

## Further additions towards a monograph of *Phaeocollybia*

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### Zusammenfassung

Aus Mexiko, Malaysia, Singapur und Papua New Guinea werden 11 neue Taxa von *Phaeocollybia* beschrieben und mit 23 schon bekannten Arten (und ihren Synonymen) kritisch verglichen und ausgeschlüsselt.

In this paper the attempt is made to add further information to the knowledge of the genus *Phaeocollybia*. Type material (of 38 described species) or at least topotypical collections (especially of the European, so-called classical species) were studied and critically compared with each other.

Furthermore several new taxa are introduced. The material was collected by Prof. CORNER and the author, either under *Pinus* in Mexico or under different *Fagaceae* (*Quercus*, *Castanopsis*, *Lithocarpus*, *Nothofagus*) in SE-Asia and Australasia.

### Area of distribution and ecology of *Phaeocollybia*

During the last years *Phaeocollybia* has been the subject of several critical revisions. KÜHNER & ROMAGNESI (1957), BRESINSKY (1960) and MOSER (1967) examined and keyed out the European taxa, which fruit there rather sporadically under conifers and therefore are unknown in fresh condition to many mycologists. The bulk of the hitherto known species of *Phaeocollybia* comes from the Pacific North West in North America. The majority of these taxa (which predominantly also grow in coniferous forests) are described by SMITH (1957), BIGELOW (1963) and SMITH & TRAPPE (1972).

In the Northern Hemisphere species of *Phaeocollybia* are also reported to occur in Japan (IMAZEKI & HONGO 1971), China (BRESADOLA 1930; KEISSLER & LOHWAG 1937) and India (HORAK 1974). Based upon these data it appeared that the area of distribution of *Phaeocollybia* is restricted both to the Northern Hemisphere and to conifers such as *Picea*, *Abies*, *Pinus*, *Tsuga*, *Sequoia* and others. Undoubtedly the species of *Phaeocollybia* play a particular role in the ecology of the coniferous woods in the region mentioned above. However, the question whether *Phaeocollybia* forms any kind of

mycorrhiza (SMITH 1957) or rather seems to be a saprophyte on buried (coniferous) wood (SINGER 1970) remains open. New and unexpected light was cast upon the ecology of *Phaeocollybia* after SINGER (1970) published 3 species from the tropical forest of Bolivia and Colombia. Few years later HORAK (1973) reported the occurrence of *Phaeocollybia* in the *Nothofagus* forests of New Zealand. The new species (except *Ph. mexicana*) described here are also gathered in tropical or subtropical woods dominated by angiocarpous trees. But we have to emphasize, however, that the relationships of *Phaeocollybia* to conifers in such localities should not be excluded, even stressing the fact that the fruitingbodies were found in seemingly pure stands of *Nothofagus* (New Zealand, Papua New Guinea), *Quercus*, *Castanopsis* or *Lithocarpus* (Papua New Guinea, Malaysia, Borneo). According to our observations in New Zealand conifers like *Dacrydium*, *Podocarpus*, *Phyllocladus* or *Libocedrus* are here and there intermixed with *Nothofagus*. The same situation can be encountered in Papua New Guinea where species of *Araucaria*, *Agathis* or *Podocarpus* were seen in the neighborhood of the collecting sites.

Furthermore one has to keep in mind that the Fagaceae (*Nothofagus*, *Quercus*, *Lithocarpus*, *Castanopsis*) in Australasia are pioneer plants which, due to their relative fast growth, can dominate the vegetation in the first 20 or 30 years after the area was deforested by natural catastrophies (fire, insect pests, landslides) or clearfelling by men. We observed in New Zealand and Papua New Guinea that the biological breakdown of coniferous wood buried in the soil takes years even under humid tropical conditions. Thus one can not exclude the possibility that the pseudorhiza or at least hyphae of the mycelium of *Phaeocollybia* are connected with rotting roots or timber of conifers, fallen years ago and are covered with litter and soil. Under such circumstances *Phaeocollybia* occurring under or south of the Equator could also be saprophytes on coniferous wood. More research both in the field and under laboratory conditions are needed to resolve that open question.

#### Taxonomic position of *Phaeocollybia*.

The genus is well defined by several particular macroscopical, microscopical and ecological characters (SINGER 1970). The tough and cartilaginous carpophores show in the majority of species a conical to papillate-umbonate pileus and the stipe is with some exceptions rooting-tapering towards the base (reminds of *Termitomyces*). Most species have in common a thin gelatinized epicutis but so far none are known with persistent veil remnants either on the margin of the pileus or on the stipe. In mature specimens the colour of the lamellae turns to deep rust brown, like in the other Cortinariaceae. Based on numerous

observations, however, the taxonomic value of the colour on young lamellae appears to lose its importance (see *Ph. raticauda* Hk.), probably not only in *Phaeocollybia* but in the Cortinariaceae in general. Ageing the lilac-violet colours on the lamellae fade away but the original bluish tints are often preserved in the cortex of stipe in mature specimens. In the presented keys the colour of the lamellae is still taken into consideration but was reduced to infraspecific value only. Looking at *Phaeocollybia* species from Europe the lack of clamp connections on the septa of hyphae appeared to be a specific character in that genus. In the meantime, however, at least half a dozen of species are known to carry clamp connections. The spore-morphology offers excellent characters to distinguish the different species (see synoptical key): the shape ranges from sublimoniform over amygdaliform-ovoid to subglobose. As a rule the ornamentation on the spore walls consists of isolated warts which are relatively coarse in *Ph. similis* and punctate-asperulate to almost smooth in other taxa. A well delimited plage, often in combination with a distinct perisporium, occur exclusively in species with sublimoniform spores, whereas an obvious germ pore is found on sublimoniform and ovoid spores as well.

In all attempts to split the genus into sections the shape of the cheilocystidia has served as principal criterion (SMITH 1957; SINGER 1970). 16 of the 34 species accepted in this study show capitate cheilocystidia and the remaining 18 spp. do have clavate-filiform cheilocystidia on the gill edge. No species with typical pleurocystidia are known yet.

On the genus level *Phaeocollybia* has evidently close relationships with *Pyrrhoglossum*, *Gymnopilus* and *Galerina*. In *Pyrrhoglossum* the stipe is reduced and in lateral or eccentric position. This character apparently does not count much from the taxonomic point of view since SINGER (1961) refers to *Pyrrhoglossum* also species with fully developed and more or less central stipe (*Ph. holocrocinum*, *Ph. lilacipes*). Similar observations were made by the author on material gathered in Papua New Guinea and New Zealand. The separation of the two genera with macroscopical characters alone is difficult and unfortunately the microscopical details are in both genera very similar. In *Pyrrhoglossum* the shape of the spores ranges from amygdaliform and ovoid to subglobose (taxa with sublimoniform spores are not known yet but might be found eventually) and the membrane bears isolated warts and often a distinct plage. Without exception all species belonging to *Pyrrhoglossum* grow on rotting wood (trunks, logs, branches) which, however, is not buried by litter or soil. In this regard *Pyrrhoglossum* comes close to *Gymnopilus* whose carpophores fruit under similar circumstances. Furthermore all three related genera share the deep yellow-brown to rust brown colour of the carpophores; however, the pigments of *Gymnopilus* usually are easier soluble in KOH than in the other genera.

Last not least in *Pyrrhoglossum* and *Gymnopilus* also occur lilac pigments on lamellae and pileus which could mean further evidence to the close relationships between the two genera and *Phaeocollybia*.

In *Phaeocollybia* clamp connections are present in about 20% of the so far known species. In about 80% no clamps have been observed neither on the septae of the cuticular hyphae nor on the basal septum of the cheilocystidia. In *Pyrrhoglossum* and *Gymnopilus*, however, clamp connections are always numerous on all septae.

