





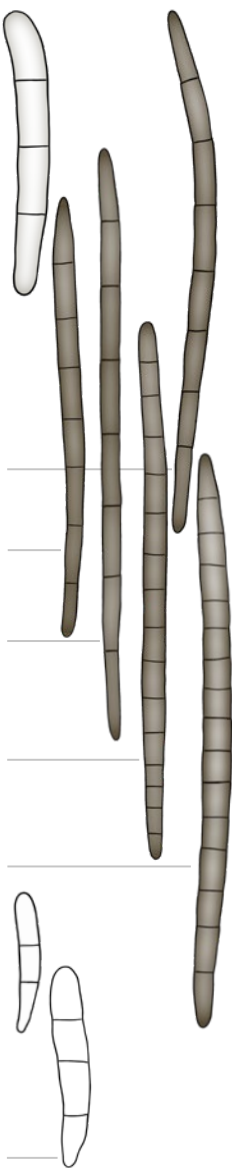
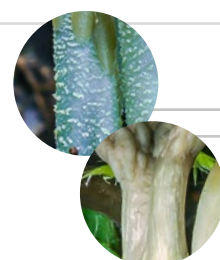
**Key to earthtongues and further club-shaped inoperculate cup-fungi**

1. Head (fertile part) and stem black, dark brown, olive or coral red (■ ■ ■ ■ ■ ■ ■ ■ ■ ■) **key A, page 4**  
 Head or stem paler, white, wood brown, yellowish to orange (□ □ □ □ □ □ □ □ □ □) **key B, page 8**

**Key A**

1. Head and stem with pointed, thick-walled, black, more than 150 μm long, hairs (hand lens and microscope) ..... 2  
*[Trichoglossum & Leucoglossum]* .. 2  
 Head without pointy black hairs, stem may have shorter hairs .. 7
2. Spores mainly hyaline and 1-7-celled, but senescent fruitbodies may have a few brownish spores with more cells. Fruitbodies black; spores 50-60 (-80) × 5-7 μm; hymenial hairs black, 150-400 × 7-12 μm; in unimproved grassland; not recorded in DK ..... 3  
*Leucoglossum leucosporum*  
 Spores ± black, 8-16-celled ..... 3  
*[Trichoglossum]* .. 3
3. Spores 8-celled ..... 4  
 Spores with more than 8 cells ..... 5
4. Spores 100-140 × 5-6 μm. Fruitbodies brownish black; hairs 130-210 μm long; in unimproved grassland; very rare in DK ..... 4  
*Trichoglossum octopartitum*  
 Spores 75-100 × 4-6 μm. Fruitbodies black; hairs 195-242 μm; in unimproved grassland, more rarely on clay soils in woodland; rare in DK ..... 4  
*Trichoglossum walteri*<sup>1</sup>
5. Spores 10-15-celled. Fruitbodies black; spores 98-117 × 5-6 μm; in unimproved grassland, rarely in deciduous woodland; rare in DK ..... 5  
*Trichoglossum variabile*<sup>2</sup>  
 Spores 16-celled ..... 6
6. Asci 4-spored. Spores 105-140 × 5-7 μm. Fruitbodies black; hairs up to 280 μm long; in unimproved grassland and woodland; DK? ..... 6  
*Trichoglossum tetrasporum*  
 asci 8-spored. Fruitbodies black; spores 96-156 × 6-7 μm, hairs up to 260 μm long; in unimproved grassland, old lawns, damp woodland on clay soils etc.; fairly common in DK ..... 6  
*Trichoglossum hirsutum*
7. Head with a marked, lower margin ..... 8  
 With a more gradual transition between head and stem ..... 9
8. Head black (■). Stem brownish squamulose in full length; spores hyaline, 1-4-celled, 21-45 × 3-5.5 μm; on sandy soils with bryophytes; very rare in DK ..... 8  
*Sarcoleotia globosa*  
 Head cinnamon brown, reddish brown, olive brown to purple brown (■ ■ ■ ■ ■ ■ ■ ■ ■ ■). Stem somewhat brownish squamulose at the top; spores hyaline, 1-celled, later up to 6-celled, 35-50 × 3.5-5.5 μm; in mires with *Sphagnum* and *Aulacomnium palustre* and often occurring with *Geoglossum glabrum*; DK? ..... 8  
*Nothomitra cinnamomea*
9. Fruitbodies with green or red tinges (■ ■ ■ ■ ■ ■ ■ ■ ■ ■); spores under 20 μm long ..... 10  
*[Microglossum]* .. 10  
 Fruitbodies dark brown to black (■ ■ ■ ■ ■ ■ ■ ■ ■ ■); spores more than 20 μm long ..... 21

