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GETTING TO GRIPS WITH *PLUTEUS*

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This key was first prepared in 1995 as a simple field key to those *Pluteus* species that had been recorded in Leicestershire and Warwickshire. It was based on personal observations, using the *British Fungus Flora, Vol. 4. Pluteaceae* (BFF4), published in 1986, as the main source of reference. That key has now been revised and expanded to cover most of the species included in the current *Checklist of the British & Irish Basidiomycota* (CBIB). A few species with very few UK records have been excluded and these are noted below.

BFF4 described 43 species, a number of which were separated by relatively minor variations in appearance or microscopic features. More recent publications consider that the number of true species is much lower. CBIB currently lists 28 species, and *Funga Nordica* (FN) 2008 describes 30 species in Northern Europe, some of which are not listed in CBIB.

Five little-known *Pluteus* species are included in CBIB but have few UK records: *P. exiguus*, *P. griseoluridus*, *P. insidiosus*, *P. pseudorobertii*, and *P. robertii*. They are rarely recorded and have not been included in the key. Future studies may either confirm them as valid species or resolve whether they are in fact varieties of better known species. They have been relegated here to Appendix 1, with descriptions and references to relevant literature.

Other pink-spored genera which could be mistaken for *Pluteus* include *Volvariella*, also with free gills but growing from a sac or volva at the stem base. *Entoloma* has pink spores which have a distinctive angular shape when viewed under a microscope, and most species have gills which are attached to the stem to some degree. *Lepista* has broadly attached or sinuate gills, and has a pinkish-white spore print colour.

Field characters of the genus *Pluteus*

A number of *Pluteus* species can, with practice, be identified in the field. There is, however, a group of small brown-capped species that can only be reliably separated by reference to their microscopic features. Any key to field characters has limitations and it

should be stressed that for scientific recording some simple microscopic checks are essential for many species (see below).

The genus includes species with a wide range of cap sizes, from 1 to 15 cm across. They can also be quite variable in size within a species. The cap colour is most commonly some shade of brown, but there are white ones, one that is grey-green, one bright red, and several that are wholly or partly yellow. Most are darker or more strongly coloured towards the centre.

All have caps that start conical or convex, then flatten out to a typical mushroom shape, many having a raised central boss, or umbo, which may also vary within a species. In many species the caps can be veined or wrinkled, usually but not always in a radial pattern and more obviously so in the centre. Some species show this feature quite strikingly and the veins may be darker, or occasionally paler, than the background cap colour. Some have radial striations on the cap, others may be sulcate (with radial grooves) towards the cap margin. The cap surface may appear shiny and hygrophanous (water absorbent giving a darker colour, but drying paler). Others may appear hairy or velvety.

The stems can be cylindrical, though more usually tapering from a slightly wider base, with the extreme base often thickened, appearing as a distinct bulb in one or two species. Stems are generally whitish and may appear smooth and shiny, or have longitudinal silky fibrils. A few have dark brown fibrils and/or brown flaky scales which may cover much of the stem. Some are described as having white flakes or a white powdery layer over all or part of the stem.

The gills are always free, i.e. not attached to the stem. They mostly start whitish, or yellow-cream, turning pinkish buff then distinctly pink as the spores ripen. A few species have dark brown margins to the gills and this feature is usually easy to see with a hand lens. Many of the others can have white gill edges when very fresh, but this feature may disappear with age.

The spore print is always some shade of pink, ranging from brownish-pink to salmon.

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Habitat

Most grow on wood or wood chips; usually, but not exclusively, of deciduous trees. Several are also found on soil but these may be arising from buried litter or wood fragments. Some may have a preference for calcareous soils and associated woodlands and the genus as a whole is distinctly southern in distribution in Britain.

Microscopic characters

Some of the microscopic features of *Pluteus* offer limited help with identification as they show little variation between species. The spores are invariably smooth and oval but do vary somewhat in size and in the length to width ratio. The basidia are four-spored and of a similar shape and size in most species. The two features that show most variation are the microscopic structure of the outer skin of the cap (cuticle), and the shape of the cystidia. These features are described below in some detail to help those just making a start on studying the microscopic features of fungi.

Cap cuticle

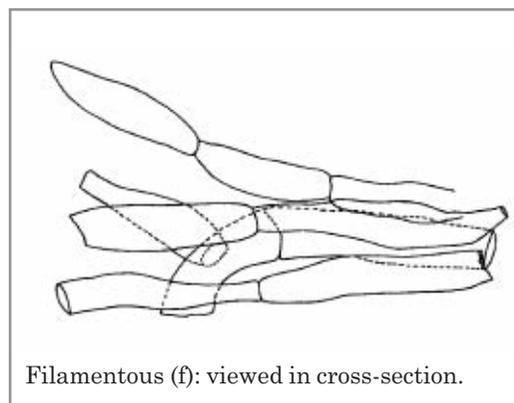
Scientifically the cap surface skin has been given various names, including cutis, cuticle, pellis or pileipellis. In this key the term cuticle is used. It is a simple matter to take a fine 'scalp' of cap tissue with a razor blade, place it on a glass slide, and to squash it with a staining agent (Congo red in ammonia is useful) under a cover slip (see Appendix 2). The structure of the cuticle should be readily apparent, particularly around the outer fringes of the preparation where the scalp tissue may be thinner. Cap cuticle structures can broadly be divided into three groups. These are illustrated here (Fig. 1), each with a code letter which is used in the key.

- 1) With only filamentous hyphae (f).
- 2) With a cellular structure; having cells which are round, oval or pyriform (pear-shaped) (c).
- 3) With a mixed structure, largely cellular with occasional longer cells (m).