At the moment no efforts are made to propose new sections to accommodate several species of *Phaeocollybia* which can not be placed according to the taxonomical lay-out published by SMITH (1957) or SINGER (1970). To our opinion this should be done in connection with a full revision of the three related genera.

### Acknowledgements

I have to thank the authorities of the Department of Forests both in New Zealand and Papua New Guinea who offered the opportunity to stay and to work in these countries.

I am very grateful to Prof. E. J. H. CORNER (Cambridge) who put all his numerous collections on *Phaeocollybia* from SE-Asia at my disposal. His material filled the "distribution gap" between the data on species occurring in India, China and Japan and the records made by the author in Papua New Guinea and New Zealand.

Loan of material is acknowledged from the following herbaria: Amhurst (MASS), Ann Arbor (MICH), Innsbruck (IB), Kew (K), Leiden (L), Lyon (Mr. M. Josserand), Munich (M), Stockholm (S) and Vienna (WU).

Type material of the new species is kept in the author's herbarium in ZT. Unless otherwise stated the magnification of the figures in the plates are: carpophores (nat. size), spores (2000×), basidia and cystidia (1000×) and vertical section of cuticle (500×).

### Key to the species of *Phaeocollybia*

1. Spores limoniform (distinctly beaked!), plage and perisporium often obvious, larger 8  $\mu$  long (except *Ph. pseudofestiva*)... 2
- 1\*. Spores amygdaliform, ovoid or subglobose, plage and perisporium indistinct or lacking ..... 15
2. Cheilocystidia capitate, constricted below apex; under conifers (except *Ph. columbiana*) ..... 3
- 2\*. Cheilocystidia clavate to filiform ..... 8
3. Capitulum 1—3  $\mu$  diam ..... 4
- 3\*. Capitulum 3—8  $\mu$  diam. .... 7
4. Pileus (lamellae and stipe when young) with distinct olive colours (see also *Ph. californica*) ..... 5

- 4\*. Pileus rust brown to fuscous ..... 6
5. Pileus —50 mm, umbonate, olive brown, viscid; stipe rooting; spores 7,5—8/4,5—5 m $\mu$ ; clamps absent; odour not distinctive; under conifers and hardwoods; USA (Oregon, California) ..... 1. *Ph. pseudofestiva*
- 5\*. Pileus —80 mm, conico-convex to umbonate, ageing olive tints fading, turning ochre brown to rust brown, viscid; stipe rooting; spores 7,5—9,5/4,5—5,5 m $\mu$ , often amgdaliform; cheilocystidia occasionally forked; clamps absent; odour raphanoid to unpleasant; under conifers (*Picea*); Europe.....2. *Ph. lugubris*
- 5\*\* Pileus —110 mm, umbonate-expanded, dark olive, olive brown, fading to olive-buff, glutinous; stipe equal or enlarged towards groundline, tapering into pseudorhiza; spores 9—10/5—6 m $\mu$ ; clamps absent; cheilocystidia capitate; odour like raw cucumber; in oak-pine forests; USA (Oregon, Washington, California)..... 2a. *Ph. olivacea*
6. Pileus —60 (—120) mm, conico-convex to umbonate, viscid; stipe rooting; spores 8—10/4,5—6 m $\mu$ ; clamps absent; odour farinaceous or like cucumber; under conifers; USA (Oregon, Washington, California) ..... 3. *Ph. californica*.
- 6\*. Pileus —25 mm, conical, viscid; stipe rooting; spores 8,5—10/5—5,5 m $\mu$ ; clamps absent; odour unknown; under conifers; Mexico ..... 4. *Ph. mexicana*
- 7 (3\*). Pileus —30 mm, acuto-conical, rust brown, dry; spores 10—12/6—7 m $\mu$ ; cheilocystidia like *Conocybe*; clamps absent; odour absent; tropical rain forest; Colombia...5. *Ph. columbiana*
- 7\*. Pileus —50 mm, acuto-conical, orange brown, viscid; spores 9,5—10,5/5—5,5 m $\mu$ ; clamps absent; odour subraphanoid; under conifers (*Abies*, *Pinus*); India (Himalaya)..... 6. *Ph. spoliata*.
- 8 (2\*). Pileus (lamellae and stipe) with obvious olive colours (at least in young specimens) ..... 9
- 8\*. Carpophores without olive tints..... 11
9. Lamellae lilac when young; pileus —50 mm, olive brown, conico-convex, viscid; stipe rooting; spores 8—10/5—6 m $\mu$ ; clamps absent; odour raphanoid; under conifers; USA (Washington, California) ..... 7. *Ph. fallax*
- 9\*. Lamellae olive or pale red brown when young ..... 10
10. Pileus —30 mm, olive, umbonate to campanulate, innate-fibrillose, viscid; stipe fusoid-rooting; spores 10,5—12,5/6—6,5 m $\mu$ ; clamps absent; odour raphanoid; under *Nothofagus* and *Castanopsis*; New Guinea ..... 8. *Ph. muscicolor*
- 10\*. Pileus —30 mm, olive, umbonate-campanulate, dry, venose or wrinkled; stipe rooting; spores 9—11/5,5—6,5 m $\mu$ , occasionally with germ pore; clamps present; odour not distinctive; under *Nothofagus*; New Guinea ..... 9. *Ph. viridis*

- 11 (8\*). Lamellae and context of stipe lilac when young; stipe rooting ..... 12
- 11\*. Lamellae and context of stipe not lilac ..... 13
12. Pileus —50 mm, conico-convex, ochre brown, dry; stipe —5 mm diam.; spores 7—8,5/5—5,5 m $\mu$ ; clamps absent; odour raphanoid; under conifers (*Picea*, *Sequoia*); USA (Washington, California) ..  
..... 10. *Ph. attenuata*
- 12\*. Pileus —100 (150) mm, conical to umbonate, dark brown, viscid; stipe 15—35 mm diam.; spores 7,5—10/5—6 m $\mu$ ; clamps absent; odour farinaceous to unpleasant; under conifers (*Picea*, *Sequoia*); USA (Oregon, Washington, California)..... 11. *Ph. kauffmanii*
- 13 (11\*). Spores limoniform but slender, often subfusoid to amygdaliform; pileus —40 mm, acuto-conical, red brown to orange brown, viscid; spores 8,5—11/4,5—5 m $\mu$ ; clamps absent; odour farinaceous; under conifers (*Picea*, *Abies*); Europe, USA (Maine, Massachusetts, Michigan) ..... 12. *Ph. christinae*
- 13\*. Spores distinctly limoniform ..... 14
14. Pileus —35 mm, umbonate, orange to rust brown, subviscid; spores 9—11,5/6,5—7 m $\mu$ ; clamps absent; odour?; under deciduous trees (?); China ..... 13. *Ph. similis*
- 14\*. Pileus —60 mm, conical to umbonate, yellow brown to orange brown, viscid; spores 8—10/5—6 (6,5) m $\mu$ ; clamps absent; odour?; taste bitter; under conifers (*Picea*); USA (Oregon, Washington) ..... 14. *Ph. piceae*
- 15 (1\*). Spores 6—8—10 m $\mu$  long, amygdaliform to ovoid ..... 16
- 15\*. Spores 3,5—6 m $\mu$  long, ovoid to subglobose ..... 25
16. Cheilocystidia capitate, capitulum 1—3 m $\mu$  diam.; spores smaller 8 m $\mu$  long ..... 17
- 16\*. Cheilocystidia clavate to filiform, distinct capitulum absent.. 19
17. Pileus (and stipe) umber brown, —30 mm, acuto-conical dry; stipe cylindrical; spores 5,5—7/3,4—4 m $\mu$ , occasionally with distinct germ pore; cheilocystidia often forked; clamps present; odour raphanoid; under *Nothofagus*; New Guinea .. 15. *Ph. tentaculata*
- 17\*. Pileus ochre; spores without germ pore; clamps absent..... 18
18. Pileus —15 mm, convex, yellow, dry; stipe cylindrical; spores 6,5—7,5/4—5 m $\mu$ ; odour?; substrate?; Australia .....  
..... 16. *Ph. primulina*
- 18\*. Pileus —40 mm, campanulate, ochre, dry; stipe fusoid-rooting; spores 6,5—8/4—5 m $\mu$ ; odour raphanoid; tropical rain forest; Bolivia ..... 17. *Ph. subattenuata*
- 19 (16\*). Pileus (lamellae and stipe) with distinct olive colours (when young); spores 8—10 m $\mu$  long, minutely warted ..... 20
- 19\*. Carpophores without olive colours..... 21
20. Pileus —30 mm, olive brown, conico-convex, viscid; stipe cylindrical, not rooting; spores 8,5—9,5/5—6 m $\mu$ , often amygdali-

