell like burnt rubber. Cap 10–50 mm wide; spores (5–) 6–7 (–8.5) × (3.5–) 4–4.5 (–5) µm; on acidic, unimproved grassland and heathlands; common. *Gliophorus laetus*
3. Cap ash grey or brownish, rarely whitish (); gills whitish. Cap 10–50 mm wide; spores (5–) 6.5–8 (–9) × (3.5–) 4.5–5 (–6) µm; on unimproved grassland; common. *Gliophorus irrigatus*
Cap and gills with yellow, green, orange, red and greyish violet colours (). 4
4. With green () shades, either on the cap or on stem top; cap in addition usually yellow or less commonly lilac (). Cap 10–35 mm wide; spores 7–9.5 × 5–6 µm; on unimproved grassland and in scrub; common. *Gliophorus psittacinus*
Without green colours; cap yellow, reddish or wine red (). 5
5. With orange to yellow () colours on cap, stem and gills. Cap 5–30 mm wide; spores 7–8.5 (–10) × 4–5 µm, Qav. 1.7–2.1; on old unfertilized lawns and other unimproved grasslands and in scrub; common. *Hygrocybe glutinipes*
Fruitbodies ± red, greyish violet to ± wine red (). 6
6. Cap bluish red to greyish wine red (); stem pale; gills greyish. Cap 15–55 mm wide; spores 6–8.5 (–9) × 4–5.5 (–6) µm; on unimproved grassland; rare (e.g. UK, Denmark, Slovakia). *Gliophorus reginae*
Cap scarlet, coral to brownish red (); stem and gills coloured as the cap. 7
7. Cap coral to brownish red (); spore Qav. 1.5–1.6. Cap 10–25 mm wide; spores (6–) 7–8.5 (–9) × (4–) 4.5–5.5 (–6) µm; on unimproved grasslands; rare. *Gliophorus europaerplexus* s.l.
Cap orange-red to scarlet (); spore Qav. 1.7–2.1. Cap 6–20 mm wide; spores (6–) 7–8.5 (–9.5) × (3–) 3.5–4.5 (–5) µm; rare. *Hygrocybe glutinipes* var. *rubra*

Key C – brightly coloured, dry to sticky hygrocyboids

1. Partially with vinaceous, rose to violet (■ ■ ■) colours 2
Entirely without vinaceous, rose to violet colours 6
2. Cap pointed and rose (☞ ■). Fruitbody large, fleshy and very fragile; cap 25–100 mm wide, rarely white or apricot orange; spores 6–9 × 4–7 μm, Q 1.2–1.8, not constricted; usually on calcareous or clayey, unimproved grasslands, including cemeteries and old lawns; scattered to rare (mostly UK) *Porpolomopsis calyptriformis*
Cap not pointed and rose 3
3. On wood. Cap 6–20 mm wide; cap and stem with yellowish to greyish colours; gills violet; spores 6.5–9 (–10) × 3.5–4.5 μm, Q 1.8–2.1; on coniferous wood in ancient woodlands *Chromosera cyanophylla*
On soil 4
4. Stem whitish to yellowish (☞ □ □ □). Cap 5–30 mm wide; spores (5–) 6–7.5 (–8) × (3.5–) 4–5 (–5.5) μm, Q 1.2–2.2; on dwarf-shrub heathlands and on unimproved grasslands; rare (arctic-alpine-oceanic) *Chromosera xanthochroa*
Stem ± vinaceous to violet (☞ ■ ■ ■) 5
5. Fruitbody mottled with both yellowish, reddish and violet (■ ■ ■) colours. Cap 5–30 mm wide; spores 8–10 (–12) × 5–7 μm, Qav. 1.4–1.8; on peaty soils in arctic-alpine areas (probably absent in the area covered) *Chromosera lilacina*
Fruitbody uniformly violet (■ ■ ■). Cap 5–15 mm wide; spores (6.5–) 7.5–9.5 (–10.5) × (4.5–) 5–6 (–7) μm, Qav. about 1.5; mostly on fairly rich soils in forests; rare, absent N of Denmark *Chromosera viola*
6. Cap cracking into small scales, especially towards the centre and when dry (lens!); dry 7
Cap smooth to nubbed; dry, greasy to sticky 16
7. Gills narrowly attached; fruitbodies robust; stem more than 5 mm thick 8
Gills broadly attached, notched to decurrent; fruitbodies rather small; stem less than 4 mm thick 9
8. Stem with coarse, longitudinal fibres; cap broadly conical and coarsely fibrous with small ± upright scales; cap mainly orange-yellow, orange to red (☞ ■ ■ ■). Cap 25–110 mm wide; spores 8–10 × 5–6.5 μm, rarely constricted; on unimproved grasslands, usually fruiting during the summer; rare to scattered *Hygrocybe intermedia*
Stem glabrous; cap acutely conical; fruitbodies yellow, usually with greenish or orange (☞ ■ ■ ■) tinge. Cap 25–90 mm wide; spores 9–12 × 5–7 μm, rarely constricted; on ± calcareous, unimproved grasslands; rare *Hygrocybe citrinovirens*
9. Gills broadly attached, notched to shortly decurrent 10
Gills distinctly decurrent 14
10. Many spores more than 10 μm long. Cap 5–50 mm wide; spores ± constricted, (7–) 9–12 (–14.5) × (4–) 5–6.5 (–8.5) μm. In dune slacks and bogs; scattered (N) to rare *Hygrocybe substrangulata*
Most spores less than 10 μm long 11
11. Fruitbodies bright red (☞ ■ ■ ■); cap scales usually upright and pointed; with faint smell of garlic (best detected after being kept in a small closed container for a few minutes); gill hyphae 150–500 μm long. Cap 8–20 mm wide; spores 8–10 × 5–6 (–7) μm, without constrictions; on unimproved, often damp grasslands, and early in the season; common *Hygrocybe helobia*
Fruitbodies red, orange-red, rarely yellow (☞ ■ ■ ■); cap scales mostly appressed, not pointed, sometimes greyish; without smell of garlic; gill hyphae up to 150 (–250) μm long 12