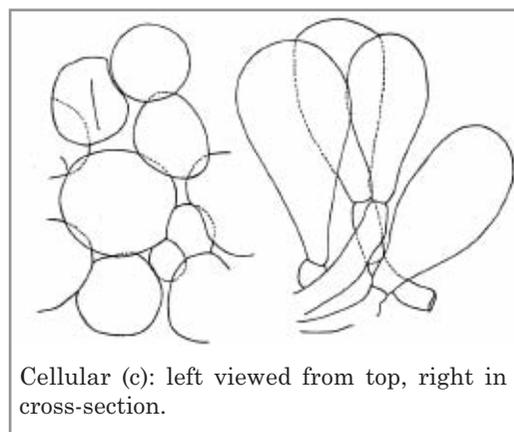
Note that in most species with a filamentous cuticle the filamentous hyphae all lie \pm flat. But in a few species, particularly near to the disc, they can become erect (e) in a palisade, giving a velvety appearance under the lens (Fig. 2). FN suggests that this occurs in only five species covered by this key, namely *P. ephebeus*, *P. hispidulus*, *P. leoninus*, *P. plautus* and *P. umbrosus*. A note to this effect is

included under the respective species descriptions.

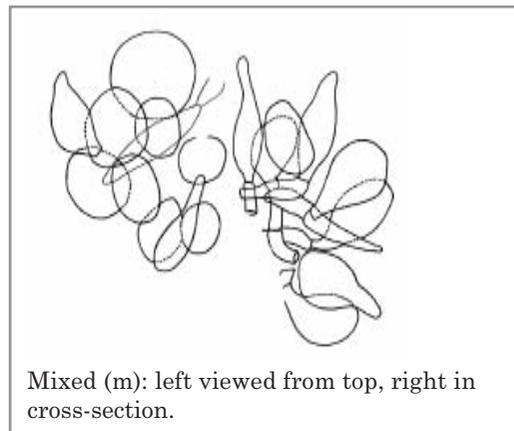
In some species there may be a thin layer of swollen cylindrical or fusiform hyphae underlying a cellular cuticle which could cause confusion when observed in a squash. This character is largely ignored in the keys in FN but is noted in the species descriptions in BFF4. It is not a sufficiently distinctive feature to be useful in identification and it has been ignored in this key.



Filamentous (f): viewed in cross-section.



Cellular (c): left viewed from top, right in cross-section.



Mixed (m): left viewed from top, right in cross-section.

Fig. 1. Types of cap cuticle.

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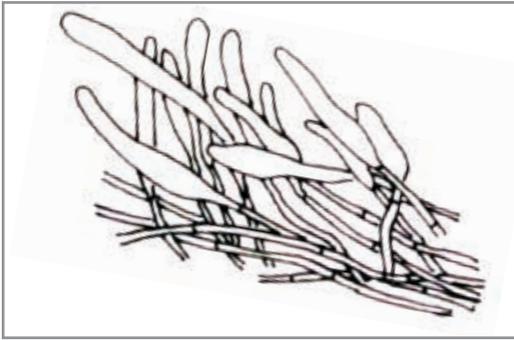


Fig. 2. Filamentous cuticle with erect swollen end cells – type (e).

A point to be aware of in field observations is that a wrinkled cap in *Pluteus* is indicative of a cellular cap cuticle. The wrinkles are formed by cellular elements riding up over each other in a way that doesn't happen with a filamentous cuticle.

Cystidia

Pleurocystidia, where present, are predominantly of four types (Fig. 3: a–d) and there can be a mix of shapes and sizes, even within any one species. One major group of species have thick-walled pleurocystidia with hook-like structures at the apex. These can be very useful aids to identification and are designated in the key with a suffix code f-hk (f to indicate that all these species have a filamentous cap cuticle, and hk for hooked cystidia). Other pleurocystidial shapes are too variable to be used as features in the key but they are noted under the species descriptions.

The cheilocystidia on the gill margin are in most species very similar to the pleurocystidia and are only mentioned in the species descriptions if they have distinctive features. Additional types (capitate with a rounded head and rostrate, meaning beaked) occur in a few species and are illustrated in Fig. 4.

The species covered by this key are all included in CBIB. *Funga Nordica* (FN) gives a different interpretation of some species, and omits some that are included in CBIB. For the purposes of this key the British checklist is given precedence. For the descriptions of species I have used FN as my main source but the microscopic features are mostly as described in BFF4, which provides more detail. *Fungi of Switzerland* Volume 4 by Breitenbach & Kränzlin (B&K4) was also used, but note that for some species it gives sketches of cap cuticle structure that differ from those described in both FN and BFF 4.

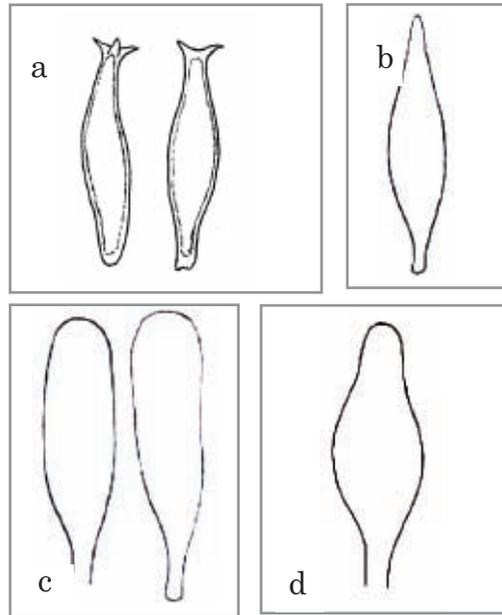


Fig.3: Pleurocystidia.

- a) Fusiform (cigar-shaped) and thick-walled with 2 to 4 hook structures at the apex.
- b) Fusiform and thin-walled.
- c) Clavate (club-shaped) and thin-walled.
- d) Lageniform and thin-walled. These are sometimes described as flask-shaped. Often the lower part is stalked

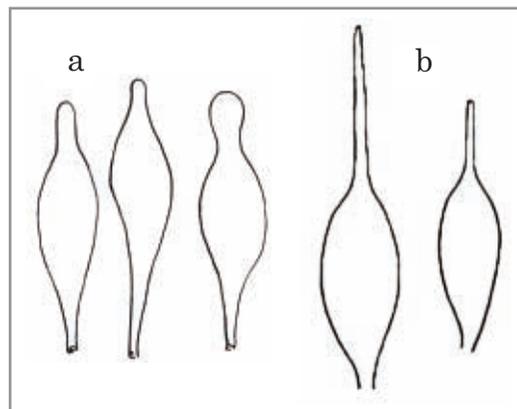


Fig. 4: Cheilocystidia.