- form; clamps absent; odour like burnt hairs, unpleasant; under *Castanopsis*; New Guinea ..... 18. *Ph. odorata*
- 20\*. Pileus —60 mm, olive brown, conico-convex to conico-umbonate, viscid; stipe rooting; spores 7—10/4,5—5,5 m $\mu$ , amygdaliform to sublimoniform; clamps absent; under *Picea* (Europe) or *Nothofagus* (New Zealand) ..... 19. *Ph. festiva*
21. Spores 8—10 (—11) m $\mu$  long, coarsely warted; stipe rooting... 22
- 21\*. Spores 6—8 m $\mu$  long, minutely warted to asperulate..... 23
22. Pileus —100 mm, umbonate to campanulate, ochre brown, subviscid; spores 8,5—10/5—5,5 m $\mu$ ; clamps present; under conifers (*Tsuga*); USA (Idaho) ..... 20. *Ph. deceptiva*
- 22\*. Pileus —80 mm, conical to umbonate, orange brown, subviscid; spores 8—10,5/4,5—6 m $\mu$ ; clamps absent; under *Nothofagus*; New Guinea..... 21. *Ph. procerca*
23. Pileus —15 mm, umbonate-campanulate, yellow brown, dry; stipe —35/—3 mm, rooting; spores 6—7/3,5—4 m $\mu$ ; clamps present; odour raphanoid; under *Nothofagus*; New Zealand..... 22. *Ph. minuta*
- 23\*. Pileus and stipe larger; clamps absent (rare in *Ph. oregonensis*).. ..... 24
24. Pileus —70 mm, subacuto-conical, fawn brown, dry; stipe —150/—9 mm; spores 6,5—8/4—4,5 m $\mu$ ; odour not distinctive; in virgin forest; Borneo, Malaya ..... 23. *Ph. intermedia*
- 24\*. Pileus —110 mm, conical to umbonate, dark reddish brown, viscid; stipe —150/—20 mm; spores 6—7,5/4—4,5 m $\mu$ , occasionally with indistinct germ pore; clamps rare; odour?; under conifers; USA (Oregon)..... 24. *Ph. oregonensis*
- 25 (15\*). Cheilocystidia capitate, constricted below apex ..... 26
- 25\*. Cheilocystidia filiform to subclavate..... 32
26. Capitulum 1—3 m $\mu$  diam. .... 27
- 26\*. Capitulum 4—6 m $\mu$  diam.; stipe gradually tapering-rooting . 31
27. Lamellae and context of stipe lilac when young ..... 28
- 27\*. Lamellae and context not lilac ..... 29
28. Spores 3,5—4,5/2,5—3,5 m $\mu$ , subglobose; pileus —65 mm, acuto-conical, (purple) brown to umber brown, subviscid; stipe rooting; clamps absent; odour raphanoid; under *Quercus* (?); Malaya, Singapore ..... 25. *Ph. parvispora*
- 28\*. Pileus —60 mm, umbonate, reddish brown to yellow brown, dry; lilac lamellae in New Zealand collections only; stipe abruptly ending at base; spores 5—6/3,5—4 m $\mu$ ; clamps absent; odour raphanoid to unpleasant; under *Nothofagus*; New Zealand, New Guinea..... 26. *Ph. ratticauda*

29. Base of stipe abruptly ending into short slender pseudorhiza — see *Ph. ratticauda*
- 29\*. Stipe gradually tapering into rooting pseudorhiza . . . . . 30
30. Pileus —60 mm, acuto-conical, cinnamon, viscid; lamellae cinnamon fawn; spores 4,5—5,5/3—3,5  $\mu$ ; clamps absent; odour like soap (not raphanoid); under *Quercus*; Borneo. . . . . 27. *Ph. querqueti*
- 30\*. Pileus —60 mm, conical to campanulate, with small umbo, orange brown, viscid; spores 5—6 (6,5)/3—4  $\mu$ ; clamps present; odour not distinctive; under conifers (*Picea*, *Sequoia*); USA (Oregon) . . . . . 28. *Ph. radicata*
- 31 (26\*). Lamellae and context of stipe lilac when young; pileus —60 mm, acuto-conical, ochraceous, viscid; stipe rooting; spores 5—6/3—3,5  $\mu$ ; clamps absent; odour rancid; under conifers (*Picea*, *Abies*); India (Himalaya) . . . . . 29. *Ph. rancida*
- 31\*. Lamellae and context of stipe not lilac; pileus —45 mm, conical to umbonate, red brown to orange brown, viscid; stipe rooting; spores 5,5—6/3,5—4  $\mu$ ; clamps absent; odour (sub)raphanoid; under conifers (*Picea*); Europe . . . . . 30. *Ph. hilaris*
- 32 (25\*). Lamellae and context of stipe lilac when young; stipe with abruptly ending and inflated base, rooting pseudorhiza absent; pileus —35 mm, conical, avellaneous, dry; spores 3,5—4,5/2,5—3  $\mu$ ; clamps present; odour unpleasant; under *Nothofagus*; New Guinea. . . . . 31. *Ph. bicolor*
- 32\*. Lamellae and context of stipe not lilac; stipe tapering-rooting . 33
33. Pileus —70 mm, subacutely umbonate-expanded, cinnamon fawn to rust brown, viscid; context concolorous with pileus; spores 4,5—5,5/3—3,5  $\mu$ ; odour raphanoid; under *Quercus*; Borneo, Singapore . . . . . 32. *Ph. corneri*
- 33\*. Pileus —50 mm, convexo-umbonate, red brown to orange red brown, subviscid; spores 4,5—5 (5,5)/3—3,5  $\mu$ ; odour raphanoid; under conifers (*Picea*); Europe . . . . . 33. *Ph. jennyi*

Synoptical key to species of *Phaeocollybia*

- |                        |                       |
|------------------------|-----------------------|
| 1 <i>pseudofestiva</i> | 8 <i>muscolor</i>     |
| 2 <i>lugubris</i>      | 9 <i>viridis</i>      |
| 2a <i>olivacea</i>     | 10 <i>attenuata</i>   |
| 3 <i>californica</i>   | 11 <i>kauffmanii</i>  |
| 4 <i>mexicana</i>      | 12 <i>christinae</i>  |
| 5 <i>columbiana</i>    | 13 <i>similis</i>     |
| 6 <i>spoliata</i>      | 14 <i>piceae</i>      |
| 7 <i>fallax</i>        | 15 <i>tentaculata</i> |