1. *Trichoglossum confusum* has 45-65 μm long spores and is known from Croatia.  
 2. *Trichoglossum variabile* is perhaps just a form of *T. hirsutum*.



10. Stem squamulose ..... 11  
 Stem glabrous ..... 13
11. Fruitbodies ± gelatinous; spores in age several-celled ..... see *Leotia*, key B, 16  
 Fruitbodies not gelatinous; spores unicellular ..... 12
12. Stem pale green (■); spores 5-7 μm broad. Spores 18-22 × 5-7 μm; asci 106-134 μm long; in fens and very damp woodlands; rare in DK ..... 12  
*Microglossum viride*  
 Stem greyish green (■); spores 4-5 μm broad. Spores 16-20 × 4-5 μm; asci 105-140 μm long; on clay soils in deciduous woodland; rather rare in DK ..... 12  
*Microglossum griseoviride*
13. Fruitbodies ± pinkish brown to cinnamon brown (■ ■ ■ ■ ■ ■ ■ ■ ■ ■), with blue green (■ ■ ■ ■ ■ ■ ■ ■ ■ ■) basis. Spores 15.5-22.5 × 4.6-6 μm; on black soil in woodland; not recorded in DK ..... 13  
*Microglossum cyanobasis*  
 Fruitbodies with different colour combinations ..... 14
14. Fruitbodies reddish (■ ■ ■ ■ ■ ■ ■ ■ ■ ■). Spores unicellular, with 4-6 big guttules, 15.5-19.5 × 4-5 μm; on calcareous soil in unimproved grassland; very rare in DK ..... 14  
*Microglossum fuscorubens* s.s. auct.  
 Fruitbodies ± olive brown to green (■ ■ ■ ■ ■ ■ ■ ■ ■ ■) ..... 15
15. Fruitbodies with rather subdued olive brown tinges (■ ■ ■ ■ ■ ■ ■ ■ ■ ■). Spores 12.5-18 × 3.8-4.7 μm; in unimproved grasslands; rather rare in DK ..... 15  
*Microglossum olivaceum*<sup>3</sup>  
 In places with more marked green colours (■ ■ ■ ■ ■ ■ ■ ■ ■ ■) ..... 16  
*[Microglossum nudipes* s.l.] .. 16<sup>4</sup>
16. Spores 15.5-20.5 μm long ..... 17  
 Spores 11-16.5 μm long ..... 19
17. Asci up to 100 μm long; stem decidedly more shiny greyish green (■ ■ ■ ■ ■ ■ ■ ■ ■ ■) than the head. Spores 15.5-18.5 × 4-5 μm; asci 85-100 μm long; not recorded in DK (known from France, Slovakia, Sweden) ..... 17  
*Microglossum truncatum*  
 Asci typically more than 100 μm long; stem and head mere uniformly coloured ..... 18
18. Some paraphyses branched at the tips. Spores 16.5-20 × 4-5.2 μm; asci 90-110 μm long; not recorded in DK (known from France) ..... 18  
*Microglossum nudipes*  
 Paraphyses not branched at the tips. Spores 15.5-20.5 × 4.5-5 μm; asci 96-118 μm long; not recorded in DK (known from Spain) ..... 18  
*Microglossum clavatum*
19. Spores 11-14 mm long, Q av. 3.05. Spores 11-14 × 3-4 μm; asci 66-80 μm long; not recorded in DK (Slovakia) ..... 19  
*Microglossum parvisporum*  
 Spores 12-16.5 μm long, Q av. 3.4-3.7 ..... 20
20. Spores 3.7-4.5 μm broad; Q av. 3.4. Spores 12-15.5 × 3.7-4.5 μm; asci 80-95 μm long; in unimproved grassland and with juniper; very rare in DK ..... 20  
*Microglossum tenebrosum*  
 Spores 4.5-5 μm broad; Q 3.7. Spores 13.5-16.5 × 4.5-5 μm; asci 78-92 μm long; not recorded in DK (Norway, Sweden, Slovakia) ..... 20  
*Microglossum pratense*



