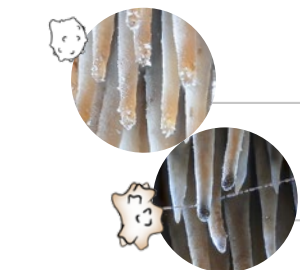


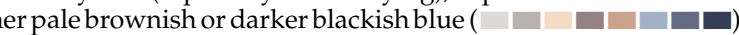
## Key to thelephoralean, stipitate hydroid fungi


All spore measurements are without ornament.

### Synopsis

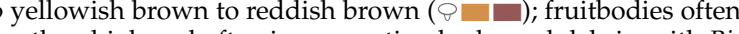
- Smell curry-like (especially when drying); spores whitish . . . . . 2  
 Smell different (farinaceous, sweetish, marzipan-like etc.); spores brownish  
 - Flesh of the cap rather tough . . . . . 12  
 - Flesh of the cap brittle . . . . . 25





1. Smell curry-like (especially when drying); cap and stem often with rather pale brownish or darker blackish blue (  ) colours; spores hyalin with an ornament of undivided spines; without clamps . . . . . [*Phellodon*] . . 2

- Smell different (e.g. farinaceous, sweetish, marzipan-like or Fernet Branca-like) or absent; cap and stem with darker brown or saturated colours (  ); spores brown, warted-spiny of often irregular and bifurcate warts; with or without clamps . . . . . [*Hydnellum* and *Sarcodon*] . 11

2. Cap flesh brittle and often rather thick . . . . . 3  
 Cap flesh tough and often rather thin . . . . . 4

3. Cap yellowish brown to reddish brown (  ); fruitbodies often wider than high and often incorporating herbs and debris; with *Pinus*; spore-Q 1.5-1.6. Spores spiny-warted, 4.2-5.5 x 2.6-3.5 µm, possibly slightly bend and nodulose; on sandy soil; very rare . . . . . *Phellodon fuligineoalbus*

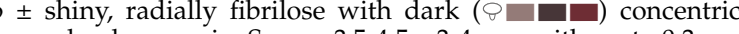
- Cap clay-pink to vinaceous grey (  ), often with a violet shade; fruitbodies often taller than wide, hardly incorporating herbs and debris; with *Picea* and *Abies*; spore-Q 1-1.3. Spores spiny, 4.5-5.5 x 4-4.5 µm; on sandy and possibly calcareous and disturbed soil; rare . . . . . *Phellodon violascens*

4. Cap surface either with radial fibres or finely felted; flesh of the cap pale to brown; stem rather thin and hardly with an obvious dark felty layer; spines white, pale greyish brown to pinkish buff (  ) . . . . . 5


- Cap center with a deep, spongy, greyish brown, dark brown to almost blueish black felt; spines greyish and often with a blueish shade (  ) . . . . . [*Phellodon niger* s.l.] . . 8


5. Spores on average around 2.6 µm wide (in side view and without ornament); cap up to 30 mm wide, ± woolly-felted. Spores 2.6-3.4 x 2.4-2.7 µm with up to 0.4 mm high spines; below lying trunks of *Pinus*, more rarely growing on the ground and possibly also with species of *Fagaceae* . . . . . *Phellodon secretus*

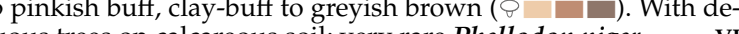

- Spores on average wider; cap mostly wider, felted or with more radial structure . . . . . 6

6. Cap ± shiny, radially fibrillose with dark (  ) concentric zones and paler margin. Spores 3.5-4.5 x 3-4 µm, with up to 0.3 µm high spines; on poor soil with coniferous trees or rarely deciduous trees, often on dug up material from ditches; scattered . . . . . *Phellodon connatus*

- Cap more fluffy-felted and/or paler . . . . . 7

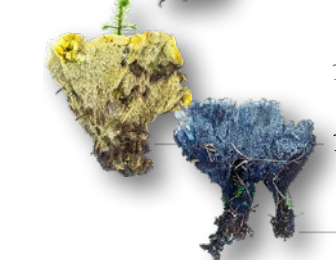
7. Cap center rather pale brown (  ) with fluffy, concentric zones and pale margin; with coniferous trees. Spores 3-4 x 2-3.5 µm, with 0.2 µm high spines; on poor, sandy soil; rare . . . . . *Phellodon tomentosus*




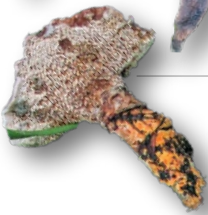



- Cap center pale to dark brown (  ), in places with a rather deep, upright felt, hardly with concentric zones, but with pale margin; with deciduous trees. Spores 3-4.5 x 2.7-4 µm, with up to 0.3 µm high spines; on poor soil; rare . . . . . *Phellodon confluens*