16	<i>primulina</i>	25	<i>parvispora</i>
17	<i>subattenuata</i>	26	<i>ratticauda</i>
18	<i>odorata</i>	27	<i>querqueti</i>
19	<i>festiva</i>	28	<i>radicata</i>
20	<i>deceptiva</i>	29	<i>rancida</i>
21	<i>procera</i>	30	<i>hilaris</i>
22	<i>minuta</i>	31	<i>bicolor</i>
23	<i>intermedia</i>	32	<i>corneri</i>
24	<i>oregonensis</i>	33	<i>jennyi</i>
1. Pileus:	olive colours:	1, (2), 2a, (3), 7, 8, 9, 18, 19	
2. Lamellae:	lilac colours:	7, (10), 11, 25, (24), (26), 29, 31	
3. Stipe:	cylindrical:	15, 16, 18	
	inflated at base:	26, 31	
4. Spores:	limoniform	1, 2, 2a, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14	
	ovoid (6–10 m $\mu$ long):	15, 16, 17, 18, 19, 20, 21, 22, 23, 24	
	subglobose (3,5–6 m $\mu$ long):	25, 26, 27, 28, 29, 30, 31, 32, 33	
	+ germ pore	9, 14, 15, 17	
5. Cheilocystidia:	capitate	1, 2, 2a, 3, 4, 5, 6, 15, 16, 17, 25, 26, 27, 28, 29, 30	
	clavate-filiform:	7, 8, 9, 10, 11, 12, 13, 14, 18, 19, 20, 21, 22, 23, 24, 31, 32, 33	
6. Clamps:	present:	9, 15, 20, 22, (24), 28, 31	
7. Habitat:	under conifers ( <i>Picea</i> , <i>Pinus</i> , <i>Tsuga</i> , <i>Sequoia</i> )	1, 2, (2a), 3, 4, 6, 7, 10, 11, 12, 14, 19, 20, 24, 28, 29, 30, 33	
	under deciduous trees: ( <i>Nothofagus</i> , <i>Quercus</i> s. l., ? <i>Eucalyptus</i> , "virgin tropical forest")	(2a), 5, 8, 9, 13, 15, (16), (17), 18, 21, 22, 23, 25, 26, 27, 31, 32	
9. Distribution:	Europe	2, 12, 19, 30, 33	
	Asia (India, China, Japan):	6, 13, 19, 29	
	SE-Asia (Malaya, Borneo)	23, 25, 27, 32	
	USA:	1, 2a, 3, 7, 10, 11, 12, 14, 20, 24, 28	
	Mexico:	4	
	S-America (Bolivia, Colombia):	5, 17	
	Australia	16	
	New Guinea:	8, 9, 15, 18, 21, 26, 31	
	New Zealand:	19, 22, 26	

1. *Phaeocollybia pseudofestiva* SMITH 1957

Brittonia 9: 213

Habitat: Under conifers and hardwoods.

Distribution: USA (Oregon, California).

Illustrations: SMITH (1957: l. c.); — Tab. IX, 1 a, b.

Material examined: USA: "Crescent City, California; 31. X. 1937, leg. SMITH (MICH, 8274; holotype)".

2. *Phaeocollybia lugubris* (FR.) HEIM 1931

Encycl. Myc. 1: 71

Basionym: *Agaricus lugubris* FRIES 1821: Syst. Myc. 1: 254.

Synonym: *Simocybe lugubris* (FR.) KARSTEN 1879: Bidr. Finl. Nat. & Folk, p. 416.

*Naucoria lugubris* (FR.) QUELET 1880: Champ. Jura & Vosges, suppl. 10, p. 663.

*Phaeocollybia spadicea* SMITH 1957: Brittonia 9: 215.

Habitat: under *Picea*, also in mixed stands with *Pinus* and *Larix*.

Distribution: Europe.

Illustrations: FRIES, Ic. Sel. Hymen., pl. 121, 1; BRESADOLA, Icon. Myc., pl. 791; KÜHNER & ROMAGNESI (1957, p. 42); Cetto (1976, pl. 438); HEIM (1930: Bull. Soc. Myc. Fr. 46, tab. XXXIX); Tab. IX, 2 c, d.

Material examined: Sweden: "Femsjö, Småland; 24. VIII. 1970, leg. MOSER (IB, 70/56)". — Italy: "Castelfondo; VIII. 1902, leg. BRESADOLA (S)". — "Varena; VIII. 1914, leg. BRESADOLA (S)". — France: "Forêt de Pramenoux, Dep. Rhône; leg. JOSSERAND, XXV/72". — Germany: "Wellenburg, Bayern; 17. VIII. 1959, leg. BRESINSKY (M)". — Switzerland: "Seengen, AG; 9. X. 1964, leg. HORAK (ZT, 64/334)". — "Fumina, Valle de Campo, TI; 5. IX. 1974, leg. HORAK (ZT, 74/305)". — USA: "Washington, Quillayute River; 26. X. 1936, leg. SMITH (MICH, 3339; holotype of *Ph. spadicea*)".

2a. *Phaeocollybia olivacea* SMITH 1957

Brittonia 9: 204

Habitat: in oak-pine woods.

Distribution: USA (Oregon, Washington, California).

Illustrations: SMITH (1957: l. c.); — Tab. IX, 2a, e, f.

Material examined: USA: "Oregon, Grants Pass; 17. XI. 1956, leg. SMITH (MICH, 55767; holotype)".

3. *Phaeocollybia californica* SMITH 1957

Brittonia 9: 216

Synonym: *Phaeocollybia sipei* SMITH 1957: Brittonia 9: 207.

*Phaeocollybia scatesiae* SMITH & TRAPPE 1972: Mycologia 64: 1146.

Habitat: under conifers (e. g. Sitka spruce), also oaks.

Distribution: USA (Oregon, Washington, California).

Illustrations: SMITH (1957: l. c.); SMITH & TRAPPE (1972: l. c.); — Tab. IX, 3 g, h.

Material examined: USA: "California, Crescent City; 23. XI. 1956, leg. SMITH (MICH 55610, holotype)". — "Oregon, Eugene; X. 1937, leg. SIPE (MICH; holotype of *Ph. sipei*)". — "Oregon, Cascade Head

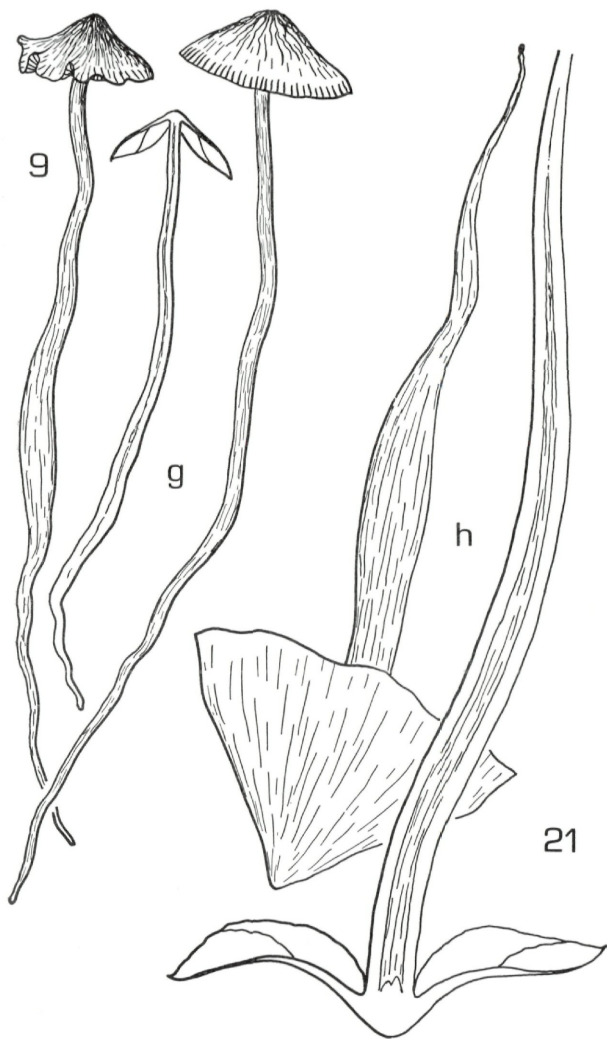


Fig. I. 9. *Ph. viridis* Hk. (ZT, 72/357; holotype): g. carpophores. 21. *Ph. procera* Hk. (ZT, 71/380; holotype): h. carpophores.