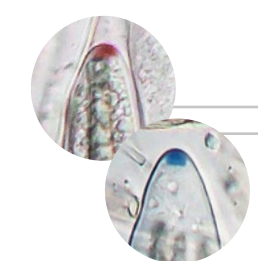
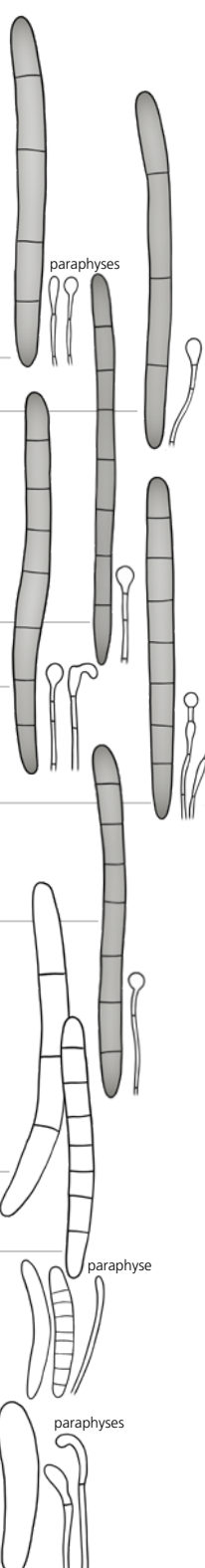
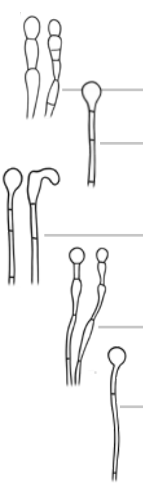
3. The delimitation of *Microglossum olivaceus* is unsettled, since many of the new species were described without defining this classical species.

4. Many of the species in *Microglossum* were described based on molecular data and based on a limited number of collections and without illustrations of microscopic characters. This makes the present key very preliminary..