8. Cap pinkish buff, clay-buff to greyish brown (  ). With deciduous trees on calcareous soil; very rare *Phellodon niger* group VI  
 Cap dark brown to blueish black (  ) . . . . . 9

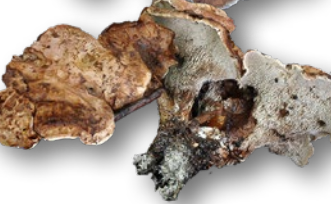


9. Cap often very dark or with blueish black colours (☐ ■ ■ ■ ■); with coniferous trees ..... *Phellodon niger* group V  
 Cap without blueish colours (☐ ■ ■ ■ ■); with deciduous and coniferous trees ..... 10
10. Fruitbodies rather gracile; very rare ..... *Phellodon niger* group VII  
 Fruitbodies large and compact; very rare ..... *Phellodon niger* group III
11. Fruitbodies tough as leather and often rather thin fleshed. .... 12  
 Fruitbodies rather brittle and more fleshy ..... 25
12. Flesh of the stem with orange (■ ■ ■ ■ ■) colours ..... 13  
 Flesh of the stem brown, yellowish or blueish ..... 15
13. Cap margin and flesh of the cap with blue (■ ■ ■ ■ ■) colours. With farinaceous smell; spores brown, 5.5-6 x 3.5-4.5 µm; without clamps; on poor soil with *Picea* and *Pinus*, rarely with *Abies* or *Fagus*; rare ..... *Hydnellum caeruleum*  
 Cap and flesh without blue colours ..... 14
14. Cap brownish (☐ ■ ■ ■ ■) with whitish margin; spines whitish to pale orange. Smell weak; spores brown, bifurcate, 5.5-6.5 x 4.5-5 µm; with up to 1.5 µm high ornament; without clamps; on poor or calcareous soil with coniferous trees; rare ..... *Hydnellum aurantiacum*  
 Cap ± orange (☐ ■ ■ ■ ■) with whitish margin; spines ± orange. Smell weak; taste bitter and farinaceous; spores brown, with coarse warts, 5-6 x 3.5-4.5 µm; without clamps; on calcareous soil with *Fagus* or coniferous trees; rare ..... *Hydnellum auratile*
15. Stem yellow or blue (☐ ■ ■ ■ ■) ..... 16  
 Stem ± brown ..... 17
16. Stem (and other parts) yellow (☐ ■ ■ ■ ■). Spores brown, warty, 4.5-5 x 3-3.5 µm; without clamps; in rich, possibly calcareous *Picea* forests ..... *Hydnellum geogenium*  
 Stem (and other parts) blue (☐ ■ ■ ■ ■). With strong anis-like smell; with clamps; spores brown, with a somewhat nodulose ornament, 4-5 x 3-3.5 µm; with clamps; in rige, possibly calcareous *Picea* forests ..... *Hydnellum suaveolens*
17. Taste bitter ..... 18  
 Taste mild or somewhat acrid, but never bitter ..... 19
18. Taste very bitter; cap initially whitish, later reddish brown to greyish brown, downy. As young with large, red drops on surface; spores coarsly warty, 5-5.5 x 3.5-4 µm; without clamps; on poor, sandy soil with coniferous trees; videspread ..... *Hydnellum peckii*  
 Taste slightly bitter; cap initially curry-yellow, later brownish, very hairy. Spores warty, 5.5-6 x 4.5 µm; without clamps; with *Pinus*; rare ..... *Hydnellum mirabile*
19. Cap felted without obvious radial structure ..... 20  
 Cap first downy, later ± smooth with radial hypha, in the center possibly cracking fluffy scales ..... 22
20. Cap up to 30 mm wide; flesh to 2 mm thick; spores 4.3-4.6 x 2.5-3.6 µm. As young with red drops on surface; spores mostly with undivided warts; without clamps; with coniferous trees; very rare ..... *Hydnellum gracilipes*  
 Cap wider; flesh thicker; spores larger than 5.5 x 3.5 µm ..... 21
21. With deciduous trees; stem with a thick cushion of brown felt. Spores bifurcate, 5.5-7 x 4.5-5.5 µm; without clamps; rare ..... *Hydnellum spongiosipes*  
 With coniferous trees; stem hardly with a felt cushion. Spores coarsly warty, 5.5-6.5 x 3.5-4.5 µm; without clamps; on poor, sandy soil; rare ..... *Hydnellum ferrugineum*