- (a) sub-capitate to capitate. (b) rostrate

For illustrations of *Pluteus* those in Cortecuisse & Duhem (1995) are recommended.

Good photographic illustrations of *Pluteus* can be found in B&K4 but it is difficult in some cases to select photographs that truly represent species that are known to be variable. Also the interpretation of what may be valid species has changed somewhat since 1995 when that volume was published. Very

good photographs are provided in Phillips (2006) but only 13 *Pluteus* species are illustrated.

Key to the better known British *Pluteus* species

Note on suffix codes:

c = cellular cuticle

e = filamentous cuticle with erect end-cells

f = filamentous cuticle

f-hk = filamentous cuticle and with hooked pleuro-cystidia

m = mixed cuticle, i.e. cellular with some longer elements

- | | | | |
|------|--|--------|--|
| 1 | Cap wholly some shade of brown to grey.....2 | 10(9) | Cap pale grey, ± olive centre, rather tall, slender species..... <i>cinereofuscus</i> (c) |
| 1* | Cap wholly or partly with other colours.....18 | 10* | Cap buff, pale brown to darker grey-brown, translucently striate..... <i>satur</i> (c) |
| 2(1) | Generally robust species, cap over 5 cm diameter.....3 | 11(8) | Stem white with coarse brown fibrils, ± smell of radish, medium to very large species..... <i>cervinus</i> (f-hk) |
| 2* | Smaller, cap seldom exceeding 5 cm.....7 | 11* | Stem white, sometimes with brown squamules at base, small to medium species.....12 |
| 3(2) | Gills with dark margin, cap dark brown, smooth to velvety or scaly, at least at centre.....4 | 12(11) | Cap hygrophanous, red-brown, brick to cinnamon, waxy appearance, often strongly wrinkled..... <i>phlebophorus</i> (c) |
| 3* | Gill edges pale, cap mid to dark brown, smooth.....5 | 12* | Cap not hygrophanous, date-brown, sepia to paler, milky coffee.....13 |
| 4(3) | On deciduous wood..... <i>umbrosus</i> (ef) | 13(12) | Cap smooth, at most veined or wrinkled....14 |
| 4* | On conifer wood..... <i>atromarginatus</i> (f-hk) | 13* | Cap velvety to hairy, at least at centre.....16 |
| 5(3) | On deciduous wood.....6 | 14(13) | Cap dark date brown, fuscous, darkening when rubbed, small species, usually on soil... <i>nanus</i> (c) |
| 5* | On conifer wood..... <i>pouzarianus</i> (f-hk) | 14* | Cap sepia brown to red-brown, to milky coffee, unchanging when rubbed.....15 |
| 6(5) | Cap grey green, darker at centre, stipe often grey or blue-grey at base..... <i>salicinus</i> (f-hk) | 15(14) | Gills with faint brown flocculose margins, cap only rarely cracking..... <i>luctuosus</i> (c) |
| 6* | Cap usually brown, robust, fibrillose, stipe white to strongly brown fibrillose below..... <i>cervinus</i> (f-hk) | 15* | Gills with concolorous margins, cap often cracking both radially and transversely..... <i>dietrichii</i> (c) |
| 7(2) | Stem grey to brown with numerous dark brown punctate floccules, cap velvety brown..... <i>podospileus</i> (m) | 16(13) | Cap distinctly hairy to fibrillose, at least at centre, dark brown.....17 |
| 7* | Stem whitish to grey or brown but not prominently punctate with dark floccules...8 | 16* | Cap velvety, brown to grey-brown, stem whitish with brown scales at base..... <i>plautus</i> (ef) |
| 8(7) | Stem entirely or partially flushed grey.....9 | 17(16) | Cap dark brown, often splitting, stem white, medium size..... <i>ephebeus</i> (ef) |
| 8* | Stem white to brown.....11 | 17* | Cap dark brown, stem white, small species... <i>hispidulus</i> (ef) |
| 9(8) | Cap brown and usually with network of raised veins, stem white, floccose..... <i>thomsonii</i> (m) | 18(1) | Cap wholly or partly yellow.....19 |
| 9* | Cap grey to brown, smooth.....10 | 18* | Cap with other colours.....21 |
| | | 19(18) | Cap wholly yellow to yellow-green.....20 |
| | | 19* | Cap brown with ± yellow margin, stem yellow..... <i>romellii</i> (c) |

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- 20(19) Cap ± velvety-scaly at centre, stem yellow towards base, medium size**leoninus** (ef)
 20* Cap ± finely veined at centre, stem white ± yellow-green at base.....**chrysophaeus** (c)
- 21(18) Cap with reddish-brown, orange to bright red colours22
 21* Cap white, cream.....23
- 22(21) Cap orange to scarlet...**aurantiorugosus** (c)
 22* Cap orange-brown, date-brown, shiny-waxy, ± with reddish margin.....**phlebophorus** (c)
- 23(21) Cap white, with or without brown scales at centre, medium to robust species24
 23* Cap white to cream, smaller species.....25
- 24(23) Medium species, cap 3–8 cm, smooth shining white, stem white.....**pellitus** (f-hk)
 24* Large species, cap 4–13 cm, white with brownish scales towards centre
**petasatus** (f-hk)
- 25(23) Cap white to cream, ± olive or grey centre.....
**inquilinus** (c)
 25* Cap white to cream, scaly centre, white flakes on stem**plautus** (ef) (pale form)
 (Footnote to couplet 25: These two species have been much confused. The second is listed in FN under the name *P. semibulbosus*.)

[Editor's note: The name *P. semibulbosus* is probably better rejected as a *nomen confusum*. In the sense of BFF4 and in the description in Phillips it equates to *P. inquilinus*, but the actual collection illustrated in Phillips has been re-examined and found to have a filamentous cuticle and thus equates to the concept of this name in FN!]

Species descriptions

Names are as entered in CBIB with synonyms in brackets. Descriptions generally follow those in *Funga Nordica* (FN). Some features are fairly constant throughout the genus and are not repeated in the species descriptions. These include caps with some radial veining towards the centre; stems which are even or slightly tapered from a broadened base; gills whitish becoming pink as spores mature. Microscopic characters are taken from FN if noted there, otherwise from BFF4 which gives more detail.