12. Some spores when viewed from the front characteristically pear-shaped or rounded triangular with the broad part at the base; cap scales relatively coarse; on acidic, unimproved grasslands, usually associated with *Hieracium pilosella*. Cap 6–50 mm wide; spores (6–) 7–9 (–10) × (4–) 4.5–5.5 (–6.5) μm; common *Hygrocybe miniata*
Spores broadly ellipsoid to subglobose; cap scales very small; on calcareous, unimproved grassland, not associated with *Hieracium pilosella* 13
13. Cap 14–65 mm wide; stem 2.5–16 mm thick. Spores (6.5–) 7–10 (–10.2) × 5–6.5 (–7) μm; in lawns and parks; rare (Slovakia) *Hygrocybe fulgens*
Cap 3–24 mm wide; stem 1–3 mm thick. Spores 7.5–9 × 5–6 (–7) μm; on calcareous and unimproved grasslands; scattered *Hygrocybe calciphila*
14. Cap scales (or felt) concolorous with the general colour (yellowish when dry), rarely greyish. Cap 3–30 mm wide; spores (7.5–) 9–10.5 (–11.5) × (5–) 5.5–7 (–9) μm; in unimproved grassland, usually in bogs, but also on moist grassland; common *Hygrocybe lepida* s.l.
Cap scales ± blackish, at least in the centre 15
15. Fruitbodies yellow to orange (☞ ■ ■ ■); usually with blackish scales covering the cap; on dry localities. Cap 8–30 mm wide; spores (8–) 9.5–11.5 (–12.5) × (4.5–) 5.5–7 (–8) μm; on acidic, unimproved grasslands; rare *Hygrocybe turunda*
Fruitbodies orange-red to red (☞ ■ ■ ■); usually with blackish scales only in the cap centre; in damp localities (mostly in *Sphagnum*). Cap 6–20 mm wide; spores (8–) 9.5–11.5 (–13) × (5–) 5.5–6.5 (–8) μm; not constricted; scattered to common *Hygrocybe coccineocrenata*
16. Cap curry yellow, cinnamon to orange-brown (☞ ■ ■ ■), sometimes with the pale yellow flesh visible in cracks see D37
Cap ± yellow or red (☞ ■ ■ ■) 17
17. Taste bitter (test by touching the cap surface with the tongue) [Hygrocybe mucronella s.l.] 18
Taste mild 19
18. Spore Qav. 1.3–1.4; all spores constricted. Cap 3–20 mm wide; spores 7–9 × 5–7 μm, av. 8.2 × 6 μm; in unimproved grasslands; probably rare *Hygrocybe amara*
Spore Qav. 1.5–1.6; only some spores constricted. Cap 4–35 mm wide; spores 6.5–9 × (4–) 4.5–6 μm, av. 7.9 × 5.2 μm, Q 1.32–1.8, many almost triangular in outline; in scrub and on unimproved grasslands; scattered *Hygrocybe mucronella*
19. Cap lemon yellow, yellow to pale apricot orange (☞ ■ ■ ■) 20
Cap apricot orange, scarlet to carmine (☞ ■ ■ ■) 31
20. Gills narrowly attached to almost free, sometimes notched; caps usually somewhat cone-shaped 21
Gills broadly attached, notched-decurrent to decurrent; caps mostly convex to flat 25
21. Stem surface distinctly longitudinally fibrous 22
Stem surface ± transversely polished or finely fibrous 23
22. Spores narrowly ellipsoid, ellipsoid to cylindrical, (8–) 10–12.5 (–15) × 4.5–6.5 (–8) μm, Q 1.5–2.5. Cap 10–70 mm wide; on calcareous, unimproved grasslands, rarely on less calcareous sites; common *Hygrocybe acutoconica*
Spores broadly ellipsoid to subglobose, (8–) 9.5–12 (–15) × 6.5–10.5 (–12.5) μm, Q 1–1.7. Cap 15–70 mm wide; on calcareous, unimproved grasslands, rarely on less calcareous sites; scattered *Hygrocybe konradii*





23. Gills pale yellow (☐); cap and stem bright yellow (☐), rarely orange; gill hyphae up to 1000 µm long 24
 Gills typically ± orange (☐); cap and stem with orange shades (☐); stem dry; gill hyphae up to 150 (–250) µm long 24



24. Cap with small fibres or scales; stem dry . see *Hygrocybe citrinovirens*, cpl. 8
 Cap smooth; stem usually greasy or wet. Cap 20–70 mm wide; gills narrowly attached; spores 7–9 (–10.5) × 4–5.5 (–6.5) µm, without constrictions; on unimproved grasslands and in scrub; common *Hygrocybe chlorophana*



25. Smell like *Lactarius quietus* or stink bug (best detected when kept in closed container for about 10 minutes); cap mostly dry, in young fruitbodies sometimes sticky, weakly hygrophanous; stem with a glabrous surface. Cap 10–80 mm wide; spores (7–) 7.5–9 (–11) × 4–5 (–6) µm, usually constricted; on unimproved grasslands, in scrub and forests; scattered to common *Hygrocybe quieta*
 Smell insignificant; cap sticky (kissing positive), distinctly hygrophanous; stem finely, longitudinally fibrous, usually whitish pruinose, especially at the top. Cap 20–50 mm wide; spores (6.5–) 7.5–9 (–11) × 4–5 (–6) µm, many constricted; on unimproved grasslands and in scrub; rare *Hygrocybe aurantiosplendens*