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22. Cap with obvious, concentric zones near the margin. Spores with undivided to bifurcate warts, 4.5-6 x 3-4.5 µm; without clamps; on sandy soil with deciduous and coniferous trees; rather common . . . *Hydnellum concrescens* s.l.  
Without obvious, concentric zones near the margin . . . . . 23
23. Spores 5.5-7 x 4.5-5 µm; cap center cracking in deep fluffy scales. Spores with undivided warts; without clamps; on sandy soil with coniferous trees; rare . . . . . *Hydnellum scrobiculatum*  
Spores smaller; cap center finely felty to finely fluffy-scaly . . . . . 24
24. Spores 4.5-5.5 x 3.5-4.5 µm and with small undivided warts. Without clamps; on sandy soil with deciduous and coniferous trees; rare . . . . . *Hydnellum cumulatum*  
Spores 4.3-4.6 x 2.5-3.6 µm and with bifurcate warts . . . . . see *Hydnellum gracilipes*, cp. 19
25. Flesh with obvious rose to ± violet (■ ■ ■ ■) areas . . . . . 26  
Flesh not rose to violet, often pale grey or brown, possibly ± greenish in the base . . . . . 29
- 
26. With deciduous trees. Cap up to 100 mm wide; taste somewhat acrid; spores ± bifurcate, 5.4-5.8 x 3.6-4.2 µm; without clamps; with *Quercus* and *Fagus* . . . . . *Hydnellum ioeides*  
With coniferous trees . . . . . 27
- 
27. Flesh pale, but sometimes with violet spots below cap surface; with *Picea* . . . . . see *Hydnellum glaucopus*, cp. 42  
Flesh more throughout rose to violet; with *Abies* and *Pinus* . . . . . 28
28. Stem-flesh initially rose, later more violet; smell and taste not striking; spores 4.3-5.1 x 3.2-4.2 µm, av. 4.7-3.6 µm. Cap 50-80 mm wide; without clamps; rare . . . . . *Hydnellum roseoviolaceum*  
Stem-flesh ± immediately violet in full length; taste ± acrid; spores 5.4-6.5 x 4-5 µm; on calcareous soil. Without clamps; rare . . . . . *Hydnellum fuligineoviolaceum*
- 
29. Stem surface with orange felt (■ ■ ■). Cap downy without radial structure; spores 5-6.5 x 3.5-4.5 µm, with bifurcate warts; without clamps; smell farinaceous; with *Picea*; rare . . . . . *Hydnellum martioflavum*  
Stem without orange felt . . . . . 30
30. Cap 100-350 mm wide, thick fleshed; either coarsely scaly all the way to the margin by large, dark scales or almost smooth; with clamps . . . . . [*kødpigsvamp (Sarcodon)*] . 31  
Cap up to 120 mm wide, but often smaller; smooth, felted, hairy or finely scaly, or sometimes with larger scales at the center; singular caps often smaller; all species on except *Hydnellum versipelle* without clamps . . . . . 33
- 
31. Cap with smooth, vinaceous grey to brunrosa (◐ ■ ■ ■) surface, with age with small, unstructured cracks at the center; smell somewhat curry- or licorice-like. Taste somewhat bitter; spores with large bifurcate warts, 7-8 x 4.5-5.5 µm; on calcareous soil with *Pinus*; rare . . . . . *Sarcodon leucopus*  
Cap to the margin coarsely scaly of large, dark brown scales that may be ± upright at the center; smell weak . . . . . 32
- 
31. Cap long arched, eventually somewhat depressed as very old; with *Pinus* and *Abies*. Cap especially in the center with coarse, ± upright scales; spores 7-8.5 x 5-5.5 µm; on sandy soil; widespread . . . . . *Sarcodon squamosus*
- 
- Cap quickly with depressed center (± funnel-shaped); with *Picea*. Cap with coarse, upright scales; spores warted, 7-8.5 x 5-5.5 µm; on sandy soil; widespread . . . . . *Sarcodon imbricatus*