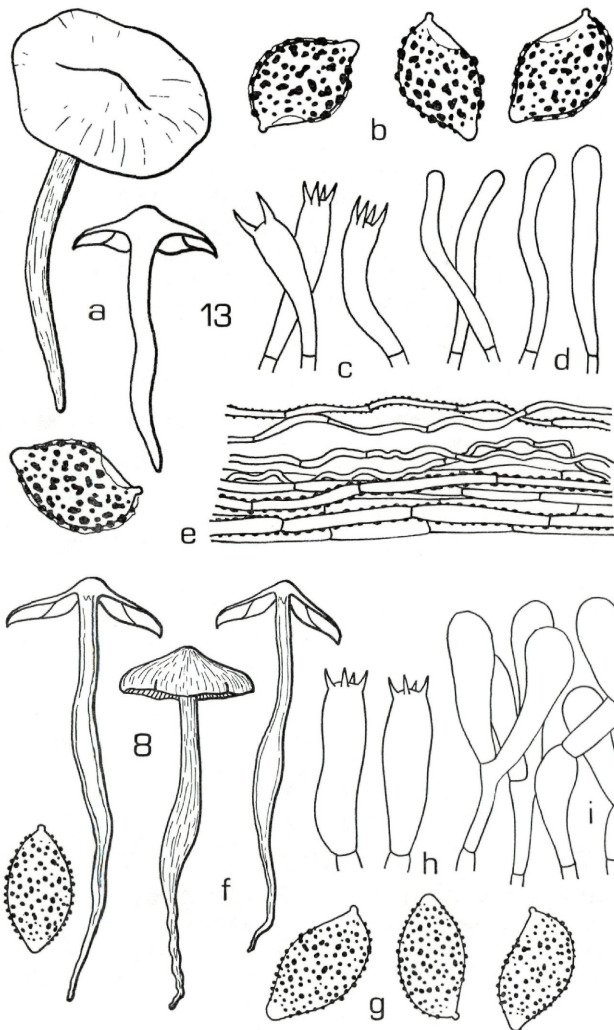


Fig. II. 13. *Ph. similis* (BRES.) SINGER (WU, 12690; holotype): a. carpophores. — b. spores. — c. basidia. — d. cheilocystidia. — e. cuticle. 8. *Ph. muscicolor* H.K. (ZT, 72/115; holotype): f. carpophores. — g. spores. — h. basidia. — i. cheilocystidia.

Exp. Station; 24. X. 1970, leg. SCATES (MICH 79286; holotype of *Ph. scatesiae*)”.

#### 4. *Phaeocollybia mexicana* CORNER & HORAK sp. n.

Pileus usque ad 25 mm lato, acuto-umbonato, fusco, viscido. Lamellis pallide cinnamomeis. Stipite —50/—4 mm, radicato, fusco-ferrugineo, sicco. Odore saporeque nullo. Sporis 8,5—10/5—5,5 m $\mu$ , sublimoniformibus, verrucosis. Cheilocystidiis 20—35/1—3 m $\mu$ , fusoides-capitatis. Fibulis nullis. Ad terram in silvis coniferarum. Mexico. Typus (ZT).

Pileus 20—25 mm diam., convex then plane, more or less umbonate, often acuto-umbonate; tawny brown to fuscous brown, drying light ferruginous ochraceous; opaque, viscid, smooth, margin narrowly incurved. Lamellae adnexed, narrow (2—2,5 mm wide), crowded; pale cinnamon fawn, edge often very uneven. Stipe 40—50/3—4 mm, cylindrical, rooting; fuscous to ferruginous; cartilaginous, smooth, dry, single. Context 3—4 mm thick in the centre of pileus, whitish, concolorous in the stem, turns light reddish on cutting or bruising. Taste and odour not distinctive. Chemical reactions on pileus unknown. Spores 8,5—10/5—5,5 m $\mu$ , sublimoniform, strongly beaked, verrucose, mucro smooth, perispodium and plage distinct, germ pore absent. Basidia 22—30/5—7 m $\mu$ , 4-spored. Cheilocystidia 20—35/1—3 m $\mu$ , slender fusoid, apex distinctly capitate, capitulum —2 m $\mu$  diam., hyaline or pale yellow-brown from plasmatic pigment. Cuticle a cutis of gelatinized cylindrical hyphae (2—4 m $\mu$  diam.), encrusted with brown pigment. Clamp connections absent.

Habitat: On soil under conifers (*Pinus* spp.), about 2000 m.

Distribution: Mexico.

Illustrations: Tab. VI, 4 e—i; Tab. X, 4 i, k.

Material examined: Mexico: “Mexico City, Desierto de los Leones; 23. XII. 1947, leg. CORNER (ZT; holotype)“.

#### 5. *Phaeocollybia columbiana* SINGER 1970

Flora Neotropica, 4: 6

Habitat: On the ground in virgin forest.

Distribution: Colombia.

Illustrations: SINGER (1970: l. c.); — Tab. X, 5 m, n.

Material examined: Colombia: „Buenaventura, San Joaquin; 22. IV. 1968, leg. SINGER (F; holotype)“.

#### 6. *Phaeocollybia spoliata* HORAK 1974

Acta Botanica Indica 2: 72

Habitat: On soil in *Pinus-Abies* forest, about 2.750 m.

Distribution: India.

Illustrations: HORAK (1974: l. c.); — Tab. X, 6 o, p.

Material examined: India: „Narkanda; 6. VIII. 1964, leg. MAAS-GEESTERANUS (L, 14167; holotype. — ZT, 70/272; isotype)“.

### 7. *Phaeocollybia fallax* SMITH 1957

Brittonia 9: 202

Synonym: *Phaeocollybia lilacifolia* SMITH 1957: Sydowia, Beiheft 1: 59.

Habitat: on soil under Sitka spruce and redwood.

Distribution: USA (Washington, California).

Illustrations: SMITH (1957: l. c.); — Tab. X, 7 q, r.

Material examined: USA: “Washington, Quillayute River; 26. X. 1935, leg. SMITH (MICH, 3342; holotype)”. — “Washington, Mt. Rainer N. P., Carbon River; 16. IX. 1952, leg. SMITH (MICH, 39976; holotype of *Ph. lilacifolia*).

### 8. *Phaeocollybia muscicolor* HORAK sp. n.

Pileo usque ad 30 mm lato, e convexo campanulato, olivaceo, glutinoso. Lamellis e olivaceo argillaceis. Stipite 70/—5 mm, fuscoideo, olivaceo, basim versus aurantio, siccio. Odore saporeque raphanoideo. Sporis 10,5—12,5/6—6,5  $\mu$ , amygdaliformibus vel sublimoniformibus, verrucosis. Cheilocystidiis 20—35/7—9  $\mu$ , clavatis. Ad terram in silvis nothofagineis. Nova Guinea. Typus (ZT, 72/115).