26. Gills distinctly arched-decurrent 27
 Gills deeply notched, broadly attached to slightly decurrent 28



27. Stem finely downy (lens!); with a greenish lichen thallus at base of the stem, either like small green nodules or like flat leaves see *Lichenomphalia*, p. 84
 Stem ± glabrous; without a lichen thallus at the base. Cap 3–30 mm wide; cap convex, greasy to dry; gill edge without slime thread; spores (7–) 8–10 (–13) × (4–) 4.5–5.5 (–7) µm, Q 1.2–2.1; on dwarf-shrub heathlands and on unimproved grasslands; rare (arctic-alpine-oceanic) *Chromosera citrinopallida*



28. Stem as young wet and greasy; cap thin and translucently striped and usually with a navel; usually rather mottled see *Chromosera xanthochroa*, cpl. 4
 Stem dry; cap more fleshy and not with a central navel; usually rather uniformly coloured 29



29. Cap greasy-sticky; smell absent. Cap 5–30 mm wide; spores (5.5–) 6–8 (–10) × 3–4 (–5.5) µm, many with a constriction; on unimproved grasslands, in scrub, on old lawns, etc.; common *Hygrocybe ceracea*
 Cap ± dry; smell like *Lactarius quietus* or honey (best detected when kept in closed container for some time) 30



30. Smell like *Lactarius quietus* or stink bugs . see *Hygrocybe quieta*, cpl. 25
 Smell honey-like see *Hygrocybe reidii*, cpl. 38



31. Cap scarlet to carmine (☐); cap ± apricot orange (☐) 32
 Cap ± apricot orange (☐) 37



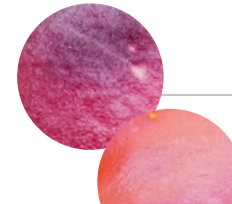
32. Cap wet and sticky (kissing positive) and with a small papilla in the centre see *Hygrocybe subpapillata*, cpl. 45
 Not wet; without a papilla in the cap centre 33



33. Smell upon drying honey-like. Cap 20–70 mm wide; spores (6.5–) 7.5–9 (–10) × (4–) 4.5–5.5 (–6) µm; on unimproved grasslands; scattered to rare *Hygrocybe splendidissima*
 Without a honey-like smell 34



34. Stem distinctly longitudinally fibrous. Cap 30–150 mm wide; gills narrowly attached; spores (7–) 8.5–10 (–11) × (4–) 4.5–5.5 (–7) µm, usually constricted; on unimproved grasslands, rarely in scrub; scattered to rare *Hygrocybe punicea*
 Stem surface ± transversely polished 35



35. Stem ± apricot orange (☐) . see *Hygrocybe constrictospora*, cpl. 46
 Stem ± scarlet (☐) 36

36. Cap carmine with a dark shading, at least in the centre, dry. Cap 3–30 mm wide; spores (6–) 7.5–10 (–12.5) × (4–) 4.5–5.5 (–7.5) µm, very variable in shape; on unimproved grasslands, in fens and on dried-out lake beds in oligotrophic lakes; common to rare *Hygrocybe phaeococcinea*
 Cap scarlet to carmine without a dark shading, slightly sticky (± kissing positive). Cap 10–60 mm wide; spores (6.5–) 7.5–10 (–13) × (4–) 4.5–5.5 (–7) µm, mostly without constriction; on unimproved grasslands, rarely in scrub and forests; common *Hygrocybe coccinea*²



37. With a smell of honey or *Lactarius quietus* (stink bugs) – best detected when kept in a closed container approximately 10 minutes 38
 Smell different or absent 39



38. Smell honey-like (especially upon drying). Fruitbodies often in clusters; cap 10–50 mm wide; gills broadly attached to somewhat decurrent; spores (6–) 6.5–8.5 (–10) × 4–5 (–7.5) µm, mostly without constrictions; on unimproved grasslands, rarely in forests; common *Hygrocybe reidii*
 Smell of *Lactarius quietus* (stink bug) see *Hygrocybe quieta*, cpl. 25



39. Stem wet (but dries quickly); cap small, thin-fleshed and usually very translucently striped 40
 Stem dry; cap usually with thicker flesh or without marginal stripes 42



40. Cap with a navel see *Chromosera xanthochroa*, cpl. 4
 Cap without a navel [*Hygrocybe insipida* s.l.] 41

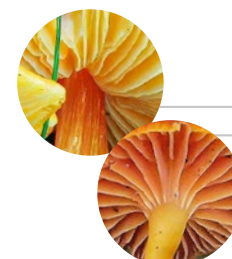
41. Stem top scarlet (☐); cap margin crenulate. Cap 3–25 mm wide; gills somewhat decurrent; spores 6–7.5 × 3.3–4.5 µm, Q 1.6–2, Qav. 1.8; in forests and on unimproved grasslands; common to scattered *Hygrocybe garajonayensis*



- Stem top ± orange (☐); cap margin not obviously crenulate. Cap 3–25 mm wide; gills somewhat decurrent; spores (5–) 6–7.5 × 3–4 (–5) µm, less than 20% constricted; in scrub and on unimproved grassland; scattered, but commonly mistaken for *H. garajonayensis* *Hygrocybe insipida*



42. Gills curve upwards and are narrowly attached to somewhat notched 43
 Gills broadly attached, deeply notched or decurrent 45



43. Stem surface ± transversely polished or finely fibrous see *Hygrocybe aurantiosplendens*, cpl. 25
 Stem surface distinctly longitudinally fibrous 44

44. Spores narrowly ellipsoid, ellipsoid to cylindrical, (8–) 10–12.5 (–15) × 4.5–6.5 (–8) µm, Q 1.5–2.5 see *Hygrocybe acutoconica*, cpl. 22
 Spores broadly ellipsoid to subglobose, (8–) 9.5–12 (–15) × 6.5–10.5 (–12.5) µm, Q 1–1.7 see *Hygrocybe konradii*, cpl. 22



