

Lactarius Pers.

ANNEMIEKE VERBEKEN & JAN VESTERHOLT

Fr with normally developed central stem and gills and crumbling texture with milky juice. Cap convex to plane, mostly with depressed centre, in many species becoming funnel-shaped, smooth, velvety or scaly, in some species with bearded margin, dry, greasy, sticky or slimy, in many species with conspicuous concentric zones. Gills adnate to decurrent. Stem mostly cylindrical, dry, viscid or slimy, pitted or smooth. Milk scarce to abundant, mostly white, in some species turning yellow, lilac, pink or greenish grey on exposure, in some species orange or wine red, and hyaline in one species, *L. helvus*. Smell indistinct, fruity, sweetish, spicy, fish-like or like *Pentamogium* bugs. Taste mild to bitter or acrid, the taste of the milk may differ from the taste of the flesh. Sp deposit white to cream or dark pinkish buff.

Sp globose to ellipsoid, ± hyaline, with amyloid ornamentation of low to high warts and ridges, which may be connected to form a zebra-like or reticulate pattern with open or closed meshes, with a differentiated plage, which may be partly amyloid. Macrocytidia with needle-like, guttulate or granular contents, mostly present as pleuro- and cheilocystidia and between the gills. Very thick-walled so-called lamprocystidia (fig. 83B) present in one species from the area, *L. volemus*. Thin-walled paracystidia without specific contents present on gill edge. Lactiferous hyphae present, and their extremities emerge through the hymenium, resembling cystidia, so-called pseudocystidia. Pileipellis an (ixo)cutis, an (ixo)trichoderm, an epithelium, a hyphoepithelium or a paraderm. Clamps absent.

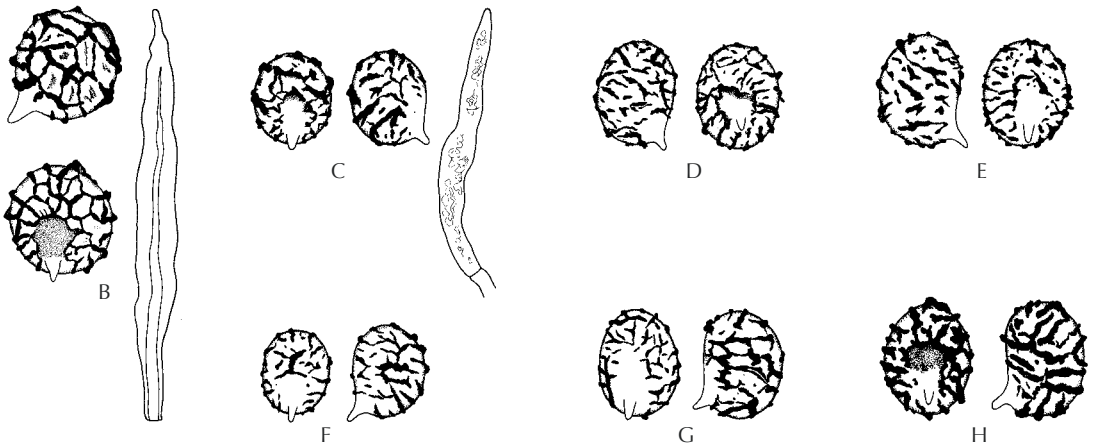
Ectomycorrhizal with trees and shrubs and found in nearly all types of forests, in dunes and in alpine habitats.

92 species in the Nordic countries. *Lactarius* species are often collected for eating, and especially orange and red milked species and *L. volemus* are considered as good. In Finland there is a long tradition of salting and consuming *L. trivialis* and other species with an acrid taste.

Lit.: Basso 1999, Bon 1980, Heilmann-Clausen et al. 1998, Korhonen 1984, Kytövuori 1984, Neuhoff 1956.

Main key

1. Milk orange to brownish red when exuded, rarely bluish or greenish in a zone right underneath the cuticle Key A p. 83
 - Milk watery, whitish or cream when exuded, but often changing colour after exposure 2
2. Milk turning lilac, violet or pink within a few minutes after exposure, at least in contact with the flesh or gills 3
 - Milk unchanged or turning yellow, greenish, greyish or brownish on exposure 4
3. Milk turning lilac or violet in contact with the flesh or gills Key B p. 85
 - Milk turning pink in contact with the flesh or gills Key C p. 88
4. Milk white, turning bright yellow on exposure Key D p. 90
 - Milk white, watery or cream, unchanged or turning greenish, greyish, brownish or pale yellow 5
5. Milk turning brownish, staining the gills and the flesh brown; smell fish-like; pleuromacrocytidia very thick-walled (fig. 83B). Cap 50-170 mm, convex to expanded, sometimes with slightly depressed centre, smooth or slightly wrinkled, sometimes cracked, dry, clay buff to orange brown; gills adnate to short decurrent, crowded, cream to warm buff; stem 50-100 x 15-30 mm, cylindrical, smooth, dry, slightly paler than cap; milk white, abundant, taste mild and pleasant. Sp 9-11 x 8.5-10.5 μm, globose to subglobose, ornamentation up to 0.5 μm high, or ridges forming a ± complete reticulum; lamprocystidia 65-90 x 8-10 μm, lanceolate. In deciduous and coniferous forests; summer to early autumn; rare in temp.-southern bore., in FI north to PS; DK (EN), FI (LC), NO (LC), SE (LC). – FNE 2:247, Korh 184-185, Phil 55e, R&H 575, Ves 440, ☉. – Edible and good.
L. volemus (Fr.: Fr.) Fr.



Spores and pleuromacrocytidia: B: *Lactarius volemus*, C: *L. sanguifluus*, D: *L. semisanguifluus*, E: *L. deterimus*, F: *L. fennoscandicus*, G: *L. deliciosus*, H: *L. quieticolor*.

- Milk not turning brownish; smell different or indistinct; pleuromacrocytidia ± thin-walled 6
- 6. Cap margin distinctly scaly, hairy or bearded, at least in young specimens [Key E p. 92](#)
- Cap margin velvety or smooth 7
- 7. Cap whitish [Key F p. 94](#)
- Cap distinctly coloured 8
- 8. Cap dry; pileipellis without a gelatinized layer; taste mild to acrid [Key I p. 101](#)
- Cap sticky to slimy; pileipellis an ixocutis or ixotrichoderm; taste of milk and flesh usually very acrid, rarely only slightly acrid after a while 9
- 9. Cap orange or yellow, typically zonate [Key G p. 95](#)
- Cap cream, greyish, brownish or reddish, zonate or azonate [Key H p. 97](#)

Key A: Milk orange to brownish red when exuded

1. Milk brownish red when exuded. Cap 40-80 mm, convex to expanded with depressed centre, smooth, viscid, dull ochraceous orange, zonate; gills short decurrent, medium spaced to crowded, pale vinaceous; stem 20-45 x 10-20 mm, cylindrical, smooth, dry, clay buff to pale vinaceous; smell faint; taste mild to slightly bitter. Sp 8-9.5 x 6.5-8 µm, broadly ellipsoid, ornamentation < 0.5 µm high, of warts and ridges forming an incomplete to almost complete reticulum (fig. 83C); pleuromacrocytidia 45-65 x 6-9 µm, ± fusiform. With *Pinus* on calcareous soil, thermophilous; summer to autumn; very rare in hemib.; SE (NT). – B&K 6:62, C&D 1549, Däh 952, FNE 2:147, SMT 28(2):33. – Edible and good.
L. sanguifluus (Paulet) Fr.
- Milk orange when exuded 2
2. Milk orange, but turning vinaceous red in 5-8 minutes; cap often partly or dominantly green, especially in older specimens. Cap 25-70 mm, convex to expanded with depressed centre, smooth, slightly viscid, partly ochraceous orange; gills short decurrent, medium spaced, pale orange; stem 30-50 x 8-16 mm, cylindrical, smooth, dry, clay pink to greenish; smell faint, carrot-like; taste slightly bitter. Sp 7.5-10 x 6-8 µm, broadly ellipsoid, ornamentation up to 0.5 µm high, of warts and ridges forming an incomplete reticulum (fig. 83D); pleuromacrocytidia 50-60 x 10-14 µm, ± clavate. With *Pinus*, mostly in grass on calcareous

soil, thermophilus; summer to autumn; very rare in hemib.; SE (vu). – B&K 6:65, C&D 1555, FE 7:289, 777, FNE 2:149, SMT 28(2):34. – Edible.

L. semisanguifluus R. Heim & Leclair

- Milk remaining orange for more than 10-15 minutes; cap not dominantly green, but green colours may be present, especially in bruised spots 3
- 3. Stem without obvious pits; with *Picea*; sp with isolated warts and short ridges, not reticulate 4
- Stem mostly pitted; with *Pinus*; sp with an incomplete reticulum 5
- 4. Cap typically azonate or with a few zones near the margin, with mainly bright orange colours and green tinges; stem unicoloured bright orange, but often with green tinges; cheilomacrocytidia mostly quite abundant. Cap 25-110 mm, convex to expanded with depressed centre, finally funnel-shaped, smooth, viscid; gills broadly adnate to decurrent, medium spaced to crowded, pale orange; stem 20-50 x 7-15 mm, cylindrical, smooth, dry; milk reddish orange; smell carrot-like; taste mild. Sp 8-11.5 x 6.5-8.5 μm , broadly ellipsoid to ellipsoid, ornamentation up to 0.5 μm high, of warts and ridges, not forming a reticulum (fig. 83E); pleuromacrocytidia 40-50 x 7-8 μm , \pm fusiform. With *Picea*, often in young stands; summer to autumn; very common in temp.-bore., rare, but locally occasional in suba.; DK (LC), FI (LC), IS, NO (LC), SE (LC). – FNE 2:151-153, Korh 107, 108 top, 110-111, Phil 64b, R&H 563, Ves 422, \odot . – Edible.

L. deterrimus Gröger

- Cap conspicuously zonate, with brownish orange, sometimes lilac-grey tinges; stem pallid to dull orange buff, rarely with indistinct pits; cheilomacrocytidia mostly rare. Cap 25-80 mm, convex to expanded with depressed centre, smooth, slightly viscid; gills decurrent, medium spaced, pale orange; stem 40-100 x 10-25 mm, cylindrical, dry; milk orange, turning greenish grey; smell faint or carrot-like; taste mild to bitter. Sp 7-9.5 x 5.5-7 μm , broadly ellipsoid, ornamentation < 0.5 μm high, of warts and ridges forming an incomplete reticulum (fig. 83F); pleuromacrocytidia 50-55 x 7-8 μm , \pm fusiform. With *Picea*; summer to autumn; occasional in bore.-arc./alp.; FI (LC), NO, SE. – FE 7:268, FNE 2:155, Korh 109 top (as *deterimus*), SMT 28(2):35. – Edible.

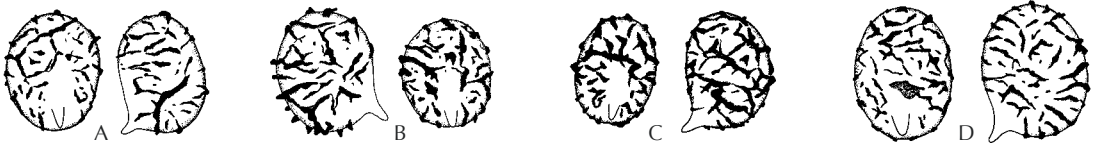
L. femoscandicus Verbeke & Vesterh.

- 5. Milk orange, remaining orange or turning red after > 30 minutes; cap bright orange; stem with orange pits; on neutral to calcareous soil; sp ornament not with very thick ridges (fig. 83G). Cap 40-110 mm, convex to expanded with depressed centre, smooth, viscid, zonate; gills short decurrent, medium spaced to crowded, pale orange; stem 30-65 x 15-30 mm, cylindrical, dry, salmon; smell carrot-like; taste mild. Sp 8-10.5 x 6.5-8 μm , broadly ellipsoid to ellipsoid, ornamentation up to 0.5 μm high, forming an almost complete reticulum; pleuromacrocytidia 45-50 x 7-9 μm , \pm fusiform. With *Pinus* on sandy soil; summer to autumn; common in temp.-hemib., occasional in bore.-suba.; DK (LC), FI (LC), NO (LC), SE (LC), \odot . – FNE 2:141, Korh 112-113, Phil 64c, R&H 563, Ves 423. – Edible and good.

L. deliciosus (L.: Fr.) Gray

- Milk orange, turning red in about 20 minutes; cap orange to brownish or bluish, mostly dull coloured; stem without or only with inconspicuous pits; on acid soil; sp ornament with thick ridges (fig. 83H). Cap 25-110 mm, convex to expanded with depressed centre, smooth, soon dry, mostly zonate; gills decurrent, medium spaced, pale orange; stem 20-60 x 10-25 mm, cylindrical, dry, salmon to greyish; smell faint; taste mild or becoming slightly bitter. Sp 8-10.5 x 6.5-8.5 μm , broadly ellipsoid to ellipsoid, ornamentation up to 0.5 μm high, forming an incomplete to almost complete reticulum; pleuromacrocytidia 25-30 x 5-8 μm , \pm fusiform. With *Pinus* on rather acid soil; summer to autumn; common in temp., occasional in hemib.-bore., in FI north to PS; DK (LC), FI (LC), FO, NO (LC), SE (LC). – FNE 2:143,145, Korh 114, Phil 66c, 67d, Svp 27:14, Ves 423, \odot . – Edible.

L. quieticolor Romagn. (*L. hemicyaneus* Romagn.)



Spores: A: *Lactarius dryadophilus*, B: *L. repraesentaneus*, C: *L. salicis-herbaceae*, D: *L. salicis-reticulatae*.

Key B: Milk turning lilac or violet after exposure

- 1. Cap margin hairy 2
- Cap margin smooth or at most velvety in young frb 3
- 2. Cap whitish to cream or warm buff, with up to 2 mm long hairs at margin; stem 20-40 x 15-25 mm, often curved, finely pitted, especially at base; in arc./alp. on calcareous soil with *Dryas* or *Salix*. Cap 30-100 mm, convex to expanded with depressed centre, viscid; gills adnate, crowded, pale cream; stem smooth, dry, whitish to pale cream; milk white, turning lilac in contact with the flesh; smell fruity, sweetish; taste aromatic to slightly acrid. Sp 9.5-12 x 7-9 μm, broadly ellipsoid to ellipsoid, ornamentation up to 0.3 μm high, of aligned ridges not forming a reticulum (fig. 85A); pleuromacrocystidia 80-120 x 10-15 μm, ± fusiform. Summer to autumn; rare in suba.-arc./alp.; FI (NT), IS (Mi, Na), NO (LC, incl. SvB), SE (LC). – B&K 6:19, C&D 1559, FNE 2:103, Korh 120, R&H 559, ☉.