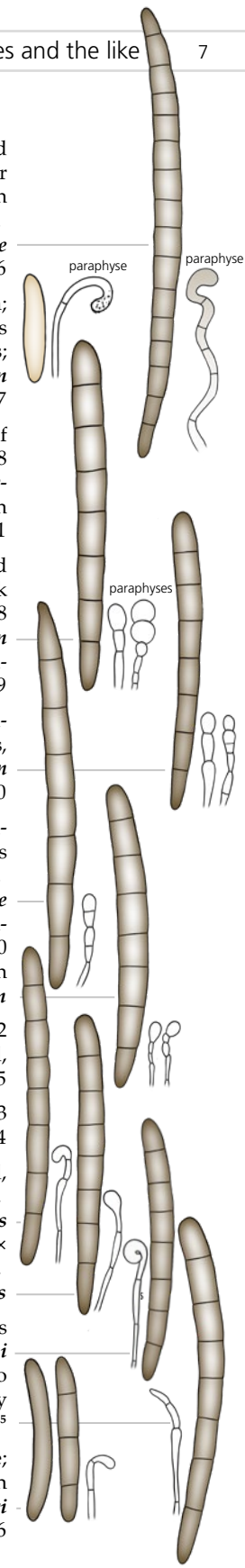




- 21. Stem slimy; spores pigmented and not distinctly tapering towards the ends ..... [*Glutinoglossum*] ... 22  
Stem dry; if spores dark pigmented, then tapering towards the ends ..... 30
- 22. Spores 16-celled ..... see *Geoglossum difforme* 35  
Spores 1-8-celled ..... 23
- 23. Spores mainly 1-4-celled ..... 24  
Many spores with more cells ..... 25
- 24. Spores 60-70  $\mu\text{m}$  long. Tips of paraphyses straight, swollen; in unimproved grassland, more rarely in deciduous woodland; fairly common in DK ..... *Glutinoglossum glutinosum*  
Spores 70-80  $\mu\text{m}$  long. Tips of paraphyses straight, swollen; not recorded in DK ..... *Glutinoglossum triseptatum*
- 25. All spores in mature asci with more than 4 cells ..... 26  
Asci with both with 4- and 8-celled spores ..... 27
- 26. Tips of paraphyses with repeatedly pear-shaped enlarged cells ..... see *Geoglossum uliginosum*, 39  
Tips of paraphyses with a swollen rounded cell. Tips of paraphyses straight; spores 75-87  $\times$  4.5-5  $\mu\text{m}$ ; in unimproved grasslands; probably very rare in DK ..... *Glutinoglossum heptaseptatum*
- 27. Some paraphyses with downcurved tip. Tips of paraphyses enlarged; Spores 71-86  $\times$  4,5-5,5  $\mu\text{m}$ ; DK? ..... *Glutinoglossum peregrinans*  
Paraphyses with straight to slightly bent tips ..... 28
- 28. Paraphyses terminate in 2-3 swollen cells. Tips of paraphyses straight; spores 62-80  $\times$  4,5-5,5  $\mu\text{m}$ ; not recorded in DK ..... *Glutinoglossum proliferatum*  
Paraphyses terminate in one swollen cell ..... 29
- 29. Spores 45-65  $\times$  4.5-5.5  $\mu\text{m}$  ..... see *Geoglossum lineare*, 46  
Spores 68-81  $\times$  4.6-5.1  $\mu\text{m}$ . Tips of paraphyses straight to bent; DK? ..... *Glutinoglossum pseudoglutinosum*
- 30. Spores hyaline to yellowish ..... 31  
At least some spores brown ..... [*Geoglossum* and *Maasoglossum*] ..... 35
- 31. Spores more than 50  $\mu\text{m}$  long ..... 32  
Spores under 40  $\mu\text{m}$  long ..... 33
- 32. Asci 140-180  $\mu\text{m}$  long; Spores 50-77  $\times$  5,5-7,5  $\mu\text{m}$ ; on slopes with seeping water. Spores 1-6-celled; with thick walled, dark hairs på stokken; not recorded in DK ..... *Hemileucoglossum pusillum*  
Asci 120-145 mm long; Spores 50-60  $\times$  4-6  $\mu\text{m}$ ; og dried out lake shores with (*Plantago uniflora*). Spores 1-11-celled; with thickwalled, dark hairs at the stem; very rare in DK ..... *Hemileucoglossum littorale*
- 33. Fruitbodies  $\pm$  dark brown (■ ■ ■), at least the stem; at least some spores many-celled. Stem squamulose; spores 1-10-celled, 20-35  $\times$  5-6  $\mu\text{m}$ ; in calcareous grassland; rare in DK ..... *Thuemenidium atropurpureum*  
Fruitbodies completely black (■ ■ ■); spores 1-celled ..... 34
- 34. Fruitbodies slender club-shaped; spores (16-) 23-30 (-35)  $\times$  (5-) 5,5-6,5 (-7)  $\mu\text{m}$ ; on black soil in garden- or park-like environments ..... see *Maasoglossum aseptatum*, 37  
Fruitbodies irregular and broadly club-shaped; spores 32-38  $\times$  4,2-5,8  $\mu\text{m}$ ; in dunes with *Empetrum*, and occasionally *Calluna*. Uncommon in DK ..... *Sabuloglossum arenarium*