45. Cap with a small papilla at centre, wet to sticky. Cap 3–30 mm wide; spores (5.5–) 7–9 (–10) × (3.5–) 4.5–5.5 (–7) µm, ± ellipsoid; on unimproved grasslands; scattered (N) to rare *Hygrocybe subpapillata*
 Cap without a papilla, dry 46



46. Cap dark apricot orange (☐); probably never growing in clusters; spores ellipsoid or mostly constricted, Q 1.5–2.4. Cap 4–35 mm wide; spores (6–) 7–9 (–11) × (3–) 3.5–4.5 (–5) µm; typically in calcareous dune slacks; rare or overlooked *Hygrocybe constrictospora*
 Cap peach to apricot orange (☐); sometimes in clusters; spores subglobose, Qav. 1.2. Cap 3–8 mm wide; spores (4–) 4.5–5 (–5.5) × (3.5–) 4–4.5 (–5) µm; in ditches and grass tufts in acidic heathlands; rare (the Netherlands) *Hygrocybe aurantia*



2. Sequenced material with very white gills is different from *H. coccinea* in the narrow sense, and maybe the name *Hygrocybe marchii* could be used for this taxon.

Key D – whitish to dull coloured, ± dry hygrocyboids

1. Cap whitish to cream (☐ ☐ ☐ ☐) 2
 Cap ± brown, pinkish buff, pale buff, greyish to brownish orange (☐ ☐ ☐ ☐) 6
2. Cap thin-fleshed and typically less than 10 mm wide; usually with lots of cystidia; spores in some species amyloid see *Hemimycena*, *Mycena*, *Phloeomana* and others, p. 108
 Cap more fleshy, when mature typically more than 10 mm wide; without cystidia; spores never amyloid 3
3. Cap not hygrophanous and not translucently striped; fruitbodies rather robust; stem 4–20 mm thick 4
 Cap hygrophanous and when moist somewhat translucently striped; fruitbodies rather gracile; stem 2–6 (–10) mm thick 5
4. Gills blackening upon drying; cap greasy; spores on average more than 7 µm long. Cap 10–40 mm wide, greasy; gills very distant, cream; without striking smell and taste; spores (5.5–) 6–9 (–9.5) × 3.5–5 µm; in forests and on calcareous grasslands; rare *Cuphophyllus monteверdae*
 Gills not blackening upon drying; cap not greasy, sometimes finely grainy; spores on average less than 7 µm long. Cap 20–100 mm wide; stem 4–20 mm thick; without striking smell and taste; spores (5–) 5.5–6.5 (–7) × (3.5–) 4–4.5 (–5) µm; on unimproved grasslands; scattered to rare *Cuphophyllus berkeleyi*³
5. Smell insignificant or like coconut flour. Cap white to cream; spores (6–) 7–8.5 (–9) × (4–) 4.5–5 (–6) µm; the occasional smell of coconut cookies is probably due to an infection, which typically colours the stem pale red at the base; also attacked by *Paecilomyces marquandii*, which colours the gills greyish blue; on unimproved grasslands, rarely in scrub; common *Cuphophyllus virgineus*
 Smell strong, like suede or cedar wood (but not detectable by all persons). Cap cream; spores (6–) 7.5–9 (–10) × 4.5–5.5 (–6) µm; in unimproved grasslands, including grassy road verges; common *Cuphophyllus russocoriaceus*
6. Cap less than 20 mm wide; spores on average less than 6.5 µm long 7
 Cap wider and/or spores on average longer 24
7. With a strong mealy smell see *Dermoloma*, p. 143
 Smell different or insignificant 8
8. Cap surface finely radially fibrous (powerfull lens!), sometimes radially cracking in small scales; gills not strikingly thick, initially convex but later ± hanging; cap cuticle of radiating, cylindrical to slightly inflated cells 9
 Cap surface not radially fibrous; gills rather thick, typically distinctly convex; cap cuticle of erect, ± pear-shaped cells [*Hodophilus*] 11
9. Spores ± ellipsoid, spore Q 1.9–2.1. Cap 8–15 mm wide, ± greyish brown; stem 1–2 mm thick, with colour like the cap; spores 5–6 × 2.5–3 µm, av. 5.5 × 2.8; on soil amongst grasses; rare *Lamelloclavaria petersenii*
 Spores ± globose, spore Q less than 1.3 10
10. Cap cinnamon to dark yellowish brown (☐ ☐ ☐ ☐); mostly with small scales; spores 4–5 × 3.5–5 µm. Cap 5–50 mm wide; smell insignificant; on unimproved grasslands or in scrub; scattered *Camorophyllopsis schulzeri*
 Cap ± dark greyish brown (☐ ☐ ☐ ☐), contrasting to rather pale gills; not distinctly scaly; spores 2.8–4.2 × 2.6–3.8 µm. Cap 5–20 mm wide; smell insignificant; on clayey soil in scrub and unimproved grasslands; rare *Camorophyllopsis atrovelutina*