L. dryadophilus Kühner

- Cap with bright yellow colours, with abundant hairs and scales, almost to centre; stem 40-125 x 12-30 mm, straight, distinctly pitted; mainly in wet forests with *Picea* and *Betula*, but also in arc./alp. with *Betula nana*. Cap 30-160 mm, convex to expanded with depressed centre, viscid to slimy; gills broadly adnate to short decurrent, crowded, cream; stem viscid to slimy, pale chrome to warm buff; milk white, turning lilac in contact with the flesh; smell hyacinth-like; taste hyacinth-like, then bitter. Sp 8.5-10.5 x 7-9 μm, broadly ellipsoid to ellipsoid, ornamentation < 1 μm high, of rounded warts and ridges forming an incomplete reticulum (fig. 85B); pleuromacrocystidia 80-110 x 10-12 μm, ± fusiform. Summer to autumn; common in hemib.-suba., very rare in temp.; DK (vU), FI (LC), IS (Ve: Sauraskógur), NO (LC), SE (LC). – B&K 6:54, Däh 940, FNE 2:105, Korh 120-122, R&H 558.

L. repraesentaneus Britzelm.

- 3. Cap dominantly with yellowish tinges 4
- Cap dominantly with violet to brownish-greyish tinges, rarely whitish 8
- 4. With dwarf *Salix* or *Betula nana*, mainly in arc./alp.; cap 10-50 mm 5
- With deciduous trees in temp.-suba.; cap often larger 6
- 5. Cap 10-30 mm, cream to buff yellow, sometimes ochraceous at the centre, hardly with crenulate margin; sp ornamentation almost reticulate. Cap convex to expanded with depressed centre, smooth, viscid to slimy, azonate; gills adnate, medium spaced, pale cream; stem 10-25 x 2-8 mm, cylindrical, smooth, dry, whitish to pale cream; milk white, turning lilac in contact with the flesh; smell indistinct; taste mild to slightly acrid. Sp 8.5-11.5 x 6.5-8.5 μm, broadly ellipsoid to ellipsoid, ornamentation < 0.3 μm high, of warts and ridges (fig. 85C); pleuromacrocystidia 55-80 x 8-11 μm, ± fusiform. With dwarf *Salix*; summer to autumn; occasional in suba.-arc./alp.; FI (LC), IS, NO (LC), SE (LC). – B&K 6:59, C&D 1560, FE 7:244, FNE 2:101, Korh 126.

L. salicis-herbaceae Kühner

- Cap 20-50 mm, pale cream to buff yellow, sometimes with crenulate margin; sp ornamentation not reticulate. Cap convex to expanded with depressed centre, smooth, viscid to slimy, azonate or indistinctly zonate; gills broadly adnate, medium spaced to crowded, cream; stem 20-30 x 5-10 mm, cylindrical, smooth, viscid, pale cream; milk white, turning

lilac in contact with the flesh; smell fruity; taste mild. Sp 9.5-11.5 × 6.5-8.5 μm, subglobose to broadly ellipsoid, ornamentation < 0.3 μm high, of irregular warts and ridges (fig. 85D); pleuromacrocystidia 80-115 × 10-12 μm, ± fusiform. With dwarf *Salix* or *Betula nana*, calciphilous; summer to autumn; occasional in arc./alp., rare in bore.-suba.; FI (NT), NO (LC), SE (LC). – B&K 6:60, FE 7:249, FNE 2:99, Korh 126-127.

L. salicis-reticulatae Kühner

6. On calcareous soil in deciduous forests; cap ± zonate with brownish spots; milk turning brownish violet to dark violet on the flesh; taste acrid. Cap 55-90 mm, convex to expanded with depressed centre, smooth, viscid, yellowish cream to cream yellow; gills broadly adnate, crowded, cream; stem 40-60 × 10-20 mm, cylindrical, smooth, dry, cream; milk white; smell faint, fruity. Sp 8.5-11.5 × 6.5-8.5 μm, broadly ellipsoid to ellipsoid, ornamentation up to 1 μm high, of aligned, mostly acute warts and ridges, not forming a reticulum (fig. 87A); pleuromacrocystidia 40-80 × 7-13 μm, ± fusiform. With *Carpinus*, *Quercus*, *Fagus*, etc.; late summer to autumn; very rare in temp.-hemib., one record from NO (Hord: Bergen) and two in DK (Lol: Ny Kirstinebjerg Storskov, Ejyl: Trelde Østerskov); DK (CR), NO, SE (NT, presumably interpreted in a wide sense). – B&K 6:21, Däh 939, FE 7:233, 775, FNE 2:93, Korh 124.

L. flavidus Boud.

- In *Salix* or *Betula* stands; cap zonate or azonate; milk turning pale violet; taste mild to bitter 7
7. With *Salix* in bogs and forest edges; cap 10-70 mm broad, viscid to sticky when young, later almost dry, straw yellow to pale cream; stem solid. Cap convex to expanded with slightly depressed centre, smooth; gills broadly adnate to decurrent, crowded, cream; stem 10-65 × 5-17 mm, cylindrical to clavate, smooth, viscid, pale straw to pale cream; milk white, turning lilac in contact with the flesh; smell faint, fruity; taste mild, becoming bitter. Sp 6.5-9.5 × 5.5-8 μm, subglobose to ellipsoid, ornamentation up to 0.5 μm high, of ridges forming a ± complete reticulum (fig. 87B); pleuromacrocystidia 40-65 × 6-10 μm, ± fusiform. Summer to autumn; occasional in temp.-arc./alp., but common in FI; DK (LC), FI (LC), NO (LC), SE (LC). – FE 7:225, 817, FNE 2:97, Korh 124, R&H 559, Ves 427, ☉.

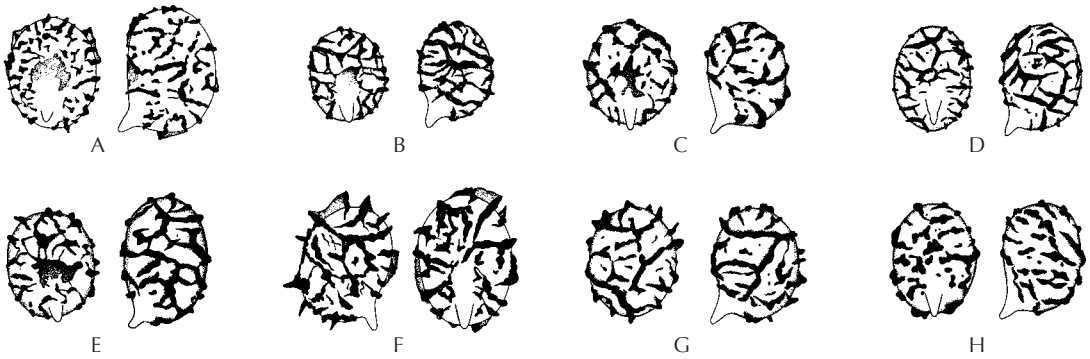
L. aspideus (Fr.: Fr.) Fr.

- In calcareous, ± swampy forests with *Betula*; cap 40-130 mm broad, very viscid and slimy, covered with a thick slime layer, whitish chrome to buff yellow; stem hollow. Cap convex to expanded with depressed centre, becoming funnel-shaped, smooth, ± zonate; gills broadly adnate to short decurrent, crowded, cream; stem 50-120 × 8-25 mm, cylindrical, smooth to finely pitted, slightly viscid, whitish chrome to honey-coloured; milk white, turning lilac in contact with the flesh; smell fruity; taste turning very bitter. Sp 7.5-10 × 6-8 μm, subglobose to ellipsoid, ornamentation up to 0.5 μm high, of warts and ridges forming an incomplete reticulum (fig. 87C); pleuromacrocystidia 60-100 × 10-13 μm, ± fusiform. Late summer to autumn; rare but locally occasional in bore.-suba.; FI (DD), SE. – FNE 2:95, Korh 125.

L. flavopalustris Kytöv. in press (*L. flavidus* Boud. s. auct. p.p.)

8. With dwarf *Salix* in suba.-arc./alp.; cap 10-50 mm broad 9
- In deciduous or coniferous forests in temp.-hemib.; cap often larger 10
9. Cap greyish buff to clay buff; gills pale cream to buff; smell insignificant; taste mild to slightly bitter; sp on av ≤ 9.5 × 7.5 μm, densely reticulate (fig. 87D). Cap 15-35 mm, convex to expanded with depressed centre, smooth, slightly viscid, azonate or indistinctly zonate; gills broadly adnate to short decurrent, medium spaced; stem 25-35 × 3-8 mm, cylindrical, smooth, dry, whitish to cream; milk white, turning lilac in contact with the flesh; smell indistinct; taste turning slightly bitter. Sp 8-10.5 × 6.5-8.5 μm, broadly ellipsoid to ellipsoid, ornamentation up to 0.3 μm high, of rounded warts and ridges; pleuromacrocystidia 60-90 × 8-10 μm, ± subfusiform. With dwarf *Salix*; summer to autumn; occasional or locally common in suba.-arc./alp.; FI (DD), FO, IS, NO (LC, incl. SvB), SE (LC). – Bor 89, FE 7:201, 205, 773, FNE 2:89.

L. pseudovidus Kühner



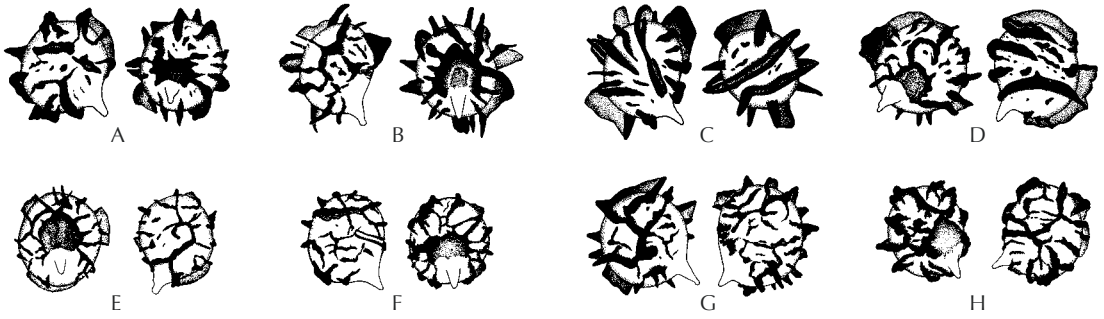
Spores: A: *Lactarius flavidus*, B: *L. aspideus*, C: *L. flavopalustris*, D: *L. pseudouvidus*, E: *L. brunneoviolaceus*, F: *L. violascens*, G: *L. luridus*, H: *L. uvidus*.

- Cap brownish vinaceous, vinaceous grey or dark vinaceous; gills white to pale cream; smell and taste like cedar-oil; sp on av $\geq 9.5 \times 7.5 \mu\text{m}$, incompletely reticulate, with higher and irregular warts (fig. 87E). Cap 20-45 mm, convex to expanded, smooth, viscid, often \pm zonate; gills adnate to decurrent, medium spaced; stem 10-35 \times 4-16 mm, cylindrical, smooth, dry, whitish; milk white, turning lilac in contact with the flesh. Sp 9-12 \times 6.5-8.5 μm , broadly ellipsoid to ellipsoid, ornamentation up to 0.5(-1) μm high, of warts and ridges; pleuromacrocystidia 40-80 \times 8-10 μm , \pm fusiform. With dwarf *Salix*; summer to autumn; occasional in suba.-arc./alp.; FI (DD), FO, IS, NO (NE, incl. Sv), SE. – B&K 6:11, FE 7:204, 205, 773, FNE 2:91, RdM 38:78, Sieniop 37.
L. brunneoviolaceus M.P. Christ. (*L. robertianus* Bon)
- 10. Cap dark brownish violet, with \pm distinct concentric circles of pits and spots near margin, hardly viscid, soon pruinose; flesh turning dark violet to brownish violet; stem not or hardly hollow; sp with acute, up to 1.5 μm high ridges. Cap 40-150 mm, convex to expanded with depressed centre, smooth; gills broadly adnate to decurrent, crowded, cream; stem 30-60 \times 12-25 mm, \pm cylindrical, smooth, dry, whitish to greyish buff; milk white; smell faint, fruity; taste mild to slightly bitter. Sp 7.5-11.5 \times 6.5-8.5 μm , subglobose to broadly ellipsoid, ornamentation forming an incomplete reticulum (fig. 87F); pleuromacrocystidia 45-80 \times 8-13 μm , fusiform. In deciduous forests on calcareous soil with *Quercus*, *Carpinus*, *Betula*, etc.; autumn; rare in hemib.-southern bore., very rare in temp.; DK (EN), FI (NT), NO (LC), SE. – C&D 1564, FE 7:217, 816, FNE 2:87, Jordst 17(2):9.
L. violascens (J. Otto : Fr.) Fr.
- Cap greyish brown to pale brown with pale violet tinge or pinkish grey with lilac and buff tinges, azonate or slightly zonate, slightly sticky or glutinous; flesh not turning brownish violet; stem soon hollow; sp ornamentation up to 1 μm high 11
- 11. Cap greyish brown to pale brown with pale violet tinge, slightly zonate with watery or darker greyish brown to reddish brown spots, hardly viscid; flesh pale violet to greyish violet when bruised; sp with acute warts and ridges forming a rather complete reticulum (fig. 87G); in (dry) deciduous forests with *Quercus*, *Carpinus*, etc. on calcareous soil. Cap 20-75 mm, convex to expanded with depressed centre, smooth; gills adnate to short decurrent, crowded, cream; stem 20-70 \times 7-20 mm, cylindrical, smooth, dry, whitish to pale greyish; milk white, turning lilac in contact with the flesh; smell faint, fruity; taste rancid to bitter. Sp 8-11.5 \times 6.5-9.5 μm , subglobose to broadly ellipsoid, ornamentation up to 1 μm high; pleuromacrocystidia 60-100 \times 9-11 μm , \pm fusiform. Autumn; rare in hemib., very rare in temp.; DK (DD), NO (NT). – B&K 6:37, C&D 1568, FE 7:196, 814, FNE 2:85, SMT 26(1):17.
L. luridus (Pers.: Fr.) Gray

- Cap pinkish grey with lilac and buff tinges, rarely whitish, distinctly viscid, not or hardly zonate; flesh pale violet to lilac when bruised; sp with rounded warts and ridges, forming an incomplete reticulum (fig. 87H); in wet habitats, especially with *Betula*, *Salix* or *Picea*. Cap 30-130 mm, convex to expanded with depressed centre, becoming funnel-shaped, smooth; gills broadly adnate to decurrent, crowded, cream; stem 20-105 x 8-25 mm, ± cylindrical, smooth, slightly viscid, whitish; milk white, turning lilac in contact with the flesh; smell faint, fruity; taste turning bitter to acrid. Sp 8.5-11.5 x 6.5-8.5 μm, broadly ellipsoid to ellipsoid, ornamentation < 1 μm high; pleuromacrocytidia 50-65 x 8-10 μm, fusiform. Late summer to autumn; common in hemib.-suba., rare in temp., occasional in IS; DK (EN), FI (LC), IS, NO (LC), SE (LC). – FNE 2:83, Korh 127-128, Phil 52b, R&H 569, Ves 426, ☉.
L. uvidus (Fr.: Fr.) Fr.