- 35. Spores 16-celled; stem sticky. Fruitbody 4-8 cm high, often twisted and flattened; spores 90-120  $\times$  6-7  $\mu\text{m}$ ; paraphyses highly twisted, longer than asci. In high-value unimproved grassland, but also recorded on clay soils in ancient deciduous woodland; very rare in DK ..... *Geoglossum difforme*  
Spores with fewer cells ..... 36
- 36. Spores 23-31  $\mu\text{m}$  long, 1-celled. Spores pale brown, 23-31  $\times$  4.8-6.8  $\mu\text{m}$ ; tips of paraphyses enlarged and often bent, adhering via amorphous black matter; on black soil in damp garden / park-like environments; DK? ..... *Maasoglossum aseptatum*  
Spores longer, 1- to many-celled ..... 37
- 37. Paraphyses with short, swollen upper cell (Q often below 2.5), tips of paraphyses straight to slightly curved; stem black (■ ■ ■) ..... 38  
Paraphyses with longer upper cell (Q often more than 2.5); tips of paraphyses often distinctly curved downwards; stem black or brownish (■ ■ ■ ■ ■) ..... 41
- 38. With many paraphyses with uppermost cells  $\pm$  globose, 9-15  $\mu\text{m}$  broad and distinctly broader than cells below; tips of paraphyses very dark and somewhat agglutinated. Stem rugose; spores 8-celled, 70-90  $\times$  7-8  $\mu\text{m}$ ; in *Sphagnum*; very rare in DK ..... *Geoglossum glabrum*  
Upper cell of paraphyses more elongated, 6-12  $\mu\text{m}$  broad and hardly broader than the cells below; dark, but hardly agglutinated ..... 39
- 39. Tips of paraphyses with repeatedly pear-shaped enlarged cells. Stem rugose and often slightly sticky; spores 8-celled, 60-80  $\times$  4.5-6  $\mu\text{m}$ ; in fens, often with *Sphagnum*; not recorded in DK ..... *Geoglossum uliginosum*  
Tips of paraphyses with  $\pm$  ellipsoid cells ..... 40
- 40. In wet / damp sites (fens, boggy woodland etc.); upper cells of paraphyses often with secondary septation (not constricted). Stem glabrous to rugose-felty; Spores 8-celled, 69-95  $\times$  5,5-8  $\mu\text{m}$ ; very rare in DK ..... *Geoglossum simile*  
In dry environments; upper cells of paraphyses generally with constrictions at septa. Stem glabrous to rugose-felty; spores 8-celled, 60-80  $\times$  5-7  $\mu\text{m}$ ; on calcareous soils, often sandy; uncommon in DK, esp. in coastal sites ..... *Geoglossum cookeanum*
- 41. All spores brown and 8-celled ..... 42  
Spores in asci brown, but many ejected spores hyaline, 1-4-celled, 1-8-celled or 1-13-celled ..... 45
- 42. Ascus plug (apical apparatus) hemiamyloid (reddish in Lugol) ..... 43  
Ascus plug amyloid (bluish in Lugol) ..... 44
- 43. Stem granulose-squamulose. Fruitbody dark brown; spores 8-celled, 63-74  $\times$  5.3-5.3  $\mu\text{m}$ ; in deciduous woodland; DK? ..... *Geoglossum scabripes*  
Stem glabrous. Head black; stem dark brown; spores 8-celled, 66-69  $\times$  5-6  $\mu\text{m}$ ; in deciduous woodland; not recorded in DK ..... *Geoglossum brunneipes*
- 44. Spores 58-63  $\times$  5-7  $\mu\text{m}$ ; stem squamulose. Fruitbody black; spores 8-celled; not recorded in DK ..... *Geoglossum geesterani*  
Spores 70-92  $\times$  6-7  $\mu\text{m}$ ; stem  $\pm$  glabrous. Fruitbody brownish black to black; spores 8-celled; in unimproved grasslands and woodland; fairly common in DK ..... *Geoglossum umbratile*<sup>5</sup>
- 45. Spores 30-45  $\times$  4-5  $\mu\text{m}$ . Fruitbody dark brown; stem squamulose; spores 1-4 (-8) celled; in unimproved grassland; not recorded in DK ..... *Geoglossum hakelieri*  
Spores more than 45  $\mu\text{m}$  long ..... 46



5. Arauzo & Iglesias (2014) also mention two not formally described species (*G. pseudoumbratile* nom. prov. and *G. subumbratile* nom. prov.).