3. Slightly darker material (especially at the cap centre) is an undescribed species.



11. With strong smell of faeces [*Hodophilus foetens* s.l.] 12
 Smell insignificant or somewhat spermatic 15
12. Gills rather crowded, with (14–) 18–30 full-length gills 13
 Gills more distant, with 10–18 (–20) full-length gills 14
13. Fruitbodies darken to almost black at maturity or upon drying, especially at the cap margin; caulocystidia on average wider than 7.5 µm. Spores (4.5–) 5–6 (–6.5) × 4–5 (–5.5) µm, av. 5.5 × 4.5 µm, Q (1.02–) 1.17–1.30 (–1.47); mainly on clay soil in scrub and forests, less common in unimproved grasslands; scattered *Hodophilus foetens*
 Fruitbodies do not darken significantly; caulocystidia on average more narrower than 7.5 µm. Spores (4.5–) 5–6 (–6.5) × (3.5–) 4–4.5 (–5) µm, av. 5.3 × 4.2 µm, Q (1.04–) 1.19–1.36 (–1.54); on clay soil in scrub and forest; scattered, but overlooked *Hodophilus tenuicystidiatus*
14. Cap greyish orange to cinnamon-buff (☐ ☐ ☐ ☐), drying to pale orange; Q-value of the cells around the cap centre less than 2.5. Spores (4.5–) 5–6 × (3.5–) 4–4.5 (–5) µm, av. 5.4 × 4.3 µm, Q (1.02–) 1.17–1.36 (–1.49); on clay soil in scrub and forests; rare or overlooked *Hodophilus pallidus*⁴
 Cap ± greyish brown to pale mouse grey (☐ ☐ ☐ ☐), or when dry dark brown; Q-value of the cells around the cap centre more than 2.5. Spores (4.5–) 5–6 (–6.5) × (3.5–) 4–4.5 (–5) µm, av. 5.3 × 4.2 µm, Q (1.08–) 1.20–1.36 (–1.53); on clay soil in scrub and forests; rare or overlooked *Hodophilus subfoetens*
15. Stem in young fruitbodies with distinct greyish orange to yellow (☐ ☐ ☐ ☐) colours [*Hodophilus micaceus* s.l.] 16
 Stem in young fruitbodies without distinct greyish orange to yellow colours 19
16. Young fruitbodies entirely yellow (☐ ☐ ☐ ☐); stem persistently yellow (☐ ☐ ☐ ☐). Spores (3.5–) 4.5–5.5 (–6) × (3–) 3.5–4.5 µm, av. 5 × 4 µm, Q (1.03–) 1.19–1.32 (–1.58); on clayey soil in scrub, forests and unimproved grasslands; rare *Hodophilus micaceus*
 Young fruitbodies with ± brown cap (☐ ☐ ☐ ☐); the stem quickly changing from yellow to more brownish 17
17. The stem in young fruitbodies is typically darker at the top than further down. Spores (4.5–) 5–5.5 (–6) × (3.5–) 4–4.5 (–5) µm, av. 5.2 × 4.1 µm, Q (1.14–) 1.19–1.31 (–1.44); on clayey soil in scrub and unimproved grasslands; rare *Hodophilus anatinus*
 The stem in young specimens not darker at the top 18
18. Stem initially olivaceous buff to dark olivaceous buff (☐ ☐ ☐ ☐), later dark greyish brown to almost black (☐ ☐ ☐ ☐) at the base; spore Qav. less than 1.2. Spores (4.5–) 4.5–5.5 (–6) × (3–) 4–4.5 (–5) µm, av. 5.1 × 4.3 µm, Q (1.06–) 1.12–1.23 (–1.58); on clayey soil in scrub and unimproved grasslands; rare *Hodophilus cambriensis*
 Stem initially mostly two-coloured, paler at the top or more yellow (☐ ☐ ☐ ☐), but not significantly darker at maturity; spore Qav. more than 1.2. Spores (4–) 4.5–5.5 (–6.5) × (3.5–) 4–4.5 (–5) µm, av. 5.1 × 4.2 µm, Q (1.09–) 1.15–1.3 (–1.45); in scrub and forests on clayey soil and in calcareous, unimproved grasslands; rare *Hodophilus phaeoxanthus*
19. Stem with distinct, dark, dot-like scales [*Hodophilus atropunctus* s.l.] 20
 Stem without distinct, dark, dot-like scales [*Hodophilus phaeophyllus* s.l.] 21



4. There is a closely related and very similar still undescribed species.

20. Cap as fresh rather pale brown (☐), upon drying paler from the cap margin; stem darker brown downwards; gills usually with pinkish tinge. Spores (4.1–) 4.6–5.4 (–6.4) × (3.1–) 3.5–4.2 (–4.9) μm, av. 5 × 3.9 μm, Q (1.13–) 1.21–1.39 (–1.62); on clayey soil in forests and scrub; rare *Hodophilus atropunctus*
Cap as fresh rather dark brown (☐), upon drying paler all over or from centre; stem uniformly coloured; gills without pinkish tinge. Spores (4–) 5–5.5 (–6) × (3.5–) 4–4.5 (–5) μm, av. 5.1 × 4.2 μm, Q (1.07–) 1.15–1.28 (–1.42); on clayey soil in forests and scrub; rare, but commonly overlooked *Hodophilus variabilipes*
21. Spores narrowly ellipsoid, Qav. more than 1.4. Spores (5–) 6–6.5 (–7.5) × (3–) 3.5–4 (–4.5) μm; in scrub and forests on clayey soil and in calcareous, unimproved grasslands; rare *Hodophilus decurrentior*
Spores broadly ellipsoid, Qav. less than 1.3 22
22. Fruitbodies as young and in moist condition dark grey-brown (☐); cap almost or entirely permanently dark brown (☐) upon drying; size of caulocystidia and cells at cap centre highly variable. Spores (4–) 4.5–5 (–5.5) × 3.5–4 (–4.5) μm, av. 4.6 × 3.9 μm, Q (1.07–) 1.13–1.26 (–1.42); in scrub and forests on clayey soil and in calcareous, unimproved grasslands; rare *Hodophilus carpathicus*
Cap ± clay-pink to brown (☐), but gills typically paler pinkish buff to greyish (☐); cap sometimes strongly fading when dry; caulocystidia and central cap cells of ± uniform size 23
23. Cap mostly clay-pink (☐) with more brownish olive (☐) centre, probably never changing upon drying; gills ± pinkish buff (☐) also at maturity. Spores (3.9–) 4.1–4.7 (–5.4) × (2.9–) 3.3–3.8 (–4.3) μm, av. 4.4 × 3.6 μm, Q (1.08–) 1.18–1.3 (–1.5); in scrub and forest on clayey soil and in calcareous unimproved grassland; rare *Hodophilus stramineus*
Cap brown (☐) as young or moist, but upon drying with significant colour change to pale grey or almost white (→ ☐); gills initially pale brown to greyish (☐), later dark greyish brown (→ ☐). Spores (4–) 4.5–5 (–6) × (3–) 3.5–4 μm, av. 4.7 × 3.7 μm, Q (1.1–) 1.17–1.37 (–1.58); in scrub and forests on clayey soil and in calcareous, unimproved grasslands; rare or confused with other species of *Hodophilus* *Hodophilus phaephyllus*
24. Spores smaller than 6 × 5 μm see *Camarophyllopsis schulzeri*, cpl. 10
Spores larger 25
25. Gills deeply decurrent 26
Gills almost free, attached, notched to shortly decurrent 36
26. Fruitbodies small and fragile (mycenoid/omphalinoid) see *Hemimycena*, p. 108
Fruitbodies more fleshy 27
27. Cap dry, generally not hygrophanous and without marginal stripes 28
Cap greasy to sticky (kissing positive), hygrophanous and translucently striped 30