Key C: Milk turning pink in contact with the flesh or gills

1. Milk white, quickly turning pink, also when isolated from the flesh; cap ± viscid; pileipellis covered by a thick slime-layer. Cap 35-80 mm, convex to expanded with depressed centre, smooth, mottled whitish and clay buff; gills adnate to short decurrent, crowded, cream to buff yellow; stem 20-70 x 8-25 mm, ± cylindrical, smooth, dry, whitish; smell chemical; taste becoming acrid. Sp 7-9.5 x 6.5-8.5 μm, subglobose, ornamentation up to 1.5 μm high, of ridges and irregular warts forming an incomplete reticulum (fig. 89A); pleuromacrocytidia absent. With *Fagus* on calcareous soil; summer to autumn; occasional in temp.-hemib.; DK (NT), NO (NT), SE (NT). – B&K 6:2, C&D 1600, FE 7:643, FNE 2:229, Ves 424, ☉.
L. acris (Bolton: Fr.) Gray
 - Milk white, unchanging when isolated from the flesh; cap dry; pileipellis not covered by a thick slime-layer 2
 - 2. Sp with wing-like ridges, up to 2(-3) μm high, forming a zebra-like or reticulate pattern (figs 89B-D); under *Carpinus* or *Fagus* on rich soil 3
 - Sp with ridges to 1(-1.5) μm high, forming a reticulate or spiny pattern (figs 89E-H); with deciduous trees or conifers on rich or poor soil 5
 - 3. Cap dark brown to blackish brown; sp with a reticulate, not zebra-like pattern (fig. 89B). Cap 55-110 mm, convex to expanded with depressed centre, radially rugulose-venose, often with crenulate margin, dry; gills adnate to short decurrent, medium spaced to distant, cream to warm buff; stem 50-85 x 10-25 mm, cylindrical, smooth, dry, clay buff to olive brown; milk white, turning pinkish in contact with the flesh; smell faint; taste mild to slightly bitter. Sp 7.5-10 x 6.5-8.5 μm, subglobose, ornamentation up to 2(-2.5) μm high, of ridges and irregular warts; pleuromacrocytidia absent. With *Fagus* on calcareous soil; summer to autumn; occasional in temp.-hemib.; DK (LC), NO (NT), SE (Sk). – FE 7:679 (as *ruginosus*), FNE 2:235, Mic Due 572, Ves 424, ☉.
L. romagnesii Bon
 - Cap yellowish to greyish brown; sp with a zebra-like pattern (fig. 89C-D), not or weakly reticulate 4
 - 4. Cap café-au-lait, often with paler ochraceous parts, often ± radially wrinkled with age, sometimes to margin, margin not crenulate; gills crowded to very crowded; sp subglobose to ellipsoid, with a few, up to 1 μm broad and up to 2.5(-3) μm high ridges forming a zebra-like pattern (fig. 89C). Cap 40-85 mm, convex to expanded with depressed centre, dry; gills short decurrent, warm buff to pinkish buff; stem 25-70 x 10-15 mm, often tapering downwards, smooth, dry, pale pinkish buff; milk white, turning pinkish in contact with the flesh; smell musty; taste mild. Sp 7-8.5 x 6-8 μm; pleuromacrocytidia absent. With *Fagus* and *Carpinus* on rich or calcareous soil; summer to autumn; common in temp., rare in hemib.; DK (LC), NO (VU), SE (LC). – C&D 1598, FE 7:671, 800, FNE 2:231-233, Phil 61d, Ves 425, ☉.
L. pterosporus Romagn.



Spores: A: *Lactarius acris*, B: *L. romagnesii*, C: *L. pterosporus*, D: *L. ruginosus*, E: *L. azonites* f. *azonites*, F: *L. fuliginosus*, G: *L. lignyotus*, H: *L. picinus*.

- Cap uniformly greyish brown, mostly without ochraceous parts, not wrinkled, margin usually crenulate; gills medium spaced; sp globose to subglobose, with numerous narrow, up to 2 μm high ridges, not forming a zebra-like pattern (fig. 89D). Cap 40-80 mm, convex to expanded with depressed centre, dry; gills adnate, cream to pinkish buff; stem 35-45 x 10-16 mm, cylindrical, smooth, dry, paler than cap; milk white, turning pinkish in contact with the flesh; smell musty; taste acrid. Sp 6.5-9 x 6-8 μm ; pleuromacrocytidia absent. With *Fagus* and *Carpinus* on rich and calcareous soil; summer to autumn; occasional in temp.; DK (LC), SE (NA). – C&D 1599, FNE 2:237, Mic Due 574.

L. ruginosus Romagn.

- 5. With deciduous trees 6
- With conifers 7

- 6. Stem whitish; gills often irregular and anastomosing near the stem; flesh quickly and intensively reddening when cut or bruised; pileipellis a trichopalisade with terminal elements which are often capitate and rarely curved upwards; with *Quercus* on calcareous soil. Cap 45-70 mm, convex to expanded with depressed centre, often irregular, smooth, dry, pale ochraceous to greyish brown, often with paler spots; gills adnate, medium spaced, whitish to pinkish buff; stem 30-50 x 10-15 mm, cylindrical or tapering downwards, smooth, dry; milk white, turning pinkish in contact with the flesh; smell fruity; taste mild. Sp 7.5-9.5 x 7-8.5 μm , globose to subglobose, ornamentation up to 1(-1.5) μm high, of narrow ridges and irregular warts forming a partial reticulum (fig. 89E); pleuromacrocytidia absent. In parks and forests; summer to autumn; rare in temp.-hemib.; DK (VU), FI (LC), NO (VU), SE (LC). – FNE 2:239, 241, Korh 183, Phil 60c, R&H 565, Ves 425.

L. azonites (Bull.) Fr. f. *azonites*

f. *virgineus* (J.E. Lange) Verbeken differs in having a whitish cap; DK, NO (Vestf: Nøtterøy).

– FE 7:651, 800, FNE 2:240.

- Stem pale to dark brown; gills not anastomosing; flesh less intensively reddening when cut or bruised; pileipellis a palisade with a thick layer of rounded cells and fewer terminal elements which are regularly cylindrical; with deciduous or coniferous trees on rich soil. Cap 45-125 mm, convex to expanded with depressed centre, mostly regular, smooth, dry, rather uniformly pale greyish brown, ochraceous to fawn; gills adnate to short decurrent, medium spaced to crowded, cream, then pinkish buff to honey-coloured; stem 40-85 x 10-20 mm, cylindrical, smooth, dry; milk white, turning pinkish in contact with the flesh; smell insignificant; taste mild to slightly acrid. Sp 7.5-9 x 6.5-8.5 μm , globose to subglobose, ornamentation about 1 μm high, of ridges forming a \pm complete reticulum (fig. 89F); pleuromacrocytidia absent. Late summer to autumn; common in hemib.-suba., very rare in temp.; DK (DD), FI (LC), NO (LC), SE (LC). – FE 7:655, 825, 816, FNE 2:245, Korh 182, Phil 60a, R&H 564.

L. fuliginosus (Fr.: Fr.) Fr.

7. Cap with a papilla, very dark brown to almost blackish brown, contrasting with the white and decurrent gills; sp on av > 9 μm long; ornamentation with a clearly spiny aspect, not completely reticulate (fig. 89G). Cap 25-110 mm, convex to expanded with depressed centre, becoming funnel-shaped, smooth to radially wrinkled, dry; gills medium spaced; stem 35-100 x 5-12 mm, cylindrical, smooth or wrinkled, dry, concolorous with cap; milk white, turning pinkish in contact with the flesh; smell agreeable; taste mild and very agreeable. Sp 8.5-10 x 7.5-9 μm , globose to subglobose, ornamentation up to 1.5 μm high; pleuromacro-cystidia absent. In *Picea* forests; late summer to autumn; common in hemib.-southern bore., occasional in middle bore., very rare in temp.; DK (VU), FI (LC), NO (LC), SE (LC). – B&K 6:35, FE 7:659, 799, FNE 2:227, Korh 181-182, R&H 564, ☉.

L. lignyotus Fr.

- Cap without a papilla, paler or gills not decurrent; sp on av < 8.5 μm long, ornamentation reticulate 8
8. Cap dark brown to blackish brown, velvety; gills whitish, remaining so for rather long time; sp with broad ridges with a moniliform aspect, as if formed of rounded warts and small meshes (fig. 89H). Cap 40-90 mm, convex to expanded with slightly depressed centre, smooth, dry; gills broadly adnate to short decurrent, crowded; stem 45-70 x 11-20 mm, cylindrical or broadest at top, smooth, dry, clay buff to greyish brown; milk white, turning pinkish in contact with the flesh; smell dust-like; taste mild, becoming bitter. Sp 6-9 x 5.5-8 μm , globose to broadly ellipsoid, ornamentation up to 1(-1.5) μm high; pleuromacro-cystidia absent. In *Picea* forests; late summer to autumn; occasional in hemib.-bore., very rare in suba.; IS (Ve: Hafnarskógur), NO (LC), SE (LC). – B&K 6:45, C&D 1604, Däh 946, FE 7:667, FNE 2:243.
- L. picinus* Fr.
- Cap pale greyish brown, ochraceous to fawn, not velvety; gills cream, soon turning pinkish buff to honey-coloured; sp with rather narrow ridges and large meshes (fig. 89F) see *L. fuliginosus* 6

Key D: Milk turning bright yellow on exposure

1. Cap margin smooth 2
 - Cap margin velvety, hairy or bearded 3
2. Cap zonate. Cap 25-90 mm, convex to expanded with depressed centre, dry, ochraceous to salmon, zonate; gills broadly adnate to short decurrent, crowded, cream to pale pinkish buff; stem 25-50 x 6-20 mm, cylindrical, smooth, dry, whitish; milk white, turning lemon yellow; smell faint, fruity; taste becoming bitter to acrid. Sp 5.5-9 x 5-7 μm , broadly ellipsoid, ornamentation up to 1 μm high, of aligned warts and ridges connected to form an incomplete reticulum (fig. 91A); pleuromacro-cystidia 45-90 x 7-12 μm , \pm lanceolate. With *Quercus*, often on sandy soil; late summer to autumn; occasional in temp.-hemib.; DK (LC), NO (LC), SE (LC). – FNE 2:123, Korh 172, Phil 66b, R&H 562, Ves 426, ☉.
- L. chrysorrhoeus* Fr.
- Cap azonate see key I p. 101
3. Cap white or whitish; with various deciduous hosts or with *Pinus* 4
 - Cap vividly yellow, buff yellow, pale yellow or tinged olive; with *Picea* 6
4. Cap with long and slimy hairs at margin; sp on av < 5.5 μm broad. Cap 65-150 mm, convex to expanded with a deeply depressed centre, viscid to slimy, white to cream, with watery zones near margin; gills decurrent, crowded, cream, often with a pinkish hue; stem 20-80 x 17-50 mm, cylindrical, smooth or rough, not pitted, dry, whitish; milk white, turning lemon yellow; smell fruity-acidulous; taste adstringent to acrid. Sp 6-8.5 x 4-6 μm , ellipsoid, ornamentation about 0.5 μm high, of aligned warts and ridges connected to form an almost complete reticulum (fig. 91B); pleuromacro-cystidia 40-75 x 7-9 μm , \pm fusiform. Mostly with



Spores: A: *Lactarius chrysoorrhoeus*, B: *L. aquizonatus*, C: *L. citriolens*, D: *L. resimus*, E: *L. leonis*.

Betula, but also with *Pinus*, *Salix* and *Populus*; late summer to autumn; rare, but locally occasional in hemib.-bore., very rare in temp. and suba.; DK (EN), FI (LC), NO (NT), SE (LC). – FE 7:415, FNE 2:119, Korh 97-100, R&H 557, Ves 427.

L. aquizonatus Kytöv.

- Cap margin with dry hairs; sp on av > 5.5 µm broad 5
- 5. Cap conspicuously hairy at margin, somewhat zonate in outer part, whitish chrome to pale cream; in rich, calcareous deciduous forests with *Betula*, *Corylus*, *Quercus*, etc. Cap 60-140 mm, convex to expanded with depressed to umbilicate centre, viscid to slimy; gills broadly adnate to short decurrent, crowded, pale cream to whitish chrome; stem 45-60 x 20-30 mm, cylindrical with a widened base, smooth, not pitted, dry, pale cream, with hairy base; milk white, turning lemon yellow; smell fruity-acidulous; taste aromatic and bitter to acrid. Sp 6.5-9 x 4.5-6.5 µm, broadly ellipsoid to ellipsoid, ornamentation < 1 µm high, of aligned warts and ridges connected to form few meshes, but not a reticulum (fig. 91C); cystidia 45-60 x 8-11 µm, ± cylindrical, mainly found between the gills. Summer to autumn; rare in hemib.-bore., very rare in temp. and suba.; DK (NA, Brnh: Rønne Nordskov 1944), FI (LC), IS (Au, Na), NO (NT), SE (LC). – C&D 1518, FNE 2:121, Korh 95-96, Phil 66a, R&H 557.



L. citriolens Pouzar (*L. cilicioides* (Fr.) Fr. s. auct.)

- Cap pubescent towards margin, azonate, white; with *Betula* or *Pinus*, both in acid and calcareous sites. Cap 100-200 mm, convex to expanded with deeply depressed centre, viscid to slimy; gills decurrent, crowded, pale cream; stem 30-55 x 20-30 mm, cylindrical, smooth or slightly pitted, dry, whitish; milk white, turning lemon yellow; smell faint, fruity; taste becoming bitter to acrid. Sp 7-9.5 x 5.5-7 µm, broadly ellipsoid to ellipsoid, ornamentation < 1 µm high, of aligned warts and ridges connected to form an incomplete reticulum (fig. 91D); pleuromacrocystidia 40-70 x 7-9 µm, cylindrical to fusiform. Late summer to autumn; in FI occasional up to PeP, elsewhere rare in hemib.-bore., very rare in temp.; DK (NA, Brnh: Rønne Nordskov 1947), FI (LC), NO (NT), SE (LC). – B&K 6:55, FE 7:423, FNE 2:117, Korh 96-97, R&H 556.