Pileus 20—30 mm diam., conical soon becoming convex to campanulate, margin strongly inrolled; deep olive; radial innately fibrillose, glutinous when wet, margin not striate. Lamellae adnexed to almost free, densely intermixed, not ventricose; at first olive-beige turning argillaceous, gill edge white, fimbriate. Stipe 45—70/3—5 mm, fusoid, with long rooting pseudorhiza; light olive at apex, reddish brown towards the base; glabrous, cartilaginous, hollow, single, dry. Context olive in pileus and upper parts of the stipe. Taste and smell raphanoid. Chemical reactions on pileus: KOH, HCl-negative. Spore print brown. Spores 10,5—12,5/6—6,5  $\mu$ , almond-shaped to sublimoniform, warty, brown, mucro distinct, plage absent. Basidia 25—30/7—8  $\mu$ , 4-spored. Cheilocystidia 20—35/7—9  $\mu$ , clavate, hyaline, membranes thin-walled. Cuticle a cutis consisting of cylindrical slightly gelatinized hyphae (4—8  $\mu$  diam.), membranes encrusted with brown pigment. Clamp connections absent.

Habitat: On soil in *Nothofagus* forests, mixed with *Castanopsis-Lithocarpus*; above 1.700 m.

Distribution: Papua New Guinea.

Illustrations: Tab. II, 8 f—i; Tab. XI, 8 s, t.

Material examined: Papua New Guinea: „Morobe District, Bulolo, Watut; leg. HORAK, 23. I. 1972 (ZT, 72/115; holotype)“.

According to the rather large spores *Ph. muscicolor* Hk. appears to be closely related with *Ph. viridis* Hk. However, the two New Guinean

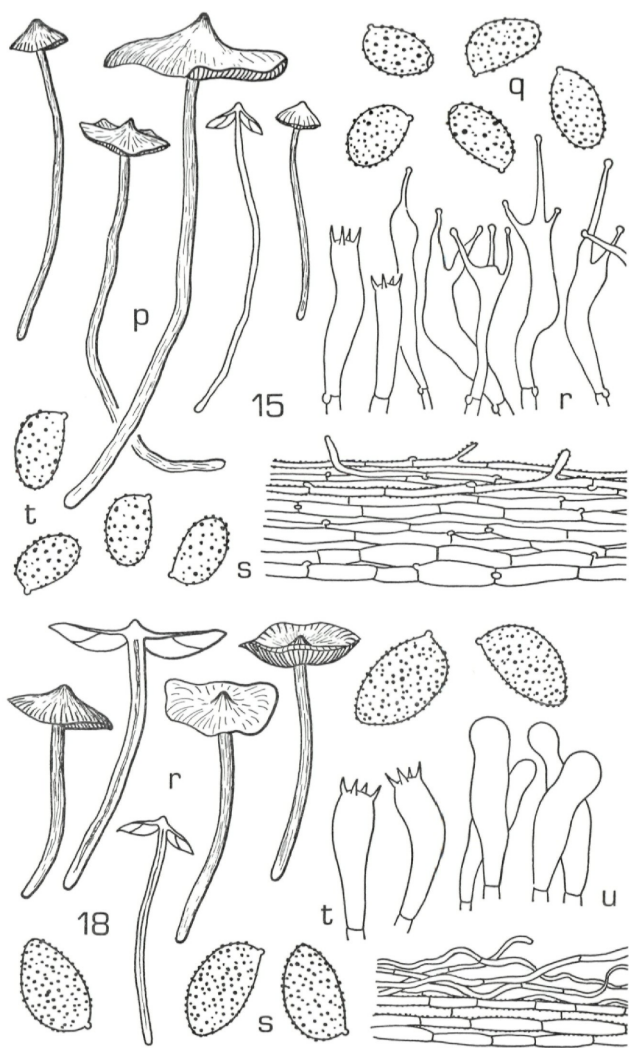


Fig. III. 15. *Ph. tentaculata* Hk. (ZT, 73/259; holotype): p. carpophores. — q. spores. — r. cheilocystidia. — s. cuticle. — (ZT, 73/217): t. spores. 18. *Ph. odorata* Hk. (ZT, 73/313; holotype): r. carpophores. — s. spores. — t. basidia. — u. cheilocystidia. — v. cuticle.

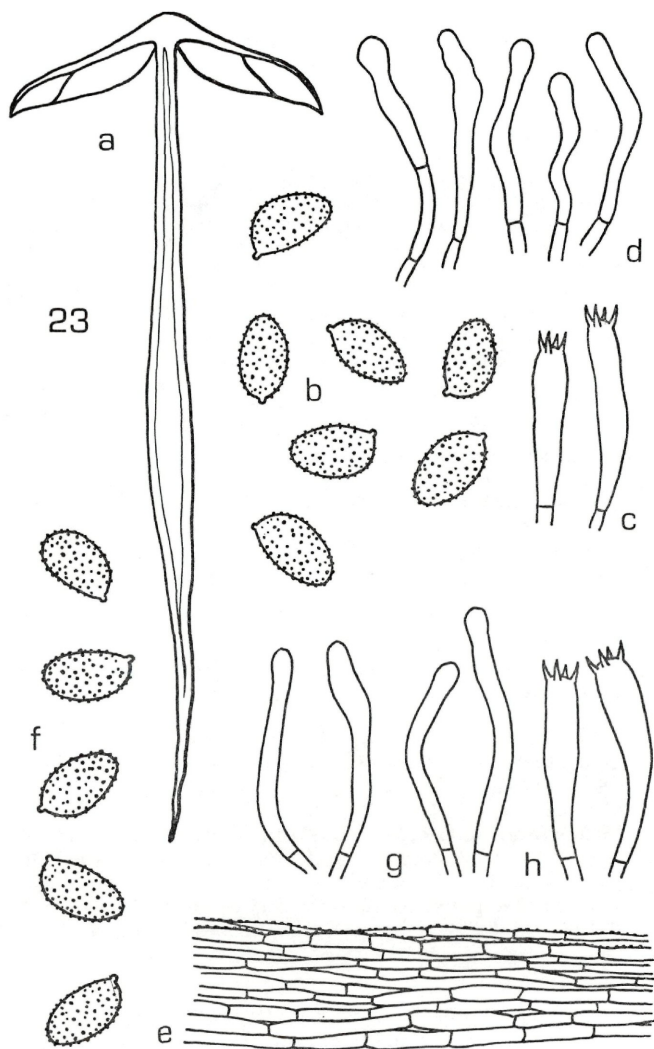


Fig. IV. 23. *Ph. intermedia* CORNER & HK. (ZT, RSNB 5121; holotype): a. carpophore. — b. spores. — c. basidia. — d. cheilocystidia. — e. cuticle. — (ZT, RSNB 5121 A): f. spores. — g. cheilocystidia. — h. basidia.



fungi are well separated by several differences: structure of the cuticle, absence or presence of a plage on the spores, clamp connections, odor and taste.

9. *Phaeocollybia viridis* HORAK sp. n.

Pileo usque ad 35 mm lato, e convexo campanulato, olivaceo, venoso. Lamellis brunneis. Stipite —160/—7 mm, cylindraco vel subfusoido, basim versus attenuato, olivaceo. Sapore odoreque nullo. Sporis 9—11/5,5—6,5  $\mu$ , amygdaliformibus, verrucosis. Cheilocystidiis cylindracois vel subfusoidis. Fibulis praesentibus. Ad terram in silvis nothofagineis. Nova Guinea. Typus (ZT, 72/357).

Pileus 20—35 mm diam., hemispherical to convex becoming broadly campanulate, conspicuously wrinkled; olive to moss green, old specimens with fading colours, strongly hygrophanous, striate when wet, dry. Lamellae adnate to emarginate-adnate, ventricose, densely crowded; chocolate brown also in old carpophores, rust brown colours absent, gill edge fimbriate, whitish. Stipe 100—160/2—7 mm, cylindrical to slightly fusoid, slender, gradually attenuating into a long rooting pseudorhiza; olive green in the upper part, orange-brown towards the base; smooth, hollow, dry, single but in groups.

Context greenish-brown in pileus and upper parts of the stipe. Odor and smell not distinctive. Chemical reactions on pileus: KOH, HCl and NH<sub>3</sub>-negative.