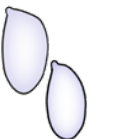
28. Cap with a brownish rose to flesh pink tinge (☐); fruitbodies small. Cap 7–20 mm wide; spores 6–7.5 (–8.5) × 5–6 (–7.5) μm; on calcareous grassland and in scrub; rare *Cuphophyllus roseascens*
Cap brownish orange or greyish (☐); fruitbodies robust 29
29. Cap brownish orange, glabrous (☐). Cap 30–120 mm wide; spores (5–) 5.5–6.5 (–7.5) × (3.5–) 4–5 (–5.5) μm; on unimproved grasslands, less commonly in scrub; common *Cuphophyllus pratensis* s.l.⁵
Cap greyish felty (☐). Cap 15–40 mm wide; spores (4.5–) 5–6 × 4–5 μm; on unimproved grasslands; rare, mainly NW (oceanic) *Cuphophyllus atlanticus*
30. Smell strong, like suede or cedar wood; cap cream to pale buff (☐) see *Cuphophyllus russocoriaceus*, cpl. 5
Smell insignificant; cap more coloured, at least at the centre 31
31. Cap pinkish buff, pale buff to clay-buff (☐), sometimes with a darker brown spot in the centre; base of the stem whitish 32
Cap dark ash grey to brown (☐), sometimes with rose or purple tinge; base of the stem white to yellow 33
32. Cap uniformly pinkish buff to pale buff or clay-buff (☐). Cap 10–35 mm wide; spores (6–) 7–8 (–9) × (4–) 4.5–5 (–5.5) μm; on calcareous, unimproved grasslands or in scrub; scattered to common *Cuphophyllus ochraceopallidus*
Cap with an obvious brownish centre and pale margin. Cap 10–30 mm wide; spores (6.5–) 7.5–9 (–11) × 4–5 (–5.5) μm; on calcareous, unimproved grassland; rare *Cuphophyllus fuscescens*
33. Cap ± orange-brown to reddish brown (☐); gills ± pinkish buff (☐). Cap 7–50 mm wide; spores (6–) 7.5–9 (–10) × (4–) 5–6 (–7) μm; on calcareous, unimproved grasslands; scattered to rare *Cuphophyllus colemannianus*
Cap ash grey to greyish brown (☐); gills greyish (☐) 34
34. Stem glabrous, white; taste sometimes acidic and unpleasant. Cap 25–60 mm wide; spores (6–) 7–8 (–8.5) × (4–) 4.5–6 (–6.5) μm; on unimproved grasslands; scattered to rare *Cuphophyllus lacmus*
Stem with longitudinal fibres, greyish white to silvery grey, mostly with yellow base; taste insignificant [*Cuphophyllus flavipes* s.l.] 35
35. Spore Q 1.22–1.27. Cap 10–40 mm wide; spores on average 7.1 × 5.6 μm (full measurement in the strict sense not known); in unimproved grasslands; scattered to rare *Cuphophyllus flavipes*
Spore Q 1.34–1.39. Cap 15–40 mm wide; spores (5.5–) 7–7.5 (–9) × (4–) 5–5.5 (–6) μm, on average 7.2 × 5.3 μm; in unimproved grassland; probably rare (S) to scattered (N) *Cuphophyllus flavipesoides*
36. Cap, stem or gills with yellow colours 37
Without yellow colours 38
37. Gills almost free or narrowly attached; cap conical. Cap 25–80 mm wide; spores 9–12 × 5–7 μm; on unimproved, usually calcareous, grasslands; scattered with erratic appearances *Hygrocybe spadicea* var. *spadicea*
Gills broadly attached, notched to shortly decurrent; cap rounded. Cap 5–28 mm; spores 7–12 × 4–7 μm; in poor, unimproved grasslands; rare (S) *Neohygrocybe citrinofusca*



5. Genetically a complicated taxon, which may have to be split into more species. Material colour-wise approaching *C. berkeleyi* is an undescribed species.