L. resimus (Fr.: Fr.) Fr.

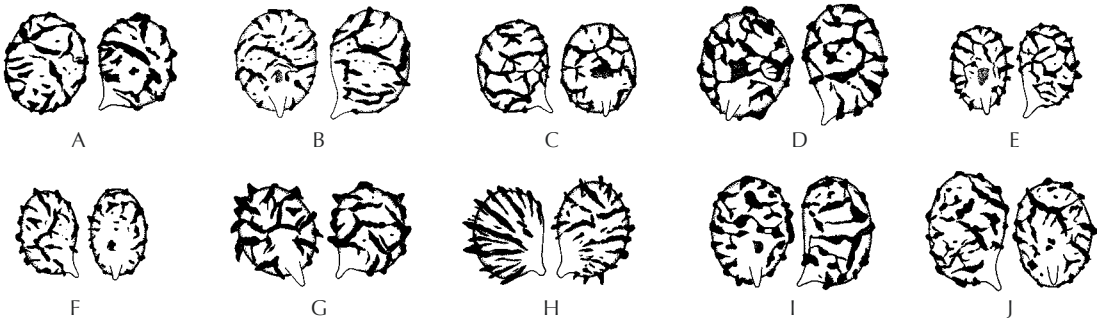
- 6. Stem distinctly pitted in full length; macrocystidia very scarce on the gills, but present between the gills 7
- Stem not pitted or only slightly so at the base; macrocystidia numerous to scarce on the gills 8
- 7. Cap pale chrome to lemon chrome or olivaceous buff, azonate or with indistinct, watery zones; sp reticulate with numerous closed meshes. Cap 50-150 mm, convex to expanded with depressed centre, finally funnel-shaped, pubescent towards margin, viscid; gills broadly adnate to decurrent, crowded, cream to whitish chrome; stem 40-80 x 15-35 mm, cylindrical or tapering downwards, dry, whitish with honey-coloured pits; milk white, turning lemon yellow; smell fruity; taste bitter to spicy. Sp 7-9 x 5.5-7 µm, broadly ellipsoid (fig. 91E), ornamentation up to 0.5 µm high, of aligned warts and ridges connected to form an almost complete reticulum; cystidia 65-100 x 6-12 µm, ± lanceolate, mainly found between the gills. In damp and calcareous *Picea* forests; summer to autumn; rare, but locally occasional in bore.; FI (LC), NO, SE (LC). – B&K 6:33, Bol Bres 41:167, 168, FE 7:435, FNE 2:109, Korh 88.

L. leonis Kytöv.

- Cap yellow to buff yellow, mostly with conspicuous zones; sp ornamentation not reticulate, closed meshes absent or rare. Cap 60-200 mm, convex to expanded with depressed centre, hairy towards margin, viscid; gills adnate to decurrent, crowded, cream to whitish chrome; stem 25-80 x 15-40 mm, cylindrical, dry, whitish with honey-coloured pits; milk white, turning lemon yellow; smell fruity-acidulous; taste bitter to acrid. Sp 7-10 x 5.5-7.5 μm , broadly ellipsoid, ornamentation up to 1 μm high, of aligned warts and ridges connected to form a \pm spirally pattern (fig. 93A). In *Picea* forests on \pm calcareous soil; summer to autumn; common in hemib.-suba., very rare in temp.; DK (EN), FI (LC), NO, SE (LC). – B&K 6:64, FE 7:446, 786, 820, FNE 2:107, Korh 86, R&H 558, .
- 8. Cap straw yellow with an olive tinge; pleuromacrocytidia 7-17 μm broad, mostly numerous. Cap 35-100 mm, convex to expanded with depressed centre, viscid, with appressed triangular scales, azonate; gills adnate to decurrent, medium spaced to crowded, cream to pale chrome; stem 30-60 x 12-20 mm, cylindrical, smooth or indistinctly pitted, dry, pale chrome; milk white, turning lemon yellow; smell fruity; taste becoming acrid. Sp 7.5-10 x 6-8 μm , broadly ellipsoid, ornamentation about 0.5 μm high, of aligned warts and ridges connected to form an incomplete reticulum (fig. 93B); pleuromacrocytidia 35-105 μm long, \pm lanceolate. In damp and \pm calcareous *Picea* forests; summer to autumn; rare in hemib.-bore.; FI (LC), NO, SE (NT). – FE 7:439, FNE 2:111, Korh 85.
L. olivinus Kytöv.
- Cap without olive tinges; pleuromacrocytidia 5-10 μm broad, scattered to rare 9
- 9. Cap 35-70 mm, deeply depressed to umbilicate, at margin with a fringe of hairs when young, without radiating ridges; sp on av < 6.5 μm broad. Cap viscid, often \pm zonate; gills decurrent, medium spaced to crowded, pale cream to whitish chrome; stem 40-65 x 10-18 mm, cylindrical, smooth or slightly pitted near base, dry, whitish chrome; milk white, turning lemon yellow; smell sweetish or fruity; taste bitter. Sp 6.5-9 x 5-6.5 μm , broadly ellipsoid to ellipsoid, ornamentation about 0.5 μm high, of aligned warts and ridges connected to form an almost complete reticulum (fig. 93C); pleuromacrocytidia 45-75 x 8-10 μm , \pm fusiform. In damp and \pm calcareous *Picea* forests; summer to autumn; rare in bore.; FI (LC), NO (NE), SE (LC). – FE 7:419, FNE 2:113, Korh 81.
L. auriolla Kytöv.
- Cap 45-160 mm, shallowly depressed, at margin hairy-scaly, often with radiating ridges; sp on av > 6.5 μm broad. Cap viscid, azonate; gills adnate to short decurrent, crowded, cream to whitish chrome; stem 40-130 x 15-35 mm, cylindrical, smooth, dry, whitish to pale chrome with scattered brownish spots; milk white, turning lemon yellow; smell fruity; taste bitter to acrid. Sp 7.5-10 x 6-7.5 μm , broadly ellipsoid, ornamentation up to 1 μm high, of aligned warts and ridges connected to form an almost complete reticulum (fig. 93D); pleuromacrocytidia 30-90 x 5-9 μm , \pm fusiform. In moist, *Picea* forests, both on acid and calcareous soil; summer to autumn; common in bore.-suba., but less common in NO, rare in hemib.; FI (LC), NO (LC), SE (LC). – B&K 6:74, FE 7:451, FNE 2:115, Korh 82-84, RdM 46:118, .
- L. tuomikoskii* Kytöv.

Key E: Milk white; cap margin distinctly scaly, hairy or bearded when young

1. Cap whitish to cream 2
- Cap clay buff, brick, salmon, dark pink or lilac 3
2. Stem 11-20 mm broad; with *Betula*, mostly in dry places, e.g. in parks, gardens and at road-sides. Cap 35-100 mm, convex to expanded with depressed centre, hairy in outer part, \pm smooth with age, dry, azonate; gills broadly adnate to decurrent, crowded, cream; stem 25-65 mm long, cylindrical, smooth, dry, cream; milk white; smell acidulous-fruity; taste very acrid. Sp 6-8.5 x 4-6 μm , broadly ellipsoid to ellipsoid, ornamentation up to 0.5 μm high, of



Spores: A: *Lactarius scrobiculatus*, B: *L. olivinus*, C: *L. auriolla*, D: *L. tuomikoskii*, E: *L. pubescens*, F: *L. scoticus*, G: *L. mairei*, H: *L. spinosulus*, I: *L. torminosulus*, J: *L. torminosus*.

ridges and warts, connected to form several closed meshes (fig. 93E); pleuromacrocytidia 30-60 x 7-10 μm , fusiform to lanceolate. Late summer to autumn; common in temp.-suba., occasional in arc./alp.; DK (LC), FI (LC), IS, NO (LC), SE (LC). – FE 7:383, FNE 2:161, Korh 72-73, Phil 50c, Ves 442, ☉.

L. pubescens (Schrad.) Fr.

- Stem 4-10 mm broad; with *Betula* in damp places, such as rich fens, springs and brooks. Cap 15-60 mm, convex to expanded with depressed centre, hairy in outer part, \pm smooth with age, dry, azonate; gills broadly adnate to decurrent, crowded, cream; stem 20-75 mm long, cylindrical, smooth, dry, cream; milk white; smell acidulous-fruity; taste very acrid. Sp 5.5-7.5 x 4.5-5.5 μm , broadly ellipsoid to ellipsoid, ornamentation up to 0.5 μm high, of ridges and warts, connected to form several closed meshes (fig. 93F); pleuromacrocytidia 40-60 x 7-10 μm , fusiform to lanceolate. Summer to autumn; common in FI, elsewhere occasional in temp.-suba.; DK (LC), FI (LC), IS, NO (LC), SE (LC). – B&K 6:63, FE 7:387, FNE 2:163, Korh 71-72, Ves 443.

L. scoticus Berk. & Broome

3. Cap pale clay buff; with *Quercus* on calcareous soil. Cap 25-120 mm, convex to expanded with depressed centre, bearded in outer part, dry, \pm zonate; gills broadly adnate to short decurrent, crowded, cream; stem 15-40 x 6-15 mm, cylindrical, smooth, dry, cream; milk white; smell fruity; taste becoming acrid. Sp 6-9 x 5-7 μm , broadly ellipsoid, ornamentation up to 1 μm high, of ridges and warts, connected to form few closed meshes (fig. 93G); pleuromacrocytidia 40-95 x 6-12 μm , lanceolate. Autumn; very rare in temp.; DK (CR, after 1980 only in Sj: Sorø Sønderkov), SE (VU). – FE 7:375, FNE 2:165, Jordst 16(1), Phil 51f, R&H 561, ☉.

L. mairei Malençon

- Cap brick to dark pink or lilac; mostly with *Betula* 4


4. Cap finely scaly to strigose hairy in outer part, rather thin-fleshed; sp ornamentation forming a zebra-like pattern (fig. 93H). Cap 20-70 mm, convex to expanded with depressed centre, dry, salmon to brick or lilac, \pm zonate; gills decurrent, medium spaced to crowded, cream to pinkish buff; stem 15-40 x 5-12 mm, cylindrical, smooth, dry, salmon to pale vinaceous; milk white; smell fruity; taste becoming bitter to acrid. Sp 6-8.5 x 5-6.5 μm , broadly ellipsoid, ornamentation about 1 μm high; pleuromacrocytidia 40-100 x 6-10 μm , fusiform. With deciduous trees, mainly *Betula*; summer to autumn; occasional, but locally common in hemib.-suba., very rare in temp.; DK (EN), FI (LC), IS, NO (LC), SE (LC). – FE 7:394, FNE 2:167, Korh 172, Phil 55g, R&H 572, ☉.

L. spinosulus Quél. & Le Bret.

- Cap hairy in outer part, thick-fleshed; sp ornamentation not forming a zebra-like pattern 5


5. Cap 15-50 mm, hairs at margin up to 5 mm long, disappearing with age. Cap convex to expanded with depressed centre, hairy near margin, dry, flesh pink to brick, \pm zonate; gills adnate to short decurrent, crowded, pale pinkish buff; stem 25-55 x 6-15 mm, cylindrical, smooth, dry, pale salmon to pinkish buff; milk white; smell acidulous-fruity; taste very acrid. Sp 7.5-10 x 5.5-7.5 μm , broadly ellipsoid to ellipsoid, ornamentation about 0.5 μm high, of warts and ridges connected to form some closed meshes (fig. 93I); pleuromacrocytidia 35-75 x 6-10 μm , fusiform to lanceolate. In mountain heaths, but also in lowland in spring places and bogs with *Betula nana*, rarely with *Betula pubescens*; summer to early autumn; common in suba.-arc. / alp.; FI (LC), IS, NO (LC), SE (LC). – Bor 87 (as *Lactarius* sp.), FNE 2:159, Korh 74 bottom (as *torminosus*).

L. torminosulus Knudsen & T. Borgen


- Cap 40-110 mm, hairs at margin up to 10 mm long, persisting. Cap convex to expanded with depressed centre, increasingly hairy towards margin, dry, flesh pink to brick, mostly zonate; gills adnate to decurrent, crowded, pale pinkish buff; stem 35-70 x 10-30 mm, cylindrical, smooth, dry, pale salmon to pinkish buff; milk white; smell acidulous-fruity; taste very acrid. Sp 7.5-9.5 x 5.5-7 μm , broadly ellipsoid to ellipsoid, ornamentation up to 0.5 μm high, of warts and ridges connected to form several closed meshes (fig. 93J); pleuromacrocytidia 50-70 x 6-10 μm , fusiform to lanceolate. With *Betula* in forests, parks, gardens, also in arctic habitats with *Betula nana*, often in damp habitats; summer to autumn; very common in temp.-arc. / alp.; DK (LC), FI (LC), IS, NO (LC, incl. Svb), SE (LC). – FNE 2:157, Korh 74 top, Phil 51e, R&H 562, Ves 442, .

L. torminosus (Schaeff.: Fr.) Pers.

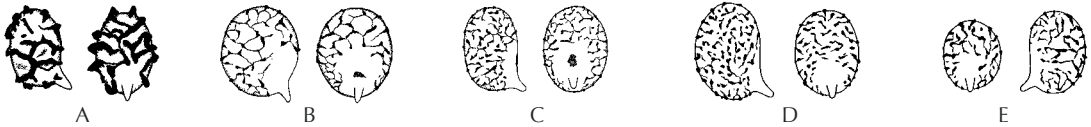
Key F: Milk white; cap whitish

1. Gills distinctly pinkish; cap with indistinct pinkish to reddish zones; with *Populus* and with *Salix* in dunes; pileipellis an ixocutis. Cap 80-300 mm, convex to expanded with depressed centre, viscid, often with adhering particles, whitish to pinkish; gills adnate to short decurrent, crowded; stem 25-50 x 15-30 mm, cylindrical, smooth, dry or slightly viscid, whitish; milk white; smell faint, acidulous; taste becoming very acrid. Sp 6-8.5 x 4-6 μm , ellipsoid, ornamentation up to 0.5 μm high, of ridges, connected to form a \pm complete reticulum (fig. 95A); pleuromacrocytidia 30-50 x 5-8 μm , cylindrical to fusiform. Summer to autumn; occasional in temp.-hemib., but rare in FI; DK (LC), FI (LC), NO (VU), SE (NE). – FNE 2:137, Korh 102, Phil 48a, R&H 565, Ves 431, .

L. controversus Pers.: Fr.

- Gills white to cream; cap white to cream, azonate; with *Fagus*, *Quercus*, *Betula* or conifers; pileipellis not an ixocutis 2
2. Cap velvety; gills medium spaced to crowded; pileipellis with terminal elements very long and thick-walled 3
- Cap smooth or wrinkled; gills very crowded; pileipellis with terminal elements rather short and thin-walled 4
3. Milk mild when isolated from the burning acrid flesh, unchanged with KOH; sp on av > 9 μm long; terminal elements of pileipellis with regularly thickened walls and a \pm swollen apex. Cap 50-300 mm, convex to expanded with depressed centre, becoming funnel-shaped, velvety, dry, whitish; gills decurrent, medium spaced to crowded, pale cream; stem 25-70 x 20-65 mm, cylindrical or tapering downwards, smooth, dry, whitish; milk white; smell indistinct. Sp 7.5-12 x 6.5-9.5 μm , broadly ellipsoid, ornamentation up to 0.2 μm high, of warts and narrow ridges, connected to form a \pm complete reticulum (fig. 95B); pleuromacrocytidia 50-85 x 6-12 μm , cylindrical to fusiform. In deciduous forests, less often in coniferous forests; late summer to late autumn; very common in temp.-hemib., but rare in FI; DK (LC), FI (NT), NO (LC), SE (LC). – FNE 2:253, Phil 48b, R&H 555, Svp 35:41, Ves 421, .