P. atromarginatus

Cap: 3.5–16 cm, dark brown, sometimes paler towards margin, with central scales and radial fibrils.

Stem: white or cream with brown fibrils and scales, base bulbous.

Gills: with dark brown margins but this feature may be intermittent.

Flesh: whitish, ± thin brown layer under cuticle.

Microcharacters: cuticle filamentous; pleurocystidia hooked.

Habitat: on conifers or conifer sawdust.

Distribution: uncommon but widespread.

Main features: dark brown colour, coloured gill edges and conifer habitat.

Look-alikes: *P. umbrosus* has a more velvety cap and is found on deciduous wood; *P. pouzarianus* is found on conifer wood but has concolorous gills; dark forms of *P. cervinus* have concolorous gills and occur only on deciduous wood.

P. aurantiorugosus (Fig. 5)

Cap: 2–6 cm, orange to orange-scarlet, ± yellow patches or occasionally entirely yellow.

Stem: whitish becoming yellow towards base.

Flesh: whitish to yellow.

Microcharacters: cuticle cellular ± clavate cells; pleurocystidia fusiform-clavate-lageniform.

Habitat: on very rotten deciduous wood, mainly elm logs.

Distribution: rare, thought to be a southern species.

Main features: distinctive bright red or orange colours.

P. cervinus

Cap: 2–15 cm, mid-brown but sometimes very dark; smooth ± scaly at centre.

Stem: whitish with brown fibrils, base bulbous.

Flesh: whitish, can have a brown layer under cuticle and brown at stem base, ± smell of radish.

Microcharacters: cuticle filamentous; pleurocystidia hooked; cheilocystidia small, clavate to clavate-globose.

Habitat: on deciduous logs, wood chips and sawdust.

Distribution: very common everywhere.

Main features: Fibrillose cap and stem, radish odour. Note that it has a very wide size range.

Look-alikes: *P. pouzarianus* is very similar but is found only on conifer wood; *P. atromarginatus* is dark brown with brown gill margins and also on conifer wood; *P. umbrosus* has a dark brown velvety cap and dark brown gill margins.



Fig. 5. *Pluteus aurantiorugosus* with bright red-orange cap. Photograph © Malcolm Storey.

P. chrysophaeus

(syn. *P. galerooides*; *P. luteovirens*; *P. xanthophaeus*)

Cap: 1.5–4 cm, tawny yellow to greenish yellow, smooth to wrinkled.

Stem: whitish to cream, may be tinged yellow-green at base.

Flesh: white to cream ± yellowish.

Microcharacters: cuticle cellular; pleurocystidia fusiform-lageniform.

Habitat: on rotten deciduous wood, singly or in groups.

Distribution: widespread.

Main features: yellow colour, smooth to slightly wrinkled cap, whitish stem ± yellow at base.

Look-alikes: *P. leoninus* which is believed to be quite rare and has a filamentous cap cuticle.

(See the article by Kibby, Burnham, and Henrici elsewhere in this issue for a discussion of the nomenclatural and taxonomic issues surrounding this species.)

P. cinereofuscus (Fig. 6)

(syn. *P. godeyi*; *P. olivaceus*)

Cap: 1.5–5 cm, greyish to grey-brown, translucently striate when moist.

Stem: white to cream or pale grey, smooth and shiny, slender.

Flesh: white to greyish with an earthy smell.

Microcharacters: cuticle cellular; pleurocystidia fusiform-lageniform ± long slender necks, occasionally pointed.

Habitat: on dead deciduous wood or on soil, particularly on calcareous ground.

Distribution: uncommon, sometimes recorded in the past under the name *P. godeyi*.

Main features: greyish cap colour and slender form.

P. dietrichii

(syn. *P. rimulosus*)

Cap: 1.5–5 cm, red-brown, but can be grey-brown to

dark-brown, frequently with radial and concentric splitting.

Stem: white to pale grey-brown.

Microcharacters: cuticle cellular, cells ± clavate; pleurocystidia absent or scarce, clavate; spores large, ellipsoid.

Habitat: generally on soil in parks and deciduous woodlands.

Distribution: uncommon, recorded until recently under the name *P. rimulosus*.

Main features: radial splitting of cuticle to reveal flesh beneath, ± red-brown cap colour.

P. ephebeus

(syn. *P. murinus*; *P. pearsonii*; *P. villosus*; *P. lepiotoides*)

Cap: 3–10 cm, dark brown, hairy and radially fibrillose, often splitting to show flesh beneath.

Stem: white to greyish, striate with brownish fibrils towards the base.

Flesh: whitish, pale grey-brown towards stem base.

Microcharacters: cuticle filamentous with erect swollen end cells – type (e) (See Fig. 2); pleurocystidia clavate-lageniform.

Habitat: on soil but also reported on rotten wood or sawdust; possibly preferring calcareous soils.

Distribution: uncommon but has confusing look-alikes and may be under-recorded.

Main features: cap distinctly fibrillose with radial splitting.

Look-alikes: *P. plautus* which is smaller with a velvety, not hairy cap, with no radial splitting.

P. hispidulus (Fig. 7)

Cap: 0.5–2.5 cm, grey-brown to dark-brown, distinctly hairy, ± scaly centre.

Stem: slender, white, silkily striate.

Microcharacters: cuticle filamentous with erect swollen end cells–type (e) (See Fig. 2); pleurocystidia absent to scarce, clavate ± sub-capitate.

Habitat: on moss-covered rotten wood.

Distribution: not uncommon, at least in the south.

Main features: very small size, dark brown colours, fibrillose hairy to scaly cap.

Look-alikes: small size separates it from most others having a brown cap and white stem.

P. inquilinus

Cap: 1–3 cm, white to cream, smooth but can be veined at centre.

Stem: white, shiny striate.

Microcharacters: cuticle cellular; pleurocystidia

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Fig. 6. *Pluteus cinereofuscus* with grey-brown to olivaceous tones and cellular cap cuticle. Photograph © Alan Outen.