38. Gills almost free or narrowly attached; smell insignificant. Stem and gills white, otherwise like main variety; rare *Hygrocybe spadicea* var. *albifolia*
Gills broadly attached, notched to shortly decurrent; smell often obvious, e.g. mealy or nitrous 39
39. Smell nitrous (like swimming pool) 40
Smell different or at most slightly nitrous 42
40. Cap on mature fruitbodies with small scales, ± greyish brown (☞ ). Cap 20–70 mm wide; flesh rarely slowly reddish brown when bruised; spores (7–) 8–9 (–10) × (4–) 4.5–5.5 (–6) μm; on unimproved grasslands; common (N–W), rare in lowlands in central and southern parts *Neohygrocybe nitrata*
Cap persistently glabrous, ± mustard yellow to pale vinaceous brown (☞  ) 41
41. Flesh quickly reddening when bruised. Cap 20–60 mm wide; gills rather pale; spores (6–) 7–9 (–10) × (4–) 5–6.5 (–7) μm; on unimproved grasslands with a high diversity of other hygrocycoids; scattered to rare (S) *Neohygrocybe ingrata*
Flesh not reddening. Cap 20–80 mm wide; spores (6.5–) 7–10 (–12) × 4.5–6.5 (–7.5) μm; on unimproved grasslands; rare, but distribution and abundance not yet clearly understood *Neohygrocybe pseudoingrata*
42. Spores amyloid; smell usually mealy 43
Spores inamyloid; smell different or insignificant 44
43. Stem 2–8 mm thick see *Pseudoomphalina* & *Pseudolaccaria*, p. 75–76
Stem thicker see *Pseudotracheloma metapodium*, p. 152
44. Stem and gills white (☞ ); cap whitish to ash grey (☞  ); surface and flesh unchanging or slightly apricot orange (→ ) when bruised, mainly in stem base. Cap 20–80 mm wide; spores (6–) 7–8.5 (–9.5) × (4–) 4.5–5.5 (–6) μm; on ± calcareous, unimproved grasslands; scattered to rare *Cuphophyllus fornicatus* s.l.
Cap, stem and gills greyish, brown or almost blackish (☞   ) all parts distinctly red (→ ) when bruised. Cap 20–90 mm wide; spores (7–) 7.5–9 (–11) × 5–6 (–7) μm; smell unpleasant or slightly nitrous; on unimproved grasslands of high diversity value; rare *Neohygrocybe ovina*



Key E – *Hygrophorus*

Overview

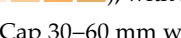
- Cap whitish, cream to pale buff (☞   ) 2
Cap pale red (☞   ) 12
Cap yellow, brownish orange to orange (☞     ) 17
Cap with greyish and brown colours (☞    ) 25



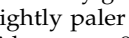
1. Cap whitish to cream or pale buff (☞   ) , sometimes more coloured or darker when old 2
Cap more coloured or darker, at least in the centre 11
2. Cap margin with yellow fluff. Cap 30–80 mm wide; stem 6–15 mm thick, with ± yellow fluff; spores 7–9 (–10) × 3.5–4.5 (–5) μm; with *Fagus* on calcareous soil; rare *Hygrophorus chrysodon* s.l.
Cap margin without yellow fluff 3
3. With coniferous trees 4
With deciduous trees 6
4. Smell marzipan-like. Otherwise like the main variety; rare or overlooked *Hygrophorus agathosmus* f. *albus*
Smell weak, not marzipan-like 5
5. Gills pale apricot orange (☞  ); spores 5–7 μm wide. Cap 30–100 mm wide; stem 5–10 mm thick; spores 8–10 × 5–7 μm; with coniferous trees, mostly with *Picea*; scattered (N) *Hygrophorus karstenii*
Gills whitish (☞  ) ; spores 4.5–5.5 μm wide. Fruitbody not distinctly slimy; cap 30–80 mm wide; stem 5–10 mm thick; spores (6–) 7–9 × (4–) 4.5–5.5 μm; with *Picea*; absent W, scattered to common N *Hygrophorus piceae*
6. Cap dry; stem slimy or dry, 8–35 mm thick; fruitbodies somewhat tricholomatoid; smell weak or slightly sweetish 7
Cap sticky to slimy; stem slimy, 5–10 (–15) mm thick; fruitbodies rather slender like a typical *Hygrophorus*; usually with somewhat unpleasant, musky smells 8
7. Spore Q 1.5–1.8; stem 8–15 (–20) mm thick; with *Fagus*. Cap 40–100 mm wide; stem 15–25 mm thick; smell weak or sweetish; spores 6–9 × 4–5 μm; common to rare (N and W) *Hygrophorus penarius*
Spore Q 1.3–1.6; stem 15–35 mm thick; with *Quercus*. Cap 90–150 mm wide; smell weak, oil-like or sweetish; spores (5–) 5.5–6.5 (–7) × 4–4.5 μm; rare or overlooked *Hygrophorus penarioides*
8. With *Betula* or *Quercus*; gills with weak or no reaction with KOH 9
With *Fagus*; the base of the stem and sometimes also the flesh and gills rather dark orange-brown (→  ) with KOH 10
9. With *Betula*. Cap 20–60 mm wide; stem 8–15 mm thick; smell strong and unpleasant; spores 7–9 × 4.5–6 μm; scattered N, to almost absent (S) *Hygrophorus hedrychii*
With *Quercus*. Cap 20–80 mm wide; stem 5–15 mm thick; smell strong and unpleasant; spores 5.5–7 (–9) × 3–4.5 μm; scattered *Hygrophorus cossus*