L. vellereus (Fr.: Fr.) Fr.

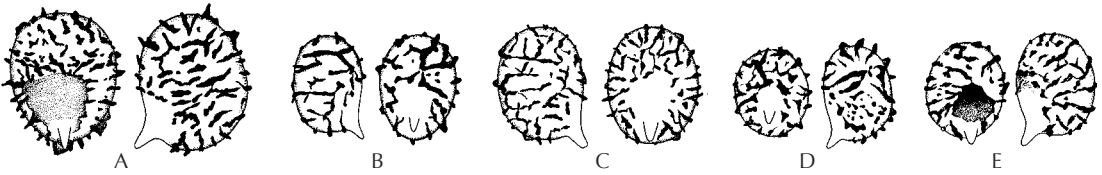


Spores: A: *Lactarius controversus*, B: *L. vellereus*, C: *L. bertillonii*, D: *L. glaucescens*, E: *L. piperatus*.

- Milk and flesh burning acrid; milk turning bright yellow with KOH; sp on av $\leq 9 \mu\text{m}$ long; terminal elements of pileipellis thin-walled towards the non-swollen apex. Cap 50-200 mm, convex to expanded with depressed centre, becoming funnel-shaped, velvety, dry, whitish; gills decurrent, medium spaced to crowded, pale cream; stem 30-80 x 20-60 mm, cylindrical or tapering downwards, smooth, dry, whitish; milk white; smell indistinct. Sp 7-10 x 5-7.5 μm , broadly ellipsoid, ornamentation up to 0.2 μm high, of partly connected narrow ridges, not forming a reticulum (fig. 95C); pleuromacrocytistidia 50-75 x 6-12 μm , clavate to subfusiform. In deciduous forests with *Fagus*, *Quercus* and *Betula*; summer to autumn; occasional, but locally common in hemib.-southern bore., rare in temp.; DK (LC), FI (LC), NO (NE), SE (LC). – FE 7:711, FNE 2:255, Korh 71, Svp 35:71, Ves 421.
L. bertillonii (Z. Schaef.) Bon (*L. vellereus* (Fr.: Fr.) Fr. var. *bertillonii* Z. Schaef.)
- 4. Milk white, drying greenish, turning yellow to orange with KOH; suprapellis 80-120 μm thick, hiding the underlying cellular layer in uperview. Cap 50-150 mm, convex to expanded with depressed centre, smooth or slightly wrinkled, dry, white to cream; gills decurrent, very crowded, very narrow, cream; stem 30-90 x 10-40 mm, cylindrical or tapering downwards, smooth, dry, whitish; smell indistinct; taste very acrid. Sp 6.5-9.5 x 5.5-7 μm , broadly ellipsoid, ornamentation up to 0.2 μm high, of isolated or aligned warts, not suggesting a reticulum (fig. 95D); pleuromacrocytistidia 60-90 x 7-10 μm , cylindrical. In deciduous forests on calcareous soil; summer to early autumn; rare in temp.-hemib.; DK (DD), FI (LC), NO (NE), SE (LC). – B&K 6:25, FE 7:727, 804, Jordst 8(1), FNE 2:251, Korh 68-69.
L. glaucescens Crossl. (*L. pergamenus* (Sw.: Fr.) Fr. s. Blum)
- Milk white, unchanged when drying and with KOH; suprapellis 10-30 μm thick, clearly showing the underlying cellular layer. Cap 40-120 mm, convex to expanded with depressed centre, smooth, dry, whitish; gills decurrent, very crowded, very narrow, cream; stem 40-95 x 12-30 mm, cylindrical or tapering downwards, smooth, dry, whitish; smell indistinct; taste very acrid. Sp 7-10.5 x 5-7.5 μm , broadly ellipsoid, ornamentation up to 0.2 μm high, of aligned warts forming an incomplete reticulum (fig. 95E); pleuromacrocytistidia 50-70 x 8-11 μm , cylindrical to subfusiform. In rich deciduous forests with *Fagus*, etc.; summer to early autumn; occasional in temp.-hemib., rare in southern bore.; DK (LC), FI (LC), NO (LC), SE (LC). – FNE 2:249, Korh 67,70, Phil 49c, R&H 556, Ves 422, ☉.
L. piperatus (L.: Fr.) Pers.

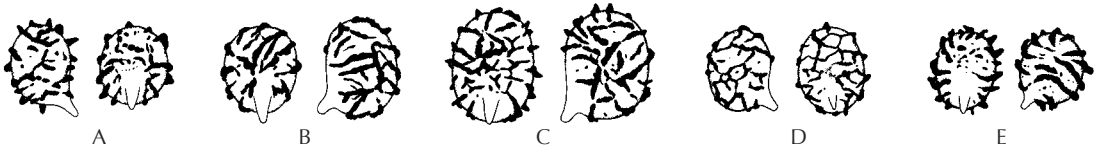
Key G: Milk white; cap sticky to slimy, orange or yellow, typically zonate

1. Basidia 2-spored; sp 9.5-14 x 8-11.5 μm (fig. 96A); gills often forked and anastomosing, especially near the stem; with *Quercus* on rich soil. Cap 35-120 mm, convex to expanded with depressed centre, often irregular, pale ochraceous, orange ochraceous or brownish orange, sometimes \pm zonate; gills adnate to short decurrent, pinkish buff; stem 14-55 x 8-20(-35) mm, cylindrical or tapering downwards, smooth or slightly pitted, dry, whitish to pale pinkish buff; milk white; smell agreeable, fruity, like apples; taste very acrid. Sp broadly ellipsoid, ornamentation up to 1 μm high, of aligned warts and ridges, not forming a reticulum; pleuromacrocytistidia 40-50 x 3-6 μm , fusiform. Summer to autumn; rare in temp.-hemib., only one record from FI (A: Mariehamn, Ytternäs); DK (EN), FI (CR), NO (EN), SE (NT). – FE 7:335, 779, FNE 2:125, Phil 58b, R&H 566 (as *insulsus*), Ves 433, ☉.
L. acerrimus Britzelm.



Spores: A: *Lactarius acerrimus*, B: *L. porninsis*, C: *L. zonarioides*, D: *L. zonarius*, E: *L. evosmus*.

- Basidia 4-spored, rarely mixed with some 2-spored; sp $\leq 10 \mu\text{m}$ long; gills not or slightly forked and anastomosing; with *Quercus* or other hosts 2
- 2. With *Larix*; milk mild; cap with bright, dominantly orange colours. Cap 30-130 mm, convex to expanded with depressed centre, smooth, viscid, zonate in outer part; gills adnate to short decurrent, crowded, pinkish buff; stem 20-90 x 7-25 mm, \pm cylindrical, smooth, dry, cream to pale pinkish buff; milk white; smell fruity; taste mild to bitter. Sp 6.5-9.5 x 5-7.5 μm , broadly ellipsoid to ellipsoid, ornamentation up to 0.5 μm high, of warts and ridges connected to form an incomplete reticulum (fig. 96B); pleuromacrocystidia 40-50 x 5-7 μm , subfusiform. Summer to autumn; very rare in temp.; DK (vu), SE (lc). – B&K 6:47, FE 7:355, FNE 2:135, RdM 46:121, Svp 29:37.
L. porninsis Rolland
- With *Picea*, *Abies* or deciduous trees; milk acrid; cap cream, pale yellowish, ochraceous or yellowish buff to salmon 3
- 3. With *Picea* or *Abies*; sp on av $> 8 \mu\text{m}$ long. Cap 30-130 mm, convex to plane with depressed centre, smooth, viscid to slimy, yellowish buff to salmon with darker zones; gills adnate to short decurrent, crowded, pinkish buff; stem 30-100 x 12-25 mm, cylindrical, smooth, dry, cream; milk white; smell fruity or like liqueur; taste very acrid. Sp 8-10 x 7-8.5 μm , broadly ellipsoid, ornamentation up to about 0.5 μm high, of aligned warts and ridges, not forming a reticulum (fig. 96C); pleuromacrocystidia 35-50 x 4-6 μm , fusiform. In herb rich forests; late summer to autumn; occasional in hemib.-bore.; FI (lc), NO (lc), SE (lc). – FNE 2:133, Korh 100-102, Nit 308, Phil 62c, R&H 566.
L. zonarioides Kühner & Romagn. (*L. bresadolanus* Singer nom. nud.)
- With deciduous trees; sp on av $< 8 \mu\text{m}$ long 4
- 4. Cap usually distinctly zonate all over, yellowish to reddish ochraceous, at margin somewhat velvety when young; smell insignificant or slightly sweet and fruity; flesh reddening after 10-20 min. or slower, later greyish; stem \pm pitted; with *Quercus*; pleuromacrocystidia larger than basidia. Cap 50-100 mm, convex to plane with depressed centre, viscid; gills \pm decurrent, crowded, white to cream; stem 25-55 x 10-25 mm, cylindrical, dry or slightly viscid, white to cream; milk white; taste very acrid. Sp 6.5-9 x 5-7.5 μm , broadly ellipsoid to ellipsoid, ornamentation $< 1 \mu\text{m}$ high, of warts and short ridges not forming a reticulum (fig. 96D); pleuromacrocystidia fusiform. On calcareous soil; late summer to autumn; very rare in temp.; DK (EJyl: Elbæk Skov). – B&K 6:82, FE 7:367, 782, FNE 2:131, Phil 58c, Svp 53:60.
L. zonarius (Bull.) Fr.
- Cap not remarkably zonate or only at margin, pale yellow to ochraceous cream when young, not velvety; smell strongly fruity like apples or *Russula fellea*; cap margin often whitish; flesh not reddening; stem not pitted; with *Salix*, *Populus* or *Quercus*; pleuromacrocystidia 25-35 x 4-6 μm , not larger than basidia. Cap 65-150 mm, convex to plane with depressed centre, viscid; gills \pm decurrent, crowded, white to cream; stem 20-55 x 15-25 mm, cylindrical, dry, white to cream; milk white; taste very acrid. Sp 6-9 x 5-7 μm , broadly ellipsoid to ellipsoid, ornamentation up to 0.5 μm high, of warts and ridges forming a zebra-like pattern (fig. 96E); pleuromacrocystidia fusiform. On calcareous soil, thermophilous; summer to




Spores: A: *Lactarius pallidus*, B: *L. musteus*, C: *L. albocarneus*, D: *L. necator*, E: *L. pyrogalus*.

autumn; rare in temp.-hemib., very rare in southern bore.; DK (NT), FI (NT), NO (NT), SE (LC). – B&K 6:20, FNE 2:127,129, Korh 101 (as *zonarius*), Phil 50b, Ves 433, ☉.


L. evosmus Kühner & Romagn.

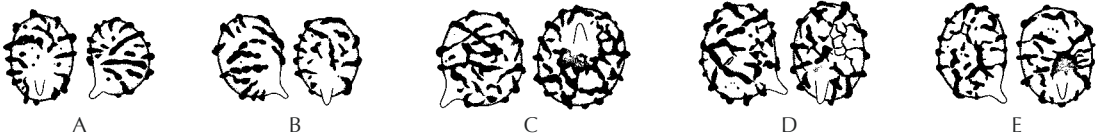
Key H: Milk white; cap sticky to slimy, cream, greyish, brownish or reddish

- 1. Cap whitish, cream or pale pinkish buff at least when young 2
 - Cap olivaceous, ochraceous, greyish, violaceous, buff or brown already when young 4
- 2. In *Fagus* forests, mostly on basic soil. Cap 35-100 mm, convex to expanded with depressed centre, smooth, slimy, cream, becoming pinkish buff, azonate; gills broadly adnate to short decurrent, crowded, cream; stem 35-85 x 10-25 mm, cylindrical, smooth, viscid, cream to pinkish buff; milk white; smell slightly fruity-acidulous; taste mild to slightly acrid. Sp 6.5-8.5 x 5-6.5 μ m, broadly ellipsoid, ornamentation about 1 μ m high, of warts and ridges connected to form a zebra-like pattern without closed meshes (fig. 97A); pleuromacrocytidia 45-100 x 6-10 μ m, \pm lanceolate. Summer to autumn; common in temp., rare in hemib.; DK (LC), NO (LC), SE (LC). – B&K 6:44, FNE 2:75, Phil 51d, R&H 568, Ves 432, ☉.
L. pallidus Pers.: Fr. 3
 - With conifers
- 3. In *Pinus* forests on acid soil; taste mild to slightly bitter. Cap 40-95 mm, convex to expanded with depressed centre, smooth, slimy, cream, becoming pale buff, azonate; gills broadly adnate, crowded, cream; stem 30-70 x 11-35 mm, cylindrical, smooth, viscid, cream to pale buff; milk white; smell faint, fruity. Sp 7-9.5 x 5.5-7.5 μ m, broadly ellipsoid, ornamentation up to 1 μ m high, of warts and ridges connected to form a reticulum (fig. 97B); pleuromacrocytidia 55-85 x 8-14 μ m, lanceolate. Late summer to autumn; occasional in hemib.-bore., very rare in temp.; DK (VU), FI (LC), NO (LC), SE (NT). – FNE 2:77, Korh 136, Phil 50a, SMT27(3):11, Ves 432.
L. musteus Fr.
 - With *Abies* on rich or calcareous soil; taste soon acrid. Cap 25-60 mm, convex to expanded with depressed centre, smooth, slimy, cream, becoming buff, azonate; gills adnate to decurrent, crowded, cream; stem 30-70 x 8-15 mm, cylindrical, often irregular, smooth, viscid, whitish; milk white; smell faint, fruity. Sp 7-9.5 x 6.5-8 μ m, subglobose to broadly ellipsoid, ornamentation up to 1 μ m high, of warts and ridges forming a zebra-like pattern and some closed meshes (fig. 97C); pleuromacrocytidia 65-100 x 8-10 μ m, lanceolate. Autumn; very rare in temp.; DK (EN). – B&K 6:3, C&D 1546, Däh 962-963, FE 7:161, 164, FNE 2:79.
L. albocarneus Britzelm. (*L. glutinopallens* F.H. Møller & J.E. Lange)
- 4. Cap olivaceous, olivaceous grey or ochraceous 5
 - Cap greyish, violaceous, pinkish buff, reddish brown or cinnamon 8
- 5. Cap olivaceous to blackish olivaceous, darkest at centre, bright purple with KOH; with *Picea* or *Betula*. Cap 30-140 mm, convex to expanded with depressed centre, velvety to hairy in outer part, viscid at centre, azonate; gills adnate to short decurrent, crowded, cream; stem 20-65 x 9-25 mm, cylindrical, smooth, slightly viscid, olivaceous; milk white; smell faint; taste very acrid. Sp 6.5-9 x 5-6.5 μ m, broadly ellipsoid, ornamentation up to 1 μ m high, of

warts and ridges forming a reticulum (fig. 97D); pleuromacrocytidia 40-85 x 7-10 μm , lanceolate. Mainly on sandy or peaty soil; summer to autumn; very common in temp.-hemib., common in bore.-suba., but very rare in IS; DK (LC), FI (LC), IS (Ve: Kópavogur), NO (LC), SE (LC). – FNE 2:43, Korh 136, Phil 57e, R&H 560, Ves 428, .