Fig. 7. *Pluteus hispidulus* with a hairy-tomentose cap surface, growing on its typical substrate of moss-covered wood. NB. Here shown twice life size. Photograph © Alan Outen.

lageniform.

Habitat: on soil and rotten wood.

Distribution: uncommon but widespread in England.

Main features: small size, white to cream colour.

Look-alikes: a similar taxon with a filamentous cuticle is considered to be a pale form of *P. plautus*.

P. leoninus (Fig. 8)

Cap: 3–6 cm, bright golden yellow, finely velvety centre veined with ± pale brown tints.

Stem: white becoming yellow to yellow-brown towards the base.

Flesh: whitish ± tinged yellow, taste or smell faintly of radish.

Microcharacters: cuticle filamentous with erect swollen end cells - type (e) (See Fig. 2); pleurocystidia fusiform-lageniform.

Habitat: on rotten deciduous wood and woodchips.

Distribution: rare, but possibly under-recorded.

Main features: medium size, bright yellow colour and velvety cuticle.

Look-alikes: *P. chrysophaeus*, but this has a cellular cap cuticle.



Fig. 8. *Pluteus leoninus* is well named with its tawny-yellow cap and stipe. Photograph © Malcolm Storey.

P. luctuosus

(syn. *P. marginatus*)

Cap: 2–6 cm, buff to pale grey-brown, waxy-shiny texture, veined at centre.

Stem: white, striate, smooth and shiny, with ± brown fibrils.

Gills: whitish becoming brownish-pink, with faint or intermittent brown margin.

Microcharacters: cuticle cellular; pleurocystidia lageniform.

Habitat: on rotten wood, particularly beech.

Distribution: uncommon but widespread.

Main features: brown margin to gills, but you may need to use a hand lens to see this feature..

Look-alikes: there are several similar small brown species but they lack brownish gill margins.

P. nanus

(syn. *P. griseopus*)

Cap: 1–5 cm, mid-brown to dark brown, becoming darker when rubbed.

Stem: white to pale grey, fibrillose to flocculose.

Flesh: whitish to greyish.

Microcharacters: cuticle cellular; pleurocystidia fusiform-lageniform.

Habitat: usually on soil but may also arise from buried wood fragments.

Distribution: not uncommon but possibly overlooked or misidentified.

Main features: small size, dark brown cap which darkens further when rubbed.

P. pellitus

Cap: 3–8 cm, smooth, shiny, white with ± cream to pale yellow tints at centre.

Stem: white, cylindrical with ± broader base.

Flesh: white, can smell or taste of radish.

Microcharacters: cuticle filamentous; pleurocystidia hooked.

Habitat: occurs singly or in groups on rotten wood, recorded on elm, beech, oak and ash.

Distribution: very widespread but seemingly uncommon.

Main features: medium to large size and shiny, smooth white cap, gills narrow at cap margin.

Look-alikes: *P. inquilinus* and the white form of *P. plautus*, though these are smaller; also less scaly forms of *P. petasatus*.

(See p. 99 for a discussion of this species by Kibby, Burnham and Henrici)

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P. petasatus (Fig. 9)(syn. *P. patricius*)

Cap: 4–13 cm, mainly white, but with coarse pale-brown scales at centre.

Stem: white with a hard texture, with ± brown fibrils, base swollen, bulbous,

Flesh: white with ± pleasant fruity smell, though some guides say smell is strong and unpleasant.

Microcharacters: cuticle filamentous; pleurocystidia hooked.

Habitat: on deciduous wood, wood fragments and sawdust.

Distribution: widespread but uncommon

Main Features: large size, cap slow to expand with gills remaining a long time white and broadest at cap margin, presence of coarse brown scales at cap centre (but not always!).

Look-alikes: at first sight very similar to a *Macrolepiota* with a scaly cap and bulbous stem base.

P. phlebophorus (Fig. 10 & front cover)

Cap: 2–6 cm, buff to pale red-brown to grey-brown, ± cinnamon red at margin, waxy-shiny surface.

Stem: cream to pale yellow-brown ± cinnamon at base.

Flesh: whitish to pale brown.

Microcharacters: cuticle cellular; pleurocystidia fusiform-lageniform.

Habitat: on deciduous wood.

Distribution: fairly common and widely distributed.

Main features: cap colour and waxy texture, can be strongly veined, colour of stem base.

P. plautus(syn. *P. boudieri*; *P. depauperatus*; *P. punctipes*; *P.**dryophiloides*; *P. gracilis*; *P. granulatus*)

Cap: 1.5–5 cm, grey-brown to dark brown and distinctively velvety, ± scaly at centre.

Stem: white to greyish with dense brown scales on lower half.

Flesh: whitish to grey-brown, can smell of wine.

Microcharacters: cuticle filamentous with erect swollen end cells–type (e) (See Fig. 2); pleurocystidia lageniform ± with apical points.

Habitat: on rotten wood, both deciduous and coniferous, also recorded on straw heaps.

Distribution: uncertain, may have been recorded under other names, misidentified or under-recorded.

Main features: the velvety-hairy cap surface.

Look-alikes: there are several similar species but the cap surface texture is distinctive.

P. plautus (pale form)

Cap: 1.5–5 cm, white to cream ± olivaceous at centre, velvety/scaly at centre.

Stem: whitish ± pale hazel-brown at base, with whitish floccules throughout ± brown scales at base with age.

Flesh: whitish to very pale grey.



Fig. 9. *Pluteus petasatus* showing the very characteristic broad gills at the cap margin, which turn pink only very slowly. Note the almost smooth cap; this species varies enormously in the degree of scaliness at the cap centre. Photograph © Alan Outen.



Fig. 10. *Pluteus phlebophorus* with yellow-brown to amber cap is frequently wrinkled and puckered at the centre because of the cellular cap cuticle. Epping Forest, Essex, April, 2002. Photograph © G. Kibby.

Microcharacters: cuticle filamentous with erect swollen end cells—type (e) (See Fig. 2); pleurocystidia fusiform-lageniform.

Habitat: on deciduous wood.

Distribution: believed widespread but possibly misidentified or under-recorded.

Main features: small to medium whitish species with a filamentous cuticle.