Spore print brown. Spores 9—11/5,5—6,5  $\mu$ , amygdaliform, verrucose, plage and perisporium distinct, sometimes callus-like structure at apex. Basidia 28—34/7—8  $\mu$ , 4-spored. Cheilocystidia 20—40/3—9  $\mu$ , cylindrical, subclavate to subfusoid, often of irregular shape, hyaline, membranes thin-walled, in dense clusters on the gill edge. Cuticle a cutis of cylindrical not gelatinized hyphae (2—5  $\mu$  diam.), subcutis consisting of globose to oval cells, encrusted with brown pigment (observed in KOH). Clamp connections numerous.

Habitat: On soil under *Nothofagus* spp.; about 2.200 m.

Distribution: Papua New Guinea.

Illustrations: Tab. I, 9 g; Tab. XI, 9 u, v.

Material examined: Papua New Guinea: „Morobe District, Wau, Kaindi; leg. HORAK & BENECKE, 3. IV. 1972 (ZT, 72/357; holotype)“.

This species is well defined by a number of characters: firstly the wrinkled olive pileus, secondly the very slender and long rooting pseudorhiza, thirdly the presence of clamp connections and finally the conspicuous plage on the rather large spores.

10. *Phaeocollybia attenuata* (SMITH) SINGER 1951

Lilloa 22: 567

Basionym: *Naucoria attenuata* SMITH 1937: Mycologia 29: 48.

Habitat: on soil under Sitka spruce, Douglas fir and redwood.

Distribution: USA (Washington, California).

Illustrations: SMITH (1937: l. c.); SMITH (1957: 206); — Tab. XI, 10 w, x.

Material examined: USA: "Washington, La Push; 2. X. 1935, leg. SMITH (MICH, 3343; holotype)".

### 11. *Phaeocollybia kauffmanii* (SMITH) SINGER 1940

Rev. Myc. 5: 11

Basionym: *Naucoria kauffmanii* SMITH 1937: Mycologia 29: 52.

Habitat: on soil under conifers (hemlock, redwood).

Distribution: USA (Washington, Oregon, California).

Illustrations: SMITH (1937: l. c.); SMITH (1957: 203); — Tab. XI, 11 y, z.

Material examined: USA: "Oregon, Lake Tahkenitch;

18. XI. 1935, leg. SMITH (MICH, 3532; holotype)".

### 12. *Phaeocollybia christinae* (FR.) HEIM 1931

Encycl. Myc. 1: 71

Basionym: *Agaricus christinae* FRIES 1836—1838: Epicrisis, 192.

Synonym: *Phaeocollybia laterarius* SMITH 1957: Brittonia 9: 205.

*Phaeocollybia rufipes* BIGELOW ap. BIGELOW & BARR 1963: Rhodora 65: 297.

Habitat: on soil under conifers (*Picea*, *Abies*).

Distribution: Europe, USA (Michigan, Maine, Massachusetts).

Illustrations: SMITH (1957: 205); BRESINSKY (1958: 1); CETTO (1976: pl. 439); BIGELOW (1963: 297); — Tab. XII, 12a, b.

Material examined: Sweden: „Halland, Bygget; 18. VIII. 1964, leg. MOSER (IB, 64/52)". — „Smaland, Femsjö; VIII. 1965, leg. BRESINSKY (M)". — Germany: „Bayern, Wellenburg; VIII. 1959, leg. Bresinsky (M)". — „Bayern, Peterhof bei Augsburg; leg. STANGL (M)". — Austria: „Tirol, Gnadenwald; 25. VIII. 1967, leg. MOSER (IB, 67/68)". — Switzerland: „TI, Fumina, Valle di Campo; 5. IX. 1974, leg. HORAK (ZT, 74/304)". — USA: "Michigan, Tahquamenon Falls State Park; 20. VIII. 1931, leg. SMITH (MICH, 38033; holotype of *Ph. laterarius*". — „Maine, Baxter State Park; 1. IX. 1962, leg. BIGELOW & CURTIS (MASS, 11478, holotype of *Ph. rufipes*).

### 13. *Phaeocollybia similis* (BRESADOLA) SINGER 1951

Lilloa 22: 567

Basionym: *Naucoria similis* BRESADOLA 1930: Icon. Myc. 16, pl. 794.

The macroscopical characters according to the original description: "Pileo carnosus, tenuis, e convexo expanso-umbonatus, subrepandus, viscosus (?), ferrugineo-aurantius, glaber, nitidus, 1.5—3.5 cm latus; lamellae confertissimae, postice emarginato-adnatae, fere liberae,

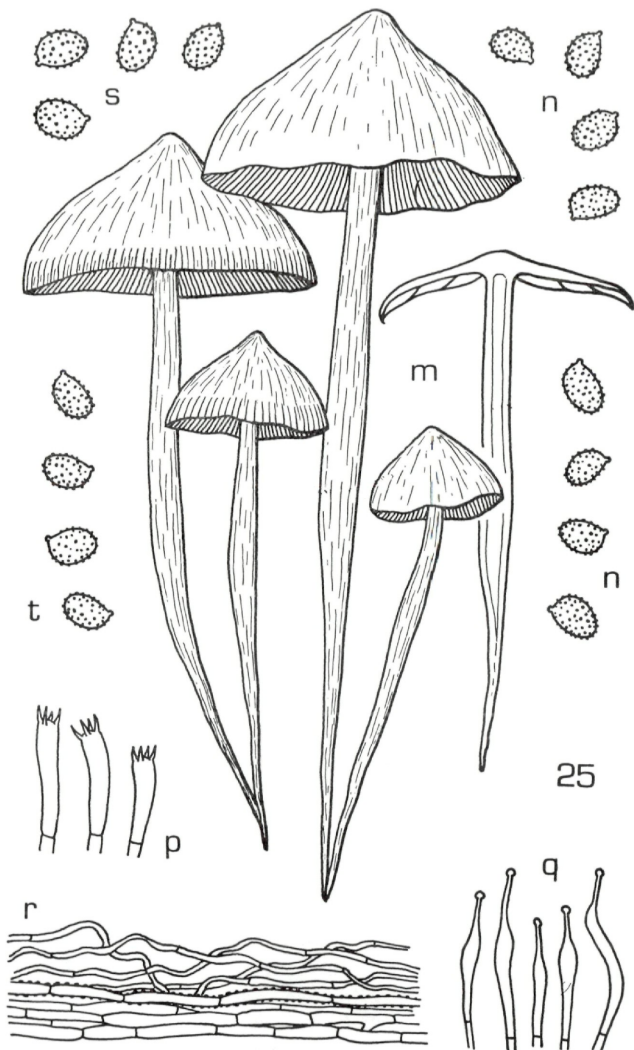


Fig. V. 25. *Ph. parvispora* CORNER & HK. (ZT; holotype): m. carpophores. — n. spores. — p. basidia. — q. cheilocystidia. — r. cuticle. — (ZT, *Naucoria* 2): s. spores. — (ZT, *Naucoria* 2a): t. spores.