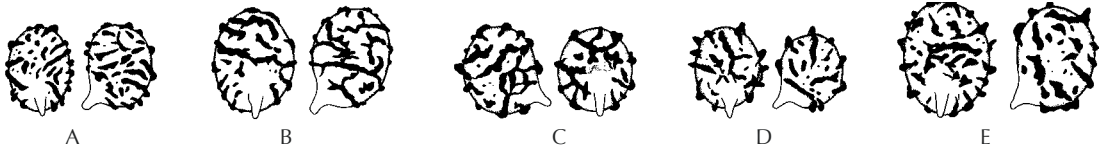
L. necator (Bull.: Fr.) Pers. (*L. plumbeus* (Bull.: Fr.) Gray, *L. turpis* (Weinm.) Fr.)

- Cap olivaceous grey or ochraceous, not purple with KOH; with *Corylus* or *Fagus* 6
- 6. With *Corylus*; gills cream to pinkish buff, medium spaced to distant. Cap 25-90 mm, convex to expanded with depressed centre, smooth, viscid, greyish to ochraceous, sometimes with darker zones; gills short decurrent; stem 25-65 x 8-20 mm, cylindrical or tapering downwards, smooth, dry, cream to greyish buff; milk white, drying greenish grey; smell faint or fruity; taste very acrid. Sp 5-7.5 x 4.5-6 μm , broadly ellipsoid, ornamentation up to 1 μm high, of warts and ridges forming a zebra-like ornamentation (fig. 97E); pleuromacrocytidia 45-105 x 7-10 μm , lanceolate. On rich soil; summer to autumn; common in temp.-hemib., rare in southern-middle bore.; DK (LC), FI (LC), NO (LC), SE (LC). – FNE 2:53, Korh 133, Phil 58a, R&H 571, Ves 431.
L. pyrogalus (Bull.: Fr.) Fr. (*L. hortensis* Velen.)
- With *Fagus*; gills white to cream, crowded 7
- 7. Cap at margin distinctly paler than the rest of the cap, soon becoming dry; gills pale cream to cream, dark greyish brown when bruised; milk very abundant. Cap 40-170 mm, convex to expanded with depressed centre, olivaceous grey to clay buff, often with darker zones; gills short decurrent, crowded; stem 35-70 x 12-25 mm, cylindrical or tapering downwards, smooth, viscid to dry, cream to greyish buff; milk white, drying olivaceous grey; smell faint; taste acrid. Sp 6-8 x 5-6.5 μm , broadly ellipsoid, ornamentation up to 1 μm high, of warts and ridges connected to form a partly zebra-like pattern with few closed meshes (fig. 99A); pleuromacrocytidia 45-90 x 6-10 μm , lanceolate. With *Fagus* on rich soil; summer to autumn; occasional in temp., rare in hemib.; DK (LC), NO, SE (LC). – C&D 1543, FNE 2:49, Phil 52a, Svp 34:12, Ves 429.
L. fluens Boud.
- Cap at margin not distinctly paler than the rest of the cap, remaining viscid to slimy; gills whitish to pale cream, pale brownish when bruised; milk moderately abundant. Cap 35-95 mm, convex to plane with depressed centre, olivaceous grey, often with zones of darker dots; gills adnate to short decurrent, crowded; stem 30-70 x 12-30 mm, cylindrical, smooth, viscid, pale olivaceous grey; milk white, drying pale olivaceous grey; smell faint; taste acrid. Sp 5.5-8 x 4.5-6.5 μm , broadly ellipsoid, ornamentation up to 1 μm high, of warts and ridges connected to form a partly zebra-like pattern with some closed meshes (fig. 99B); pleuromacrocytidia 30-85 x 6-10 μm , \pm lanceolate. With *Fagus* in forests and parks, on rich and on poor and sandy soil; summer to autumn; very common in temp., occasional in hemib.; DK (LC), FI (DD), NO (LC), SE (LC). – FNE 2:45-47, Korh 137, R&H 567, Svp 34:13, Ves 428, .
- L. blennius* (Fr.: Fr.) Fr.
- 8. Milk drying greenish grey; stem mostly with a pale zone at the top; with *Betula* 9
- Milk unchanged or drying greyish or ochraceous; stem hardly with a pale zone at the top; with *Betula* or other hosts 10
- 9. Cap dark brown to sepia or greyish brown, often umbonate. Cap 12-55 mm, conical to convex, later plane, smooth, viscid, azonate or indistinctly zonate; gills decurrent, medium spaced to crowded, pinkish buff; stem 25-70 x 4-20 mm, \pm cylindrical, smooth, dry, pinkish buff; milk white, drying greenish grey; smell indistinctly acidulous; taste acrid. Sp 6.5-8.5 x 5.5-7 μm , broadly ellipsoid, ornamentation up to 1 μm high, of warts and ridges connected to form a \pm complete reticulum (fig. 99C); pleuromacrocytidia 50-75 x 6-9 μm , lanceolate. With *Betula* in bogs, often in *Sphagnum*; summer to autumn; occasional in temp.-suba.; FI (LC), NO (LC), SE (LC). – FE 7:113, FNE 2:63, Korh 134.
L. pilatii Z. Schaef. (*L. moseri* Harmaja)



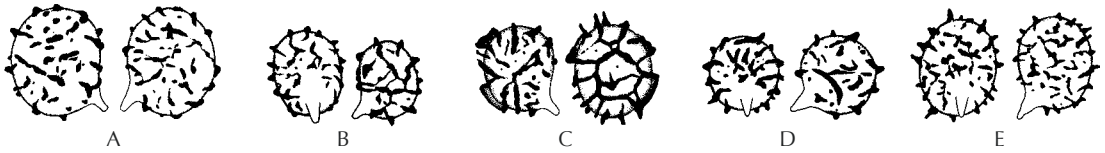
Spores: A: *Lactarius fluens*, B: *L. blennius*, C: *L. pilatii*, D: *L. vietus*, E: *L. nanus*.

- Cap pale grey to vinaceous grey, rarely umbonate. Cap 20-75 mm, convex to plane with depressed centre, smooth, viscid, zonate or azonate; gills decurrent, crowded, cream to pinkish buff; stem 25-65 x 5-18 mm, ± cylindrical, smooth, dry, cream to pale olivaceous grey; milk white, drying greenish grey; smell indistinctly fruity; taste very acrid. Sp 7-9.5 x 5.5-7.5 μm, broadly ellipsoid, ornamentation up to 1 μm high, of warts and ridges connected to form an incomplete reticulum (fig. 99D); pleuromacrocystidia 25-55 x 5-9 μm, lanceolate. With *Betula* on nutrient poor soil in bogs or on dry soil; late summer to autumn; very common in temp.-arc./alp.; DK (LC), FI (LC), IS, NO (LC), SE (LC). – FNE 2:59, Korh 135, Phil 53de, R&H 568, Ves 430, ☉.
L. vietus (Fr.: Fr.) Fr.
- 10. With dwarf *Salix* in arc./alp.; cap 15-35(-50) mm, almost dry. Cap convex to plane or slightly depressed, smooth, clay buff to vinaceous brown, azonate, greyish pruinose when young; gills adnate to short decurrent, medium spaced, pinkish buff; stem 10-25 x 3-10 mm, cylindrical, smooth, dry, pruinose, pale pinkish buff; milk watery white; smell insignificant; taste mild to slightly acrid. Sp 7-9.5 x 5.5-7.5 μm, broadly ellipsoid, ornamentation about 0.5 μm high, of warts and ridges connected to form an incomplete reticulum (fig. 99E); pleuromacrocystidia 45-85 x 6-9 μm, lanceolate. Summer; occasional, but locally common in suba.-arc./alp.; FO, IS, NO (LC, incl. Svb), SE (LC). – B&K 6:41, C&D 1533, FE 7:145, FNE 2:65, FND 11:10, ☉.
L. nanus J. Favre
- In temp.-suba. with other hosts or cap larger and distinctly viscid to slimy 11
- 11. With *Carpinus* in forests and parks. Cap 30-100 mm, convex to plane or slightly depressed, smooth, slightly viscid, greyish with greyish brown zones; gills adnate to short decurrent, crowded, pinkish buff; stem 17-45 x 8-25 mm, ± cylindrical, smooth, dry, pale grey; milk white, drying olivaceous buff; smell fruity; taste becoming bitter to acrid. Sp 5.5-8 x 4.5-6.5 μm, broadly ellipsoid, ornamentation about 1 μm high, of ridges and warts in a zebra-like pattern (fig. 100A); pleuromacrocystidia 35-60 x 5.5-7 μm, cylindrical to narrowly lageniform. Summer to autumn; occasional in temp., very rare in hemib.; DK (LC), NO (NE), SE (LC). – C&D 1540, Däh 966, FNE 2:51, Phil 56a, Ves 429, ☉.
L. circellatus Fr.
- With *Betula*, *Populus*, *Salix* or conifers 12
- 12. Cap cinnamon to brick or reddish brown or pinkish brown to clay pink 13
- Cap without reddish or pinkish tinges 15
- 13. Taste mild or slightly acrid after a while; with *Picea*, *Betula* and *Salix*, often in periodically flooded places. Cap 30-70 mm, convex to plane with depressed centre, smooth, viscid, clay pink to pinkish brown, azonate or with few narrow zones at margin; gills adnate to short decurrent, pinkish buff; stem 35-85 x 10-17 mm, cylindrical, smooth, dry, pinkish buff; milk white. Sp 6.5-8.5 x 5-7 μm, broadly ellipsoid, ornamentation < 1 μm high, of warts and ridges connected to form an incomplete reticulum (fig. 100B); pleuromacrocystidia 40-65 x 6-7 μm, cylindrical to fusiform. Summer to autumn; occasional in bore.-suba., very rare or overlooked in IS; FI (LC), IS, NO (LC), SE (LC). – FNE 2:67.
L. hyginoides M. Korhonen & T. Ulvinen



Spores: A: *Lactarius circellatus*. B: *L. hyginoides*, C: *L. hyginus*, D: *L. flexuosus* var. *flexuosus*, E: *L. trivialis*.

- Taste becoming very acrid; on dry soil with *Picea*, *Populus*, *Abies*, etc. 14
- 14. Smell like caterpillar of willow borer (*Cossus cossus*) or *Hygrophorus discoxanthus*; gills crowded; with *Picea*, often in disturbed places along paths, etc. Cap 50-85 mm, convex to plane, often with depressed centre, smooth, viscid, cinnamon to brick or reddish brown with paler margin, \pm zonate; gills adnate to short decurrent, cream; stem 35-60 \times 12-25 mm, cylindrical, smooth, dry to greasy, cream to pale pinkish buff; taste very acrid; milk white. Sp 6-8 \times 5-6.5 μ m, broadly ellipsoid, ornamentation up to 1 μ m high, of broad ridges connected to form a \pm complete reticulum (fig. 100C); pleuromacrocytidia 30-65 \times 6.5-10 μ m, \pm fusiform. Late summer to autumn; occasional in hemib.-suba., in FI common, but rare in northern part, very rare in temp.; DK (EN), FI (LC), IS, NO (LC), SE (LC). – B&K 6:29, Däh 993, FNE 2:83, Korh 138-140, Phil 59f.
L. hyginus (Fr.: Fr.) Fr. (*L. curtus* Britzelm.)
- Smell faint; gills medium spaced to distant; with *Populus*, *Abies*, etc. see *L. flexuosus* var. *roseozonatus* 15
- 15. Gills medium spaced to distant; sp on av < 8 μ m long; cap uniformly grey, sometimes zonate near margin. Cap 30-110 mm, convex to plane or with depressed centre, smooth, viscid; gills adnate to short decurrent, cream to pinkish buff; stem 18-60 \times 7-40 mm, cylindrical or tapering downwards, smooth, dry, whitish to pale grey; milk white; smell faint; taste very acrid. Sp 6-8.5 \times 5-7 μ m, broadly ellipsoid, ornamentation up to 1 μ m high, of warts and ridges connected to form an incomplete reticulum (fig. 100D); pleuromacrocytidia 50-90 \times 7.5-11 μ m, \pm fusiform. With *Betula* and *Pinus*, probably also *Populus*; late summer to autumn; occasional and locally common in hemib.-suba., very rare in temp.; DK (NT), FI (LC), NO (LC), SE (LC). – B&K 6:22, C&D 1539, FNE 2:55, Korh 151-154, R&H 570.
L. flexuosus (Pers.: Fr.) Gray var. *flexuosus*
var. *roseozonatus* H. Post (*L. roseozonatus* (H. Post) Britzelm.) differs in having distinct pinkish tinges on the cap. With *Populus*, *Abies*, etc.; autumn; very rare in temp.-bore.; DK (DD), FI (LC). – C&D 1538, FNE 2:57, Korh 154.
- Gills crowded; sp on av > 8 μ m long; cap often strongly zonate or with small dots suggesting zones 16
- 16. Cap azonate or with small dots suggesting zones, grey with purplish or vinaceous tinges; taste becoming moderately acrid. Cap 40-150 mm, convex to plane with depressed centre, becoming funnel-shaped, smooth, viscid to slimy; gills decurrent, crowded, cream to dull cream; stem 30-120 \times 9-20 mm, cylindrical to club- or barrel-shaped, smooth, viscid to dry, cream; milk white; smell weak or fruity. Sp 7.5-10 \times 6-8 μ m, broadly ellipsoid, ornamentation up to 1 μ m high, with warts and ridges suggesting an incomplete reticulum (fig. 100E); pleuromacrocytidia 55-75 \times 7-13 μ m, \pm fusiform. With *Betula* and *Picea*, often in damp habitats; summer to autumn; very common in hemib.-suba., rare, but locally occasional in temp.; DK (NT), FI (LC), NO (LC), SE (LC). – Däh 964, FNE 2:71,73, Korh 156-158, R&H 569, Ves 430, .
L. trivialis (Fr.: Fr.) Fr. (*L. utilis* (Weinm.) Fr.)
- Cap with numerous dark grey to brownish grey zones on a pinkish buff to greyish background; taste mild, but unpleasant. Cap 55-140 mm, convex to plane with depressed centre, sometimes becoming funnel-shaped, smooth, viscid; gills short decurrent, crowded, cream



Spores: A: *Lactarius subcircellatus*, B: *L. helvus*, C: *L. serifluus*, D: *L. rostratus*, E: *L. camphoratus*.

to pinkish buff; stem 40-85 x 15-25 mm, cylindrical, smooth, dry, cream to ochraceous; milk white; smell fruity-acidulous. Sp 8-10.5 x 6.5-8.5 μm, broadly ellipsoid, ornamentation about 0.5 μm high, of warts and ridges suggesting an incomplete reticulum (fig. 101A); pleuromacrocytidia 65-110 x 7-13 μm, ± fusiform. With *Betula* and *Picea* in damp depressions and mountain heathland; summer to autumn; occasional in middle bore.-arc. / alp.; FI (LC), IS, NO (LC), SE (LC). – FE 7:149, FNE 2:69, Korh 155, R&H 570.