Look-alikes: *P. inquilinus* but this has a cellular cuticle. Possibly recorded in the past as *P. boudieri* or *P. depauperatus*. (See BFF4 and B&K 4 No.117). Listed as *P. semibulbosus* in FN.

P. podospileus (Fig. 11)

(syn. *P. minutissimus*; *P. seticeps*)

Cap: 1–3 cm, mid to dark-brown, with distinctive velvety texture, ± radial cracks in cuticle.

Stem: often with bulb at base, whitish becoming grey, with dense dark brown floccules/scales on lower half.

Flesh: whitish.

Microcharacters: cuticle mixed; pleurocystidia fusiform-clavate.

Habitat: on soil or rotten deciduous wood.

Distribution: Not uncommon in southern calcareous woodlands, uncommon further north.

Main features: small size, velvety cap and flocculose

stem.

Look-alikes: difficult to confuse with other species.

P. pouzarianus

Cap: 4–9 cm, dark grey-brown, ± scaly at centre, otherwise smooth and radially fibrillose.

Stem: white to pale brown ± with brown longitudinal fibrils, base bulbous.

Flesh: whitish; smell weak to sweetish, or can be of radish.

Microcharacters: cuticle filamentous; pleurocystidia hooked. NB. has clamps in cap cuticle hyphae (*P. cervinus* does not)

Habitat: on rotting conifer wood or may be on needles or soil in conifer woods.

Distribution: uncommon but may be under-recorded (probably often mistakenly recorded as *P. cervinus* on conifer wood)

Main features: very similar to *P. cervinus*, but exclusive to conifer wood.

Look-alikes: *P. cervinus*, but usually greyer than that species.

P. romellii (Fig. 12)

(syn. *P. lutescens*; *P. splendidus*)

Cap: 2–6 cm, light to mid-brown, ± yellow margin, veined or wrinkled towards centre.

Stem: pale yellow, more strongly yellow towards base.

Flesh: whitish, yellow towards stem base.

Microcharacters: cuticle cellular; pleurocystidia sparse, broadly clavate-lageniform.

Habitat: on deciduous wood or sawdust, or on soil from buried wood.

Distribution: fairly common and widely distributed, formerly recorded as *P. lutescens*.

Main features: hazel brown cap, with or without yellow margin, yellow stem base.

P. salicinus

Cap: 3–7 cm, pale grey-green, ± blackish scales at centre.

Stem: whitish to pale grey, often grey-green at base.

Flesh: whitish, pale grey at stem base.

Microcharacters: cuticle filamentous; pleurocystidia hooked.

Habitat: on deciduous wood.

Distribution: common and widespread.

Main features: grey-green cap colours, pale grey stem.

Look-alikes: some greyish forms of *P. cervinus* or *P. pouzarianus* might look similar.

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Fig. 11. *Pluteus podospileus* is a small species with punctate stem and velvety cap. Photographs © Malcolm Storey.

P. satur

(syn. *P. pallescens*)

Cap: 2–6 cm, buff to pale grey-brown, shiny-waxy texture, hygrophanous, translucently striate when moist.

Stem: whitish to cream, silky striate, shiny.

Flesh: whitish to pale brown.

Microcharacters: cuticle cellular; pleurocystidia broadly clavate; \pm lageniform; cheilocystidia unusually broad.

Habitat: on deciduous wood, possibly preferring calcareous ground.

Distribution: uncommon, scattered records from the Midlands to the southern counties.

Main features: cap colours, shiny-waxy appearance, distinctly hygrophanous.

P. thomsonii (Fig. 13)

Cap: 1–3 cm, pale to dark brown, very strongly wrinkled with prominent paler veins.

Stem: greyish, with pale brown floccules, particularly towards base.

Flesh: whitish to greyish.

Microcharacters: cuticle \pm mixed, occasional cells with needle points; pleurocystidia absent or sparse, fusiform-clavate \pm with extended needle-like points (see Fig. 3); cheilocystidia fusiform-clavate some with extended needle-like points.

Habitat: on rotten deciduous wood and on soil, possibly from buried wood.

Distribution: uncommon, mainly in southern calcareous woodlands.

Main features: very strongly veined, small brown cap, greyish stem.

P. umbrosus

Cap: 3–10 cm, mid to dark brown, strongly velvety appearance, \pm veined at centre.

Stem: whitish to pale brown with bulbous base, lower part covered with brown scales and fibrils.

Gills: with obvious dark brown margins.

Flesh: whitish-grey \pm brown layer under cap cuticle, pungent acid smell when cut.

Microcharacters: cuticle filamentous with erect swollen end cells type (e) (See Fig. 2); pleurocystidia thin-walled fusiform-lageniform.

Habitat: deciduous wood.

Distribution: Widespread in the south and Midlands, rarer further north. Formerly common on elm.

Main features: dark brown velvety squamules often arranged in veins or ridges on cap and also on stem, dark margins to gills, acid smell.

Look-alikes: *P. atromarginatus* shares the dark brown gill edge but is otherwise very different with a smooth to fibrillose cap and fibrous stem.



Fig. 12. *Pluteus romellii* usually has a delicate flush of yellow on its stem contrasting with the brown cap. Photograph © Alan Outen.



Fig. 13. *Pluteus thomsonii* showing the remarkably wrinkled and veined cap surface which is often prominent on this species. Photograph © Malcolm Storey.

Appendix 1

Notes on species not included in the key.

The following species were accepted as British in the 2005 Basidiomycota Checklist (CBIB) but have been omitted from the key above: *P. exiguus*, *P. griseoluridus*, *P. insidiosus*, *P. pseudorobertii* and *P. robertii*. All of these species have been very little recorded. They have been accepted as British on the basis of one or two authenticated UK records. The fact that some may not have been recorded elsewhere in Europe does not necessarily mean that they are not true species. The following descriptions may help with their identification, hopefully leading to more British finds in the future. The descriptions are derived from BFF4, and from FN if included there. Notes from other sources have been added. It is stressed that any records of these species should be submitted, with photographs, descriptions and dried material, to an expert for confirmation.