46. Stem glabrous and somewhat sticky; spores 45-65 × 4,5-5,5 μm. Spores 4-8-celled; paraphyses with a very long, club-shaped end-cell; in unimproved grassland; not recorded in DK

*Geoglossum lineare*

Stem squamulose and dry; spores may be longer ..... 47

47. Spores 50-65 × 4-7 μm. Fruitbodies dark brown to blackish brown; stem squamulose; ejected spores often 1-celled and hyaline, overmature spores within asci typically 8-celled; in unimproved grassland and woodland; uncommon in DK

*Geoglossum elongatum*

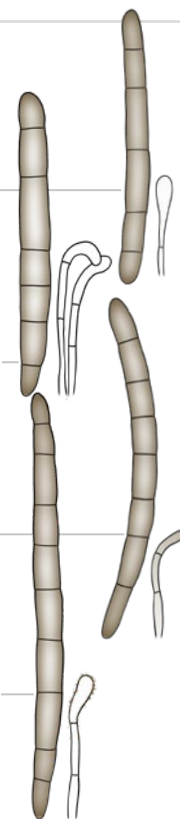
Spores more than 65 μm long ..... 48

48. Hyphal walls in upper cells of the paraphyses brown. Fruitbodies brownish black to black; stem squamulose; spores 65-85 × 5-6 μm, ejected spores often 1-celled and hyaline, overmature spores within asci 8-10-celled; in unimproved grasslands, willow carrs etc.; rare in DK

*Geoglossum starbaeckii*

Hyphal walls in upper cells of the paraphyses hyaline, but often agglutinated from brownish matter. Fruitbodies dark brown to blackish brown; stem squamulose; spores 65-105 × 5-7 μm, ejected spores often 1-celled and hyaline, overmature spores within asci 8-13-celled; in unimproved grasslands and scrubs; fairly common in DK

*Geoglossum fallax*



**Key B**

1. Head compressed/flattened ..... 2  
Head ± oval to circular in transect ..... 4

2. Head yellow (■). Spores ± filiform, 35-62 × 2-2.5 μm; on needle beds, esp. with *Larix*; uncommon in DK ..... *Spathularia flavida*  
Head whitish to pale brown (□) ..... 3

3. Stem pale brown (■). Spores ± filiform, 30-50 × 1.5-2 μm; not recorded in DK (northern) ..... *Spathularia rufa*  
Stem ± grey (■). Spores 30-47 × 1.8-3 μm; not recorded in DK (southern) ..... *Spathularia nigripes*

4. Stem with small, dark squamules; spores filiform, 200-250 × 1-1.5 μm. On wood in running, clean water; very rare in DK

*Vibrissea truncorum*

Stem without dark squamules; spores less than 50 μm long ..... 5

5. Head up to 5-10 (-20) mm broad, ± wood brown to rosaceous brown (■) with a incurved, free lower rim; spores 30-50 μm long ..... 6  
Head different; spores under 30 μm long ..... 7

6. Stem clearly darker than the head. Spores 30-50 × 1.5-2.5 μm; forms fairy rings on needle beds, more rarely in deciduous woodland; rather rare in DK ..... *Cudonia circinans*

Stem and head with more or less the same colour. Spores 30-50 × 2-2.5 μm; forms fairy rings on needle beds and rarely in deciduous woodland; rare in DK ..... *Cudonia confusa*

7. Underside of the head conical .....  
see *Cudoniella* and other long-stemmed inoperculate cup-fungi  
Head with another shape ..... 8