L. subcircellatus Kühner

Key I: Milk white or watery; cap velvety or smooth, dry

1. Milk transparent or watery whitish; smell strong, like fenugreek (*Trigonella foenum-graecum*), curry or bugs, sometimes stronger when kept in a closed box or in exsiccata 2
 - Milk white to pale cream, not transparent or watery; smell often different or indistinct 5
2. Cap with age becoming distinctly tomentose or scaly, dry; milk water-like, transparent. Cap (25-)50-130 mm, convex to depressed, pinkish buff to clay pink; gills broadly adnate to decurrent, crowded, cream, later buff; stem 20-100 x 6-22 mm, cylindrical, velvety to smooth, pinkish buff, becoming yellowish brown; smell like fenugreek (*Trigonella foenum-graecum*); taste mild. Sp 6-8.5 x 4.5-6.5 μm, broadly ellipsoid to ellipsoid, ornamentation 0.5-1 μm high, of warts and short ridges, connected to form an almost complete reticulum (fig. 101B); pleuromacrocytidia 40-70 x 7-12 μm, cylindrical to subclavate. With conifers or *Betula* on sandy or peaty soil, often in damp habitats; summer to autumn; common in temp.-suba.; DK (LC), FI (LC), NO (LC), SE (LC). – FNE 2:175, Korh 165, Phil 62b, R&H 571, Ves 443, ☉.

L. helvus (Fr.: Fr.) Fr.

 - Cap smooth, dry or greasy; milk at least partly whitish 3
3. Pleuromacrocytidia absent; milk almost transparent and watery. Cap 25-80 mm, convex to plane with depressed centre, smooth, often crenate at margin, orange brown to dark reddish brown or vinaceous brown; gills broadly adnate to short decurrent, medium spaced to crowded, clay pink to clay buff; stem 25-50 x 3-13 mm, cylindrical or tapering downwards, pale vinaceous to fawn or orange brown; smell like fenugreek (*Trigonella foenum-graecum*) or bugs; taste mild. Sp 6.5-8.5 x 5.5-8 μm, subglobose to broadly ellipsoid, ornamentation about 1 μm high, of warts and ridges forming a complete reticulum (fig. 101C). In rich deciduous forests, with *Quercus*, possibly also with other hosts; late summer to autumn; occasional in temp., rare in hemib.; DK (LC), FI (VU), NO (LC), SE (LC). – FNE 2:221-225, Korh 187, Phil 63e, R&H 578, Ves 441, ☉.

L. serifluus (DC.: Fr.) Fr. (*L. subumbonatus* Lindgr., *L. cimicarius* (Batsch) Gillet s. auct.)

 - Pleuromacrocytidia present; milk watery whitish 4
4. Cap rugose all over, 10-35 mm; with *Fagus* on clayey soil; pleuromacrocytidia often with very acute apex. Cap convex, later plane with depressed centre, sometimes with a small papilla, dry, orange brown to dark brick; gills adnate to decurrent, crowded, pinkish buff; stem 10-28 x 3-9 mm, cylindrical, sometimes compressed, smooth, ochraceous to brick, turning fawn to orange brown from base; milk watery whitish; smell like bugs; taste sweetish. Sp 6-8 x 5.5-7 μm, subglobose to broadly ellipsoid, ornamentation up to 1.5 μm high, of warts

and ridges forming zebra-like pattern and some closed meshes (fig. 101D); pleuromacrocytidia 25-50 x 4-6.5 μm . Summer to autumn; rare in temp.; DK (vu). – C&D 1587, Däh 975, FE 7:595, FNE 2:217-219.

L. rostratus Heilm.-Claus. (*L. cremor* Fr. s. auct.)

- Cap smooth, but sometimes with crenulate margin, usually larger; with deciduous and coniferous hosts on rich or rather poor soil; pleuromacrocytidia fusiform. Cap 20-50 mm, low convex to plane with depressed centre, becoming funnel-shaped, dry, dark brick to fawn; gills broadly adnate to decurrent, medium spaced, clay buff, turning orange brown; stem 25-65 x 4-10 mm, cylindrical, smooth, fawn to brownish vinaceous, turning dark vinaceous brown; milk watery whitish; smell sweet curry-like; taste mild. Sp 6-8.5 x 5-7 μm , subglobose to broadly ellipsoid, ornamentation about 1 μm high, of pointed warts aligned to form lines, but rarely closed meshes (fig. 101E); pleuromacrocytidia 30-45 x 6-10 μm , rare. On soil, or sometimes fruiting on old stumps; summer to autumn; common in temp.-southern bore., rare in middle bore.; DK (LC), FI (LC), NO (LC), SE (LC). – FNE 2:215, Korh 188, Phil 62a, R&H 576, Ves 438, ☉.

L. camphoratus (Bull.: Fr.) Fr.

- | | | |
|----|------------------------------------|---|
| 5. | Smell distinct, like dried coconut | 6 |
| - | Smell not like coconut | 7 |

- 6. Cap pale to dark pinkish buff; stem 3-10 mm broad; with *Betula*, in wet places or in grassy roadsides and lawns. Cap 12-45 mm, low convex to plane, soon becoming depressed, velvety to finely scaly, dry; gills decurrent, crowded, pale pinkish buff; stem 20-70 mm long, cylindrical or tapering downwards, smooth, pale pinkish buff; milk white; smell like dried coconut; taste becoming slightly acrid. Sp 5.5-8.5 x 4.5-7 μm , broadly ellipsoid, ornamentation up to 1 μm high, of warts and ridges, connected to form an incomplete reticulum (fig. 103A); pleuromacrocytidia 40-70 x 7-12 μm , \pm cylindrical. Summer to autumn; very common in temp.-suba.; DK (LC), FI (LC), FO, IS, NO (LC), SE (LC). – FNE 2:171, Korh 168, Phil 59e, R&H 573, Ves 434, ☉.

L. glyciosmus (Fr.: Fr.) Fr.

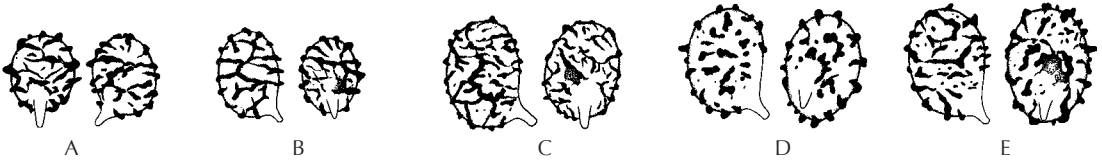
- Cap greyish brown to fuscous; stem 5-15 mm broad; with conifers, especially *Pinus*, or with *Betula* on dry mineral soil. Cap 25-80 mm, low convex to plane, becoming depressed, finely velvety to finely scaly, dry; gills decurrent, crowded, pinkish buff; stem 20-50 mm long, cylindrical to \pm clavate, smooth, greyish buff to greyish brown; milk white; smell like dried coconut; taste becoming slightly bitter to acrid. Sp 6-9 x 5-6.5 μm , broadly ellipsoid, ornamentation up to 1 μm high, of warts and ridges forming a \pm complete reticulum (fig. 103B); pleuromacrocytidia 45-75 x 6.5-9.5 μm , cylindrical to clavate. Late summer to autumn; common in hemib.-suba., rare in temp.; DK (vu), FI (LC), IS, NO (LC), SE (LC). – FNE 2:173, Korh 167, Phil 55f, R&H 573, Ves 434.

L. mammosus (Weinm.) Fr. (*L. fuscus* Rolland)

- 7. Cap pinkish to lilac, velvety to finely scaly; with *Alnus*. Cap 15-50 mm, low convex to plane, becoming depressed, dry; gills broadly adnate to decurrent, medium spaced, pinkish buff; stem 15-50 x 3-12 mm, cylindrical, smooth, pinkish buff to salmon, becoming ochraceous orange; milk white; smell fruity or like bugs; taste mild to slightly bitter. Sp 6.5-9 x 5.5-7 μm , broadly ellipsoid, ornamentation about 1 μm high, or warts and ridges connected to form a \pm complete reticulum (fig. 103C); pleuromacrocytidia 60-105 x 7-11 μm , cylindrical. Summer to autumn; common in hemib.-bore, occasional in temp.; DK (LC), FI (LC), NO (LC), SE (LC). – Däh 969, FNE 2:169, Korh 169, R&H 572, Ves 435.

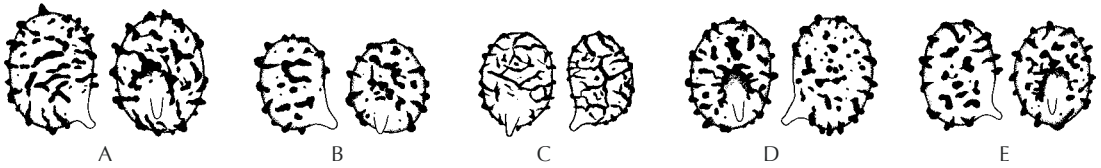
L. lilacinus (Lasch) Fr.

- Cap dominantly orange, reddish, brownish or olivaceous, smooth or concentrically cracked; with *Alnus* or other hosts 8
- 8. With *Alnus*; stem 1.5-5 mm broad 9



Spores: A: *Lactarius glycosmus*, B: *L. mammosus*, C: *L. lilacinus*, D: *L. omphaliformis*, E: *L. obscuratus*.

- With other hosts or stem broader 11
- 9. Cap becoming concentrically cracked and scaly with age, yellowish brown to orange brown, without olivaceous or green tinges. Cap 8-22 mm, plane to depressed, later funnel-shaped, sometimes with a small papilla, translucently striate in outer half; gills short decurrent to decurrent, medium spaced, pinkish buff; stem 13-33 x 1.5-3 mm, cylindrical, smooth, brownish orange, turning reddish brown; milk white; smell insignificant; taste mild. Sp 7-9.5 x 5.5-8 μm , broadly ellipsoid to ellipsoid, ornamentation about 1 μm high, of warts and short ridges aligned to form an incomplete reticulum (fig. 103D); pleuromacrocytidia 35-90 x 6-9 μm , narrowly fusiform. With *Alnus*, in damp places, on bare ground or in deep moss carpets, sometimes in *Sphagnum*; summer to autumn; occasional in temp., rare in hemib.-bore.; DK (LC), FI (LC), NO (LC), SE (LC). – B&K 6:43, C&D 1606, FE 7:631, FNE 2:213, Korh 202, . *L. omphaliformis* Romagn. (*L. cyathula* (Fr.: Fr.) Fr. s. J.E. Lange)
- Cap hardly cracked or scaly with age, sometimes with \pm olivaceous tinges or an olivaceous green centre 10
- 10. Sp on av < 6.5 μm broad (fig. 103E); cap 10-20(-30) mm, mostly with vivid orange colours, but sometimes olivaceous at centre. Cap convex to plane with depressed centre, sometimes with a small papilla, smooth, translucently striate in outer part with age; gills short decurrent, pinkish buff; stem 10-30 x 2-5 mm, cylindrical, ochraceous orange, turning yellowish brown; milk white; smell insignificant; taste mild. Sp 6.5-9 x 5-7 μm , broadly ellipsoid to ellipsoid, ornamentation up to 1.5 μm high, of warts and short ridges, aligned to form an incomplete reticulum; pleuromacrocytidia 40-100 x 5.5-10 μm , narrowly fusiform. With *Alnus*; late spring to autumn; common in temp.-bore.; DK (LC), FI (LC), NO (LC), SE (LC). – B&K 6:42, FE 7:619, 788, FNE 2:207, 209, Phil 52c, Ves 439. *L. obscuratus* (Lasch) Fr. (*L. obnubilus* (Lasch) Fr.)
- Sp on av > 7 μm broad (fig. 104A); cap 12-45 mm, dull orange brown, often with olivaceous tinges. Cap convex to plane with depressed centre, often with a small papilla, smooth, translucently striate in outer part with age; gills short decurrent, pinkish buff; stem 20-50 x 2-5 mm, cylindrical, ochraceous to dull yellowish brown; milk white; smell faint or fruity; taste mild. Sp 7-11 x 6-8.5 μm , broadly ellipsoid, ornamentation up to 1.5 μm high, of warts and short ridges, aligned to form an incomplete reticulum; pleuromacrocytidia 45-110 x 6.5-12 μm , narrowly fusiform. With *Alnus*; late spring to autumn; common in temp.-hemib., occasional in bore.; DK (LC), FI (LC), NO (LC), SE. – FE 7:615, FNE 2:211, Korh 201 (as *obscuratus*). *L. cyathuliformis* Bon (*L. obnubilus* (Lasch) Fr. s. auct.)
- 11. Cap typically with zones formed of darker spots, pinkish buff to brick; smell grease-like, like some heteropteran bugs; with *Quercus*. Cap 25-80 mm, convex, later plane to slightly depressed, smooth, dry; gills broadly adnate, medium spaced to crowded, pinkish buff; stem 30-70 x 7-20 mm, cylindrical, smooth, pinkish buff, turning fawn to dark brick from the base; milk pale cream; taste mild, becoming acrid. Sp 6.5-9 x 5.5-7 μm , subglobose to broadly ellipsoid, ornamentation about 1 μm high, of warts and short ridges aligned to form an incomplete reticulum (fig. 104B); pleuromacrocytidia 35-65 x 6.5-10.5 μm , fusiform.



Spores: A: *Lactarius cyathuliformis*, B: *L. quietus*, C: *L. rufus*, D: *L. subdulcis*, E: *L. tabidus*.

Summer to autumn; very common in temp., common in hemib.; DK (LC), FI (LC), NO (LC), SE (LC). – FNE 2:193, Korh 170-171, Phil 56c, 57d, R&H 577, Ves 440, ⊙.

L. quietus (Fr.: Fr.) Fr.

- Cap azonate; with various deciduous and coniferous hosts 12
- 12. Taste of flesh and milk becoming burning acrid. Cap 25-90 mm, low convex to plane or depressed, with a small umbo, becoming funnel-shaped, smooth to rugulose, dry, orange brown to dark brick; gills broadly adnate to decurrent, crowded, cream to pinkish buff; stem 35-100 × 6-20 mm, ± cylindrical, smooth, clay pink, becoming reddish brown except at top and base; milk white; smell faint. Sp 6.5-10 × 5.5-7.5 μm, broadly ellipsoid, ornamentation about 0.5 μm high, of warts and short ridges aligned to form a complete reticulum (fig. 104C); pleuromacrocytidia 30-75 × 6-10 μm, fusiform to subclavate. With conifers, especially *Picea* and *Pinus*, less often with deciduous trees, on acid soil, rarely on rich soil; summer to autumn; very common in temp.-suba., rare in arc./alp. with *Betula nana*; DK (LC), FI (LC), FO, NO (LC), SE (LC). – FNE 2:177, Korh 166, Phil 54c, 55d, R&H 576, Ves 435, ⊙.