P. exiguus

This is generally agreed to be a rare close relative of *P. hispidulus*, growing only on calcareous soil, but there is some lack of agreement on which are the key differentiating characters. *P. hispidulus* usually differs in growing on wood but can probably also grow on soil and can certainly grow on buried wood and thus apparently from soil. *P. exiguus* has subcapitate cystidia, narrower than the usual

clavate cystidia of *P. hispidulus*, but a variety *P. hispidulus* var. *cephalocystis* has been described (probably also British) with cystidia very similar to those of *P. exiguus* (*P. exiguus* sensu Moser would appear to equate to this variety). So neither habitat nor cystidia are sufficient to identify *P. exiguus*. The crucial difference may be in the structure of the cap cuticle. It is type (e) of this article in *P. exiguus* while it is largely type (f) in *P. hispidulus*. Orton in BFF4 somewhat hesitantly assigned a single British collection to *P. exiguus* (from the North Downs chalk).

P. griseoluridus

CBIB says 'Known from Lincolnshire, Middlesex, Surrey and South Hampshire. Reported elsewhere, but unsupported by voucher material'.

Cap: 1.1 to 4 cm, dark brown, mid-brown, to fawn, hazel or milky coffee when fresh, drying pale grey to grey-buff with a darker centre; convex often with a pronounced umbo, finely veined at centre, silky striate at margin; hygrophonous.

Stem: white becoming grey with age from the base upwards.

Flesh: hazel to clay-buff in the cap, contrasting with white to pale grey in the stem.

Microcharacters: cheilocystidia very variable, pyriform (pear-shaped), clavate, fusiform, lageniform; pleurocystidia lageniform ± with long narrow neck; spores broadly oval to sub-globose; cap cuticle

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cellular.

Habitat: on soil or on deciduous wood.

Distribution: possibly widespread in the UK.

Main Features: hygrophanous cap, contrasting flesh colours, long-necked pleurocystidia.

Look-alikes: *P. nanus* but that species has darker colours.

Comment: this species is not included in FN. It was described by Peter Orton in 1984 who thought it to be a distinctive species and to be common and widespread in the UK, though possibly misidentified in the past as a pale form of *P. nanus*. It has not been discussed by subsequent European authors, who have presumably been unconvinced by its distinction from *P. nanus*.

P. insidiosus

CBIB says 'Two collections, from Shropshire (Oaks Wood) in 2000 and Surrey (Sheen Common) in 2004.

Cap: 1.5 to 4 cm, grey-brown to dark-brown; convex with an umbo; smooth or slightly veined towards the centre.

Stem: white to pale grey, striate, smooth and shiny.

Flesh: whitish to greyish.

Microcharacters: cheilocystidia fusiform to lageniform and rostrate i.e. with apical extended points (similar to *P. thomsonii*) (see Fig.4); pleurocystidia absent to sparse and similar to cheilocystidia; spores oval to sub-globose; cap cuticle cellular.

Habitat: on soil or rotten wood in damp deciduous woodland.

Distribution: as yet unknown.

Main Features: the rostrate cheilocystidia.

Look-alikes: *P. nanus* and *P. phlebophorus* in the field; microscopically the cheilocystidia are like those of *P. thomsonii* but that species has a different cap cuticle.

Comment: only described in 1985 (from W. Germany and the Netherlands), too late to appear in BFF4 (1986). Probably rather uncommon.

P. pseudorobertii

CBIB says 'Accepted on the basis of the record in BFF4 and a specimen in herb. E from Somerset. Poorly known in Britain and most records are unsubstantiated with voucher material'.

Cap: 2 to 5 cm, whitish, buff to grey vinaceous-buff, scales at centre olivaceous to blackish; convex, often with an umbo, fibrillose to minutely scaly especially around the centre.

Stem: solid and tough; whitish to pale buff, pruinose at apex otherwise silky fibrillose.

Flesh: whitish in cap and stem ± ivory at stem base.

Smell: strongly mouldy-fungussy.

Microcharacters: Pleurocystidia fusiform-lageniform with 2-3 hooks at apex; spores broadly oval to sub-globose; cap cuticle filamentous.

Habitat: on deciduous wood.

Distribution: uncommon; first British record Yorkshire in 1983.

Main Features: hooked pleurocystidia.

Look-alikes: small specimens of *P. cervinus*.

Comment: included in Moser. FN has it as a synonym of *P. petasatus*. In B&K4 No.115 the description given of *P. petasatus* is close to the above descriptions of *P. pseudorobertii*, as is the accompanying photograph. Elsewhere *P. petasatus* is usually described as a large white species with variable amounts of brown scales on the cap.

P. robertii

CBIB says 'Known from Middlesex (Ealing, Perivale Wood). Reported from Berkshire, Huntingdonshire, and South Hampshire but unsubstantiated with voucher material. In FAN2 this is considered a synonym of *P. ephebeus*'.

Cap: 2.5 to 4 cm, whitish or creamy buff with fine radiating brown streaks and with small blackish-brown scales at the centre; convex, with a ± prominent umbo.

Stem: pale buff becoming reddish-brown towards the base.

Flesh: pale buff in cap and stem.

Microcharacters: cheilocystidia ± broadly clavate to fusiform or lageniform; Pleurocystidia fusiform or lageniform of varying breadth and with apex of two distinct forms, either narrow or broad; spores broadly oval to sub-globose; cap cuticle filamentous.

Habitat: on deciduous wood.

Distribution: unknown.

Main Features: dark scales at centre on a pale background.

Look-alikes: possibly resembling a small version of *P. petasatus* but lacking hooked cystidia.

Comment: The Middlesex record agrees well with a description by Derek Reid of a collection on beech wood in Buckinghamshire in 1967. FN excludes this species. FAN2 regards it as a synonym of *P. ephebeus* and Reid's interpretation as mistaken. [Moser includes it as a valid species on beech wood (possibly based on the Derek Reid collection described in BFF4?).

One to look out for:***P. bullii***

CBIB: not a confirmed UK species so excluded to date [But see article on *Pluteus* by Kibby, Burnham & Henrici elsewhere in this issue for further notes on this species – Editor].

Cap: up to 14 cm. Described as a large form of *P. cervinus* ± paler in colour

Stem: as *P. cervinus*.