10. Fruitbodies ± orange-brown (→ ) with KOH and partly so also with old age; gills blackish brown on drying; spores 7–9 × 5–6 µm. Cap 20–100 mm wide; stem 5–10 mm thick; on calcareous soil; common *Hygrophorus discoxanthus*
Fruitbodies not orange-brown with KOH and in old age; stem base brownish with KOH; gills not blackish brown upon drying; spores (6.5–) 7–9 (–9.5) × (4–) 4.5–5 µm. Cap 20–70 mm wide; stem 5–10 mm thick; common, especially with naturally occurring *Fagus* *Hygrophorus eburneus*
11. Cap ± pink () fleshy species with 7–25 mm thick stems 12
Cap with other colours; gracile or fleshy species 16
12. With deciduous trees, mostly *Quercus* 13
With coniferous trees 14
13. Stem 15–25 mm thick, ± pink, usually with darker spots. Cap 50–120 mm wide; taste mild; smell insignificant; spores 7–8 (–9) × 4–5 (–6) µm; with *Quercus* and sometimes other deciduous trees on calcareous soil; rare (N), scattered (S) *Hygrophorus russula*
Stem 5–15 mm thick, whitish to pale buff see *Hygrophorus nemoreus*, cpl. 23
14. With a threadlike universal veil, which is left as a ring-zone on the stem. Cap 60–120 (–150) mm wide; stem 10–25 mm thick; taste almost or entirely mild; smell insignificant; spores 7.5–9.5 × 4.5–7 µm; with *Picea* and probably also *Pinus*; rare *Hygrophorus purpurascens*
Without a ring-zone on the stem 15
15. Taste bitter; flesh slightly yellowing (→ ) when bruised. Cap 40–150 mm wide; stem 10–22 mm thick; smell insignificant; spores 7–10.5 × 4–5.5 µm; in damp, calcareous forests with *Picea*; common towards N or at higher altitudes, scattered to absent further S *Hygrophorus erubescens*
Taste mild; flesh not yellowing. Cap 30–100 mm wide; stem 7–15 mm thick; smell insignificant; spores 7–9 × 5–6 µm; with *Picea*; scattered to absent in parts of the lowlands *Hygrophorus pudorinus*
16. Cap yellow, orange to brownish orange () at least in the cap centre 17
Cap greyish to brownish () 25
17. With coniferous trees 18
With deciduous trees 21
18. Cap ± yellow () with *Larix*. Cap 15–60 mm wide; stem 4–10 mm thick; smell and taste insignificant; spores 7–10 × 4–6 µm; rare to absent (N), scattered S (esp. at higher altitudes) *Hygrophorus lucorum*
Cap orange to brownish orange () with *Pinus* or *Picea* 19
19. Gills and stem in places yellow to orange () cap dark orange () with *Pinus*. Otherwise like main variety; rare *Hygrophorus hypothejus* var. *aurea*
Gills and stem whitish to pale buff () cap paler brownish orange to apricot orange () with *Picea* 20
20. Smell insignificant; spores 6–9 × 3–5 µm. Cap 30–60 mm wide; stem 3–10 mm thick; scattered (N) to rare or absent (S) *Hygrophorus discoideus*
With smell of marzipan; spores 10–14 × 5.5–7.5 µm. Cap 30–80 mm wide; stem 6–15 mm thick; scattered (N) to absent (S) *Hygrophorus secretanii*



21. With *Fagus* 22
With *Quercus*, *Corylus* and *Carpinus* 23
22. Stem 8–30 mm thick; smell sweetish fruity. Cap 50–150 (–200) mm wide, centre pale apricot orange; spores (6–) 7–8 × 4.5–5.5 µm; rare *Hygrophorus poetarum*
Stem 4–8 mm thick; smell insignificant. Cap 20–50 mm wide; stem 4–9 mm thick; spores 6.5–9 × 4–5 µm; scattered *Hygrophorus unicolor*
23. With *Quercus*; smell ± mealy. Cap 40–70 mm wide; stem 4–15 mm thick; spores 6–8 × 3.5–5 µm; scattered to rare *Hygrophorus nemoreus*⁶
With *Corylus* and *Carpinus*; smell insignificant 24
24. With *Corylus*. Cap 25–60 mm wide; stem 4–10 mm thick; spores 7.5–9.5 × 5–6 (–6.5) µm; scattered *Hygrophorus lindtneri*
With *Carpinus*. Cap 20–55 mm wide; stem 3–8 mm thick; spores 6–8 × 4–5 µm; rare or overlooked *Hygrophorus carpini*
25. With deciduous trees 26
With coniferous trees 28
26. Cap ash grey to dark bluish grey () see *Hygrophorus marzuolus*, cpl. 45
Cap brownish to pale mouse grey () 27
27. Stem 6–15 mm thick, typically with slimy girdles downwards; cap dark brown () slightly paler towards the margin; with *Quercus*. Cap 30–80 mm wide; spores 9–12 × 5–7 µm; rare to scattered *Hygrophorus glutinifer*
Stem 3.5–6.5 mm thick, slime coating not in girdles; cap towards the margin pale mouse grey () with *Fagus*, probably also with *Quercus*. Cap 20–50 mm wide; stem 3–7 mm thick; spores 8.5–12 × 5.5–7.5 (–8.5) µm; rare to scattered *Hygrophorus mesotephrus*
28. Smell marzipan- or hyacinth-like 29
Smell sweetish or insignificant 34
29. Smell hyacinth-like. Cap 20–100 mm wide; stem 6–15 mm thick; spores 8–11 × 4.5–6 µm; mostly with *Picea*; rare, mostly towards N or at higher altitudes *Hygrophorus hyacinthinus*
Smell marzipan-like 30
30. Cap pinkish buff to cinnamon-buff () see *Hygrophorus secretanii*, cpl. 20
Cap ± greyish () 31
31. Cap less than 8–20 (–25) mm wide; with *Picea*. Stem 2–7 mm thick; spores 9–11.5 × 5.5–7 µm; typically deep in moss close to fruitbodies of *Tricholoma inamoenum*; rare or overlooked, mainly Scandinavia *Hygrophorus exiguus*
Cap wider; with *Picea* or *Pinus* 32
32. Cap with dark grey to clay-buff () centre; with *Pinus*. Cap 40–100 mm wide; stem 10–18 mm thick; spores (8.5–) 9.5–10 (–11) × (5–) 5.5–6 (–6.5) µm; rare (N) or overlooked *Hygrophorus suaveolens*
Cap ash grey to pale greyish brown () without significantly darker centre; with *Picea* [Hygrophorus agathosmus s.l.] 33



6. There are two further species in the group: *Hygrophorus arbustivus* and a still undescribed twin. These should be slightly more delicate and slightly more rose coloured, but separation based on morphology appears to be problematic.



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