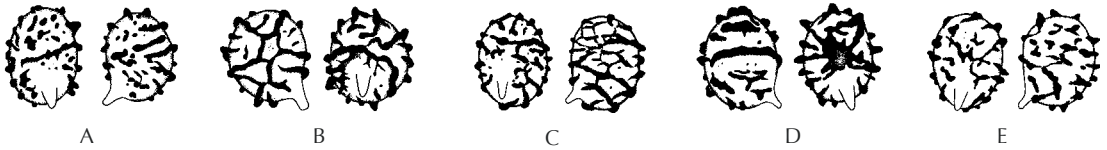
L. rufus (Scop.: Fr.) Fr.

- Taste mild to bitter or slightly acrid 13
- 13. Taste mild and sweet, then turning ± bitter; smell distinct, rubber-like; with *Fagus*, exceptionally with *Corylus*, *Quercus* or *Carpinus*. Cap 20-55 mm, convex to plane or depressed, sometimes becoming funnel-shaped, smooth to rugulose, cinnamon to clay buff; gills broadly adnate to decurrent, medium spaced to crowded, pinkish buff; stem 25-65 × 4-18 mm, cylindrical, smooth, pinkish buff, becoming cinnamon; milk white. Sp 7-9.5 × 5.5-7.5 μm, subglobose to broadly ellipsoid, ornamentation up to 1.5 μm high, of warts and short ridges aligned to form irregular crests, but only a very incomplete reticulum (fig. 104D); pleuromacrocytidia 40-90 × 6-12 μm, fusiform. Summer to autumn; very common in temp., occasional in hemib.; DK (LC), NO (LC), SE (LC). – Däh 986, FNE 2:195, Phil 54b, R&H 577, Ves 436, ⊙.

L. subdulcis (Bull.: Fr.) Gray

- Taste or smell different or with other hosts 14
- 14. Cap wrinkled to rugulose, at least when drying out 15
- Cap smooth, even when old or drying out 16
- 15. Milk turning pale yellow or drying yellowish, immediately turning yellow on a white handkerchief; cap 10-40 mm; stem pinkish brown or pale reddish brown, paler at top. Cap convex, later plane to depressed, smooth, becoming wrinkled when drying out, yellowish brown to orange brown; gills broadly adnate to decurrent, crowded, cream to pinkish buff; stem 20-80 × 3-10 mm, cylindrical, smooth; smell faint; taste mild to slightly acrid. Sp 6-8.5 × 5-7 μm, broadly ellipsoid, ornamentation about 1 μm high, of acute warts connected by fine lines to form a very incomplete reticulum (fig. 104E); pleuromacrocytidia 35-90 × 7.5-11 μm, fusiform. Often with *Betula*, but also with *Quercus*, *Picea*, etc.; late spring to autumn; very common in temp.-suba., but rare in IS; DK (LC), FI (LC), IS, NO (LC), SE (LC). – FNE 2:201, Korh 195-196, Phil 60b, R&H 575, Ves 439, ⊙.

L. tabidus Fr. (*L. theiogalus* (Bull.: Fr.) Gray s. auct.)



Spores: A: *Lactarius rubrocinctus*, B: *L. decipiens*, C: *L. hepaticus*, D: *L. sphagneti*, E: *L. badiosanguineus*.

- Milk unchanging; cap 30-70 mm; stem flesh-coloured to pale reddish brown, soon turning darker to brick, often with an intensely coloured zone at the extreme top. Cap convex to plane, becoming depressed to funnel-shaped, smooth, becoming radially wrinkled when drying out, yellowish brown to orange brown; gills broadly adnate to decurrent, crowded, cream to pinkish buff; stem 20-70 x 8-25 mm, cylindrical, smooth; smell faint; taste mild to slightly acrid. Sp 6.5-9.5 x 5.5-7.5 μm , broadly ellipsoid, ornamentation up to 1 μm high, of warts and short ridges, connected by finer lines to form a very incomplete reticulum (fig. 105A); pleuromacrocytostidia 60-110 x 9-13.5 μm , fusiform. Under *Fagus* on rich, \pm calcareous soil; summer to autumn; occasional in temp.; DK (LC), SE (NT). – B&K 6:57, C&D 1585, Däh 976, FNE 2:203,205, Ves 437.

L. rubrocinctus Fr.

16. Cap pinkish brown to clay pink; smell like *Pelargonium*. Cap 20-60 mm, convex to plane with depressed centre, smooth, dry to slightly viscid; gills adnate to short decurrent, medium spaced to crowded, pale pinkish buff; stem 15-55 x 4-13 mm, cylindrical, smooth, clay pink; milk white, turning yellowish on exposure; taste mild, becoming slightly acrid and unpleasant. Sp 6.5-9 x 5.5-7.5 μm , subglobose to broadly ellipsoid, ornamentation up to 1 μm high, of warts and ridges connected in a \pm complete reticulum (fig. 105B); pleuromacrocytostidia 40-90 x 6-9.5 μm , fusiform. With deciduous trees on rich soil, e.g. *Fagus* and *Quercus*; summer to autumn; rare in temp.-hemib.; DK (VU), NO (NE), SE (VU). – B&K 6:16, Däh 993, FE 7:523, 789, FNE 2:191, Phil 61e.

L. decipiens QuéL.

- Cap without pinkish tinges; smell not like *Pelargonium* 17
- 17. Cap very dark when young, dark brick, dark orange brown, reddish brown, sepia or umber, at least at centre; with conifers 18
- Cap orange, orange brown, brick or brownish red; with deciduous trees or conifers 20
- 18. Cap sepia to umber. Cap 15-70 mm, low convex to plane with depressed centre, smooth, dry to slightly greasy; gills decurrent, medium spaced, pale pinkish buff to clay buff; stem 25-70 x 4-12 mm, cylindrical, smooth, fawn to brick; milk white, turning yellowish on exposure; smell faint, of bugs; taste mild, then bitter. Sp 6.5-9.5 x 5.5-7.5 μm , subglobose to broadly ellipsoid, ornamentation up to 1 μm high, of warts and short ridges, aligned to form an almost complete reticulum (fig. 105C); pleuromacrocytostidia 40-80 x 6-10 μm , fusiform. On humus rich soil with *Pinus*, more rarely with *Picea*; late summer to autumn; locally very common and probably increasing in temp., occasional in hemib.-bore.; DK (LC), NO (LC), SE. – B&K 6:28, FNE 2:189, Phil 56b, Svp 15:3, Ves 441, ☉.

L. hepaticus Plowr.

- Cap dark brick to dark reddish or orange brown 19
- 19. Cap dark brick to dark reddish or orange brown with paler margin; sp ornamentation very strongly amyloid. Cap 17-50 mm, convex to plane with depressed centre, smooth, dry to slightly greasy; gills emarginate to broadly adnate, medium spaced, pinkish buff; stem 20-70 x 3-8 mm, cylindrical to clavate, clay pink to clay buff; milk white; smell faintly of bugs; taste mild. Sp 6.5-9 x 5-7.5 μm , broadly ellipsoid, ornamentation about 1 μm high, of warts

and ridges aligned to form a reticulum (fig. 105D); pleuromacrocytidia 40-80 × 6-9 μm, fusiform. On wet soil with *Picea*, often with *Sphagnum*; late summer to autumn; common in bore., occasional in hemib., very rare in temp.; DK (NA, Brnh: Almindingen), FI (LC), FO, NO (LC), SE. – B&K 6:67, FE 7:507, FNE 2:187, Korh 199, 200.

L. sphagneti (Fr.) Neuhoff

- Cap ± unicoloured dark brick to dark reddish or orange brown; sp ornamentation amyloid, but not very strongly so. Cap 25-85 mm, convex to plane with depressed centre, smooth, dry to greasy; gills broadly adnate to short decurrent, medium spaced, ochraceous; stem 30-90 × 6-14 mm, cylindrical, ochraceous orange, becoming orange brown; milk white; smell faint, of bugs; taste mild to slightly bitter. Sp 7-9 × 5.5-7.5 μm, broadly ellipsoid, ornamentation about 1 μm high, of elongated warts and ridges, connected to form a zebra-like to subreticulate pattern (fig. 105E); pleuromacrocytidia 40-80 × 6-10 μm, cylindrical to fusiform. With *Picea* and *Abies*, often on calcareous soil, on dry soil and in *Sphagnum*; late summer to autumn; occasional in hemib.-suba., very rare in temp.; DK (NA, EJyl: Rubjerg Klitplt., WJyl: Stråsø Plt.), FI (LC), NO (LC), SE. – B&K 6:7, Däh 989, FNE 2:185, Korh 198, 199, R&H 578.
- L. badiosanguineus* Kühner & Romagn.

- 20. Milk white, also when dry 21
- Milk white but after a while yellowing, drying yellowish 22

- 21. Cap orange brown; with dwarf *Salix* in arc./alp. Cap 25-55 mm, convex to plane with depressed centre, sometimes with a small umbo, smooth, dry, slightly glossy; gills broadly adnate to short decurrent, medium spaced, pinkish buff; stem 20-30 × 5-11 mm, cylindrical to ± clavate, smooth, clay buff to cinnamon; smell faint or like bugs; taste mild to slightly bitter. Sp 7-11 × 5.5-8.5 μm, subglobose to ellipsoid, ornamentation up to 1 μm high, of warts and ridges, aligned to form an incomplete reticulum (fig. 107A); pleuromacrocytidia 50-135 × 6.5-11 μm, ± fusiform. Calciphilous; summer to autumn; rare in arc./alp.; FI (EnL: Kilpisjärvi), NO (LC, SvB, Troms: Kåfjord), SE (PL: Arjeblog). – FNE 2:181.

L. lanceolatus O.K. Mill. & Laursen

- Cap bright orange; in deciduous and coniferous forests, also in sand dunes with *Salix*. Cap 10-50 mm, low convex to plane with depressed centre, smooth, dry, slightly glossy; gills broadly adnate to short decurrent, medium spaced, pinkish buff; stem 25-65 × 5-12 mm, cylindrical to ± clavate, smooth, brownish orange; smell faint or like bugs; taste almost mild. Sp 6.5-9.5 × 5.5-7.5 μm, broadly ellipsoid, ornamentation up to 1 μm high, of warts and ridges, aligned to form an incomplete reticulum (fig. 107B); pleuromacrocytidia 45-80 × 6.5-11 μm, fusiform. Mostly on rich, calcareous soil; summer to autumn; common in temp.-southern bore., occasional in middle bore., very rare in northern bore.-suba.; DK (LC), FI (LC), NO (LC), SE (LC). – FNE 2:179, Korh 186, Phil 59d, R&H 575, Ves 437, ☉.

L. aurantiacus (Pers.: Fr.) Gray s.l. (*L. mitissimus* (Fr.: Fr.) Fr., *L. aurantiofulvus* Bon)

- 22. Milk quickly turning sulphur yellow; cap ± sticky or glossy; with *Betula* on nutrient rich, damp soil in middle bore.-arc./alp. Cap 20-40 mm, low convex to plane with depressed centre, smooth, vivid orange brown; gills broadly adnate to short decurrent, medium spaced, cream to pinkish buff; stem 25-70 × 6-9 mm, cylindrical, smooth, pale orange brown; smell spicy or like bugs; taste becoming slightly bitter. Sp 6.5-10 × 5.5-7.5 μm, broadly ellipsoid, ornamentation up to 1 μm high, of warts and ridges, joined to form an incomplete reticulum (fig. 107C); pleuromacrocytidia 50-105 × 9-13 μm, lanceolate. Summer to autumn; FI (LC), NO (LC), SE (LC). – Bor 90, FE 7:538, FNE 2:183, Korh 187, Sieniop 43.

L. duplicatus A.H. Sm. (*L. lapponicus* Harmaja)


- Milk unchanged or slowly turning pale yellowish; cap dry or slightly greasy; with deciduous or coniferous hosts in temp.-bore. 23
- 23. Cap 15-60 mm; smell indistinct or slightly like bugs; in humid places with *Alnus*, *Betula* or *Populus*. Cap low convex to expanded with depressed centre, becoming funnel-shaped,



Spores: A: *Lactarius lanceolatus*, B: *L. aurantiacus*, C: *L. duplicatus*, D: *L. lacunarum*, E: *L. fulvissimus*.

smooth, dry, brick to orange brown; gills adnate to decurrent, medium spaced, pinkish buff to ochraceous; stem 15-70 x 3-10 mm, cylindrical, smooth, ochraceous orange, becoming orange brown; milk white, turning yellow; taste mild to slightly acrid. Sp 6-8.5 x 5-6.5 μm , broadly ellipsoid, ornamentation up to 1 μm high, of warts and short ridges connected to form an incomplete reticulum (fig. 107D). Summer to autumn; locally common in hemib.-middle bore., occasional in temp.; DK (LC), FI (LC), NO (LC), SE (LC). – B&K 6:32, C&D 1595, FNE 2:199, Korh 196-197, Ves 438.

L. lacunarum Hora

- Cap 40-85 mm; smell strong, like *Lepiota cristata*; on rich, clayey soil with deciduous trees, e.g. *Fagus*, *Quercus*, *Tilia*, *Populus* and *Corylus*, mostly in parks. Cap convex to plane or depressed, \pm smooth, dry or slightly greasy, brownish orange to brownish red, with margin paler and more yellow than centre, discolouring; gills adnate to short decurrent, crowded, pale pinkish buff; stem 30-75 x 5-20 mm, cylindrical to clavate, smooth, pinkish buff to brownish orange; milk unchanging on a white handkerchief; taste mild to bitter. Sp 6-9 x 5.5-7.5 μm , subglobose to broadly ellipsoid, ornamentation about 1 μm , of pointed warts and short ridges, connected to form an incomplete reticulum (fig. 107E); pleuromacrocytidia 40-90 x 5.5-9.5 μm , fusiform. Summer to autumn; occasional in temp., rare in hemib.; DK (LC), FI (LC), NO (NE), SE (LC). – Däh 983, FNE 2:197, Phil 62d, R&H 574, Ves 436, .

L. fulvissimus Romagn. (*L. britannicus* D.A. Reid, *L. ichoratus* (Batsch) Fr. s. auct.)

Note: *L. subsericatus* Bon with milk turning yellow on white handkerchief, darker gills, a more unicoloured, chamois-leather-like cap and sp with more isolated spines may occur in the Nordic countries; DE. – C&D 1578, Däh 977.