Microcharacters: pleurocystidia thick-walled fusiform ± 2-3 hooks at apex, but with a large proportion (up to half) narrowly fusiform with single acute points ± with two opposing small side projections (Fig. 14); cap cuticle filamentous.

Habitat: only on woodchips or sawdust to date.

Distribution: records from Kew Gardens, Scotland, Sussex and Sheffield – all relatively recent.

Main Features: the pleurocystidia and the habitat.

Look-alikes: large forms of *P. cervinus*.

Comment: First described by Berkeley and accepted by Rea. Found in the UK at three locations but not yet included in CBIB. It could be an aberrant form of *P. cervinus* but more collections are required so that this can be resolved. See 'Notes and Records' in Field Mycology Volume 5(3) July 2004 - page 103.

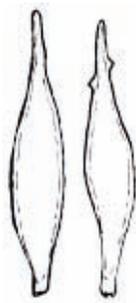


Fig. 14. Examples of the unusual narrow cheilocystidia in *P. bullii* with either a single point or with tiny side projections near the apex.

Appendix 2 (contributed by Archie McAdam) Cutting a Cap Cuticle - Figs 15–19.

Materials required:

Reading glasses and good light

Two microscope slides

Water in a dropper bottle

Razor blade



Fig. 15. Take a thin slice, about 3-5 mm thick, from the fruiting body and place it between two slides. Photo © A. McAdam.



Fig. 16. This shows the appearance at an angle. Water is dropped on top of the cap between the slides before cutting it. Photo © A. McAdam.



Fig. 17. After soaking the specimen with water, cut a section as thin as possible from the side nearest to the front slide. It is a good idea to cut several slices till you get what you want. It is important not to cut too thin a specimen so that the surface layer which is the cap cuticle remains intact. Photo © A. McAdam.

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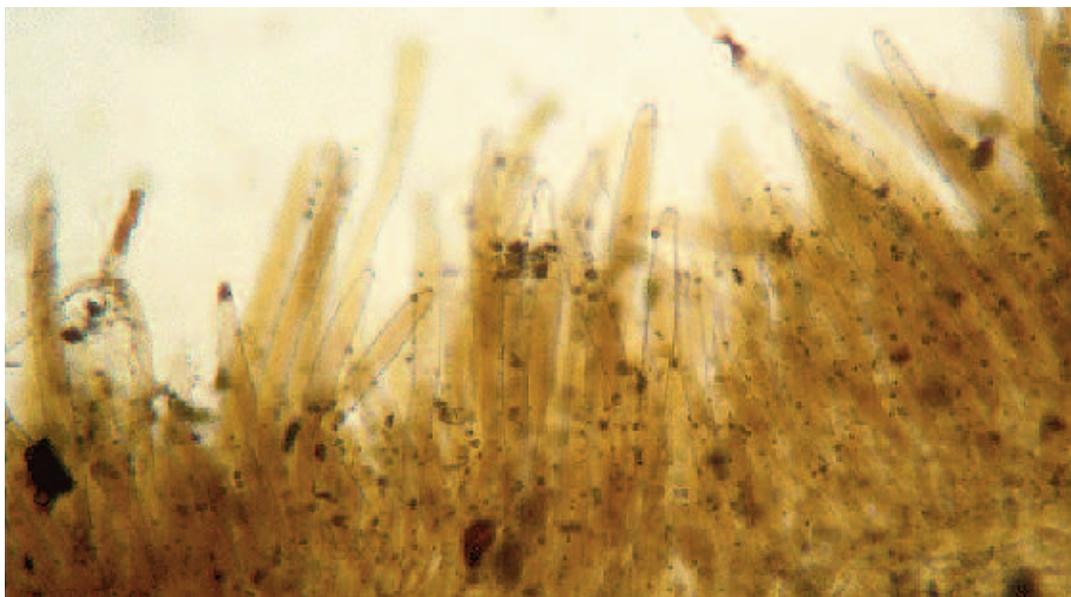


Fig. 18. The microscopic appearance of the cap cuticle from *Pluteus thomsonii*, near the centre of the cap, showing a fairly uniform, filamentous appearance. Cut using the technique described. Photo © A. McAdam.

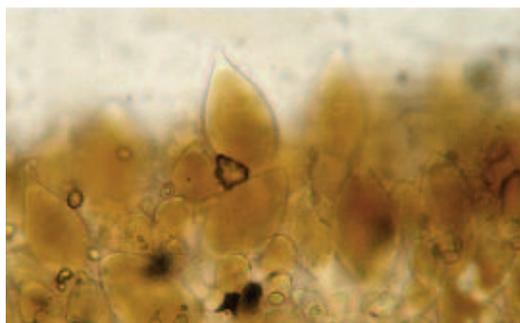


Fig. 19. Shows the appearance of the same cap cuticle from *Pluteus thomsonii*, lateral to that in Fig. 4 and at a higher magnification. It shows the more mixed structure of the cap, with many swollen cells at that point. Photo © A. McAdam.

Acknowledgements

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References

- Bas, C., Kuyper, T.W., Noordeloos, M.E., & Vellinga, E.C., Eds. (1990). *Flora Agaricina Neerlandica*. Volume 2. Balkema, Rotterdam.
- Breitenbach, J. & Kränzlin, F (1995). *Fungi of Switzerland*, Volume 4 Agarics 2nd part. Lucerne.
- Courtecuisse, R & Duhem, B (1995). *Mushrooms & Toadstools of Britain & Europe*. HarperCollins, London.
- Knudsen, H. & Vesterholt, J., Eds. (2008). *Funga Nordica*. Nordsvamp, Copenhagen.
- Legon, N.W. & Henrici, A. (2005). *Checklist of the British and Irish Basidiomycota*. Royal Botanic Gardens, London.
- Moser, M. (1978-English Translation 1983). *Keys to Agarics and Boleti*. Roger Phillips, London.
- Orton, P.D. (1986) *British Fungus Flora* Volume. 4 *Pluteaceae*. Royal Botanic Garden, Edinburgh.
- Phillips, R (2006) *Mushrooms*. Macmillan, London.