33. With a strong smell of bittermandel or marzipan. Cap rather dark, initially nappa-like, later cracking in floffy, radial scales starting at the center; taste bitter; spores with both undevided and bifurcate warts, 6.3-7.6 x 4.5-5.2 µm; with *Pinus*; rare . . . *Hydnellum ferricium*  
Smell different (e.g. farinaceous or of oranges, licorice or Fernet Branca) . . . . . 34
34. Stem base without greenish colours; taste mild or bitter, possibly farinaceous . . . . . 35  
Stem base with greenish (■ ■ ■) colours; taste distinctly bitter, but often also farinaceous . . . . . 38
35. With *Fagus* and *Quercus* . . . . . see *Hydnellum lepidum*, cp. 40  
With *Picea* . . . . . 36
36. With clamps; cap finely felted, never obviously scaly. Smell sweet-ish (licorice, vanilla, oranges); taste farinaceous with a bitter after-taste; spores with coarse warts, 4.5-5.5 x 3.5-4.5 µm; rare . . . . . *Hydnellum versipelle*  
Without clamps; cap with or without scales . . . . . 37
37. Cap clay-buff, fawn to greyish brown with more vinaceous brown areas (◡ ■ ■ ■ ■); cap felted to smooth, but never scaly; smell farinaceous or of licorice or oranges; spores 4-4.5 x 3.5-4 µm . . . . . see *Hydnellum glaucopus*, cp. 42  
Cap deep orange-brown to reddish brown (◡ ■ ■ ■ ■); cap center scaly; smell sour, cucumber- og leather-like; 4.9-5.8 x 3.6-4.2 µm. Spores bifurcate; rare . . . . . *Hydnellum lundellii*
38. With deciduous trees . . . . . 39  
With coniferous trees . . . . . 41
39. Spores on average 4.1 x 3.4 µm; cap ± smooth, but often furrowed of cracking; smell spicy or Fernet Branca-like. Cap 40-100 mm wide, rather dark with vinaceous brown and wine-red colours; flesh slowly reddening; taste bitter; spores with rather small, mostly rounded warts, but also with bifurcate warts, 3-5.3 x 2.8-3.8 (-4.5) µm; without clamps; on poor soil with *Fagus*, *Quercus* and *Castania*; rare . . . . . *Hydnellum nemorosum*  
Spores on average more than 5 x 3.8 µm; cap ± scaly; smell farinaceous . . . . . 40
40. Cap with age with coarse scales, 50-140 mm wide; flesh greyish white (□ ■); on poor soil. Cap ± cinnamon to fawn with en paler margin; flesh hardly reddening; smell farinaceous; taste ± bitter and farinaceous; spores with bifurcate warts, 4.5-6.3 x 3.5-5.6 µm, av. 5.4 x 4.7 µm; without clamps; with *Fagus*, *Quercus* and *Castania*; rare . . . . . *Hydnellum fagiscabrosum*  
Cap cracking into unconvspicuous adressed scales, 40-80 (-120) mm wide; flesh with a honey-yellow (■ ■ ■) shade, at least upon drying; on calcareous soil. Cap greyish brown to clay-pink; taste farinaceous with a bitter aftertaste; smell farinaceous; spores with bifurcate warts, 5.8-6.3 x 3.6-4.3 µm; without clamps; with *Fagus*; rare . . . . . *Hydnellum lepidum*
41. With *Picea* . . . . . 42  
With *Pinus* and *Pseudotsuga* . . . . . 43
42. With a conspicuous farinaceous smell; cap colour buff to cinnamon (◡ ■ ■ ■); spores 4.7-5.7 (6.1) x 3.5-4.5 µm . . . . . see *Hydnellum illudens*, cp. 43  
Smell weakly farinaceous or of licorice or oranges; cap clay-buff, fawn, to greyish brown with more vinaceous brown areas (◡ ■ ■ ■ ■), darker by age and on touch; spores 4-4.5 x 3.5-4 µm. Cap 50-120 mm wide, surface somewhat cracking into radial scales; spores bifurcate; without clamps; widespread . . . . . *Hydnellum glaucopus*






43. Stem up to 10 mm thick; cap 30-60 (-100) mm wide. Cap rather pale brown to greyish brown, towards the center somewhat cracking; taste somewhat farinaceous, later bitter; spores with broad warts, 5-6.6 x 3.4-4.7  $\mu\text{m}$ ; without clamps; on calcareous soil with *Pinus*; rare . . .


*Hydnellum scabrosellum*

Stem 20-50 mm thick; cap often over 60 mm wide . . . . . 44



44. Cap buff to cinnamon (☉ ); on calcareous soil; spores up to 6  $\mu\text{m}$  long. Cap 70-120 mm wide; taste farinaceous, later somewhat bitter; spores bifurcate, 4.5-6 x 3.5-4.5  $\mu\text{m}$ ; without clamps; rare . . .

*Hydnellum illudens*

Cap clay-pink to  $\pm$  reddish brown (☉ ); on poor soil; spores more than 6  $\mu\text{m}$  long. Cap up to 120 mm wide; taste farinaceous and bitter; spores bifurcate, 6-7.5 x 3.5-5  $\mu\text{m}$ ; without clamps; with *Pinus* and *Pseudotsuga*; rare . . . . . *Hydnellum scabrosum*