8. From sclerotia or sclerified plant tissue ..... 9  
On soil, needle beds, herbaceous stems or wood ..... 13



9. With 1 (-2) clubs from 2-4 mm, brown (■) sclerotia produced by *Macrotiophula phacorrhiza*. Heads ± yellow brown (■); spores fusiform, 5.5-9 × 1.5-2.5 μm; very rare in DK ..... *Episclerotium sclerotipus*  
With many clubs from larger, black (■) sclerotia or black sclerified tissue ..... 10

10. From sclerotia produced by *Sclerotinia trifoliorum* that often occurs in connection with leguminose herbs. Heads ± tan to buff (■); spores 6.5-8.5 (-9.5) × 1.8-3 (-3.5) μm; very rare in DK (perhaps extinct)

*Episclerotium sclerotiorum*

From its own sclerotia or sclerified tissue in *Rubus chamaemorus*, *Flipendula*, *Iris* or *Caltha* ..... 11

11. With *Rubus chamaemorus* ..... *Scleromitrla rubicola*  
With *Flipendula*, *Iris* or *Caltha* ..... 12

12. Spores 6.5-10 × 1.5-2.5 μm ..... *Scleromitrla calthicola*  
Spores 5-7 × 1.5-2.7 μm ..... *Scleromitrla spiraeicola*

13. On *Picea*, *Abies* or *Pinus* needles ..... 14  
On soil, herb stems or wood ..... 15

14. Asci with croziers; on *Picea* needles, rarely *Pinus* or *Abies* needles. Spores cucumber-shaped, 11.5-16 (-18.5) × 2.3-3 (-3.5) μm; rare in DK or overlooked ..... *Heyderia cucullata*

Without croziers; on *Pinus* needles. Spores cucumber-shaped, 13-16 (-18.5) × 2.2-3 μm; very rare in DK or overlooked ..... *Heyderia pusilla*

15. On soil in woodland; ascus I- ..... 16  
Habitat different; ascus plug I+ ..... 17

16. Fruitbody ± fragile; without paraphyses; spores unicellular, 6-8.5 × (3-) 3.5-4.5 μm. Head yellow; on soil/humus in conifer woodland (probably parasitic on conifers); not recorded in DK (northern)

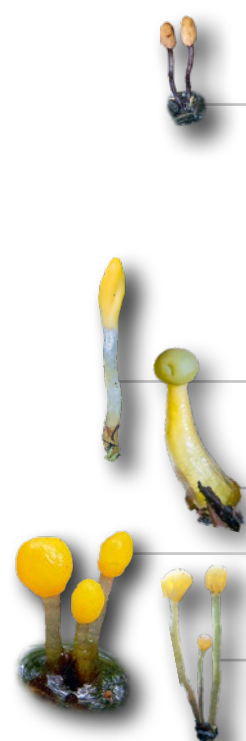
*Neolecta vitellina*

Fruitbody very tough and gelatinous; with paraphyses; spores in age more-celled, 18-27 × 5-6 μm ..... *Leotia lubrica*<sup>6</sup>

17. On water covered leaves and stick in clean, often moving water; fruitbodies 20-80 × 2-20 mm; stem in young specimens white (□), later ± browning. Head often brilliant orange yellow, rarely brownish; spores 10-19 × 2.5-3.5 μm; uncommon in DK ..... *Mitrla paludosa*

On bryophytes in fens; fruitbodies up to 30 × 5 mm; stem initially yellowish to brownish (■) ..... 18

18. In conifer woodland; spores 2.5-3 mm broad. Spores 9-13 × 2.5-3 μm; not recorded in DK ..... *Bryoglossum rehmi*  
On moss, e.g. *Paludella* in fens; spores 3-3.5 μm broad. Spores 11-13 × 3-3.5 μm; not recorded in DK ..... *Bryoglossum gracile*



6. *Leotia lubrica* should apparently be split in several species, including one where the pale stem turn green upon drying. Specimens with dark green, somewhat decaying heads are often parasitized by *Hypomyces leoticola*. Look out for thick-walled conidia (chlamydozoospores in the upper tissues. Maybe never sexual in Europe.