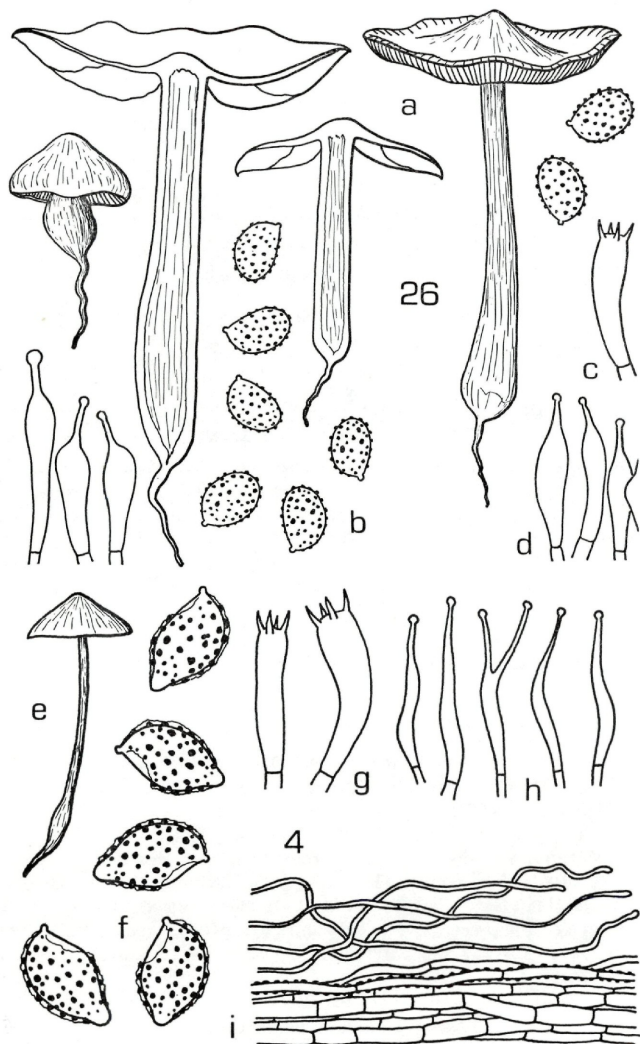


Fig. VI. 26. *Ph. ratticauda* Hk. (ZT, 71/383): a. carpophores. — b. spores. — c. basidia. — d. cheilocystidia. 4. *Ph. mexicana* CONER & Hk. (ZT; holotype): e. carpophore. — f. spores. — g. basidia. — h. cheilocystidia. — i. cuticle.

fulvae; stipes fistulosus, tenax, cylindraceus, plerumque curvatus vel flexuosus, profunde radicans, glaber, fulvo-ferrugineus, aetate nigrescens, 4–6 cm longus, 2–4 mm crassus; caro luteola”.

Spore print ?. Spores 9–11,5/6,5–7  $\mu$ , sublimoniform, with distinct mucro, coarsely warted, plage present. Basidia 22–34/5–8  $\mu$ , 2- and 4-spored. Cheilocystidia 25–40/3–7  $\mu$ ,  $\pm$  cylindrical to subclavate, hyaline, indistinct. Cuticle a cutis consisting of cylindrical hyphae (4–8  $\mu$  diam.), membrane gelatinized, encrusted with yellow-brown pigment. Clamp connections absent.

Habitat: On soil.

Distribution China (Yünnan).

Illustrations: BRESADOLA (1930: l. c.); — Tab. II, 13 a–e; Tab. XII, 13 c, d.

Material examined: China: „Yünnan, Ngulukö prope urbem Lidjiang; coll. HANDEL-MAZZETTI, iter sinense 1914–18, Nr. 12690; IX–X, 1916 (WU, 12690; holotype)“.

The type material (believed to be lost) of *Ph. similis* is still in good condition, however, mixed with exsiccata of another agaric which belongs probably to *Mycena*. SMITH (1957), not knowing the exact data of the type, identified one of his collections from Washington as *Ph. similis*. The restudy of the type and SMITH’s material showed that the two collections are not identical. The material from the American West Coast (Mt. Rainier, Washington) is transferred to *Phaeocollybia piceae* SMITH & TRAPPE (see No. 14).

#### 14. *Phaeocollybia piceae* SMITH & TRAPPE 1972

Mycologia 64: 1145

Synonym: ?*Phaeocollybia similis* (BRESADOLA) ss. SMITH 1957: Brittonia 9: 207.

*Phaeocollybia gregaria* SMITH & TRAPPE 1972: Mycologia 64: 1144.

Habitat: On soil under *Picea sitchensis*.

Distribution: USA (Washington, Oregon).

Illustrations: SMITH (1957: l. c.); — Tab. XII, 14 e, f.

Material examined: USA: “Oregon, Cascade Head Exp. Forest; 16. X. 1970, leg. SMITH (MICH, 79085; holotype)“ — „Oregon, Cascade Head Exp. Forest; 16. X. 1970, leg. SMITH (MICH, 79075; holotype of *Ph. gregaria*)“ — “Washington, Mt. Rainer N. P., Carbon River; 16. IX. 1952, leg. SMITH (MICH, 39988, auth. mat. *Ph. similis* ss. SMITH)“.

#### 15. *Phaeocollybia tentaculata* HORAK sp. n.

Pileo usque ad 35 mm lato, conico, brunneo, sicco. Lamellis ferrugineis. Stipite –80/–3 mm, cylindraceo, brunneo, sicco. Odore saporeque aciduloraphaneo. Sporis 5,5–7/3,5–4  $\mu$ , minute verrucosis, ovatis. Cheilocystidiis

fusoideo-cylindraceis, saepe apicaliter furcatis, minute capitatis. Ad terram vel ligno putrido in silvis nothofagineis. Nova Guinea. Typus (ZT, 73/259).

Pileus 10–35 mm diam., conical to convex with distinct conical papilla, margin straight; dark brown, amber brown, drying paler, greenish colours absent; radially innately fibrillose, dry, slightly striate towards the margin. Lamellae adnexed, ventricose, edge whitish fibrillate; at first argillaceous turning rust brown. Stipe 40–80/2–3 mm, cylindrical, equal, base not rooting, rarely inflated to a small indistinct bulb; uniformly dark brown to amber brown; glabrous to innately fibrillose, dry, hollow, single in groups. Context brownish. Taste and smell farinaceous to raphanoid. Chemical reactions on pileus: unknown.

Spore print brown. Spores 5,5–7/3,5–4  $\mu$ , oval, minutely verrucose to asperulate, brown, plage absent, sometimes with indistinct germ pore at apex. Basidia 18–30/5  $\mu$ , 4-spored. Cheilocystidia 25–40/2–7  $\mu$ , cylindrical to subfusoid, apically with a long attenuating neck carrying a small but distinct capitulum (up to 2  $\mu$  diam.), hyaline, membranes often encrusted with brown pigment. Cuticle a cutis consisting of cylindrical not gelatinized hyphae (2–3  $\mu$  diam.), encrusted with brown pigment; clamp connections numerous.

Habitat: On soil or rotten wood in *Nothofagus* forests (*N. carrii*); above 1.800 m.

Distribution: Papua New Guinea.

Illustrations: Tab. III, 15 p–t; Tab. XII, 15g, h.

Material examined: Papua New Guinea: “Morobe District, Wau, Mt. Kaindi; leg. HORAK, 23. V. 1973 (ZT, 73/259; holotype)”. Same locality: “leg. HORAK, 11. V. 1973 (ZT, 73/217)“.

The most conspicuous microscopical character of *Ph. tentaculata* HK. are the cheilocystidia. One, two or three projection-like arms crowned with a tiny capitulum sit on top of the cystidia. According to our knowledge similar cheilocystidia are also known to occur in *Ph. lugubris* (FR.).

Occasionally the spores of *Ph. tentaculata* do show a more or less distinct callus or even germ pore. Studying a number of type specimens of *Phaeocollybia* this specific character was observed several times; so for instance in *Ph. oregonensis* SMITH & TRAPPE, *Ph. amazonica* SINGER and other taxa.

#### 16. *Phaeocollybia primulina* (BERKELEY) HORAK c. n.

Basionym: *Marasmius primulinus* BERKELEY 1877: J. Linn. Soc. 16: 38.

Synonym: *Gymnopilus primulinus* (BERKELEY) PEGLER 1965: J. Austr. Bot. 13: 343.

Original description: „Pileo e convexo explanato primulino demum umbilicato pulverulento, margine striato; stipite brevi gracili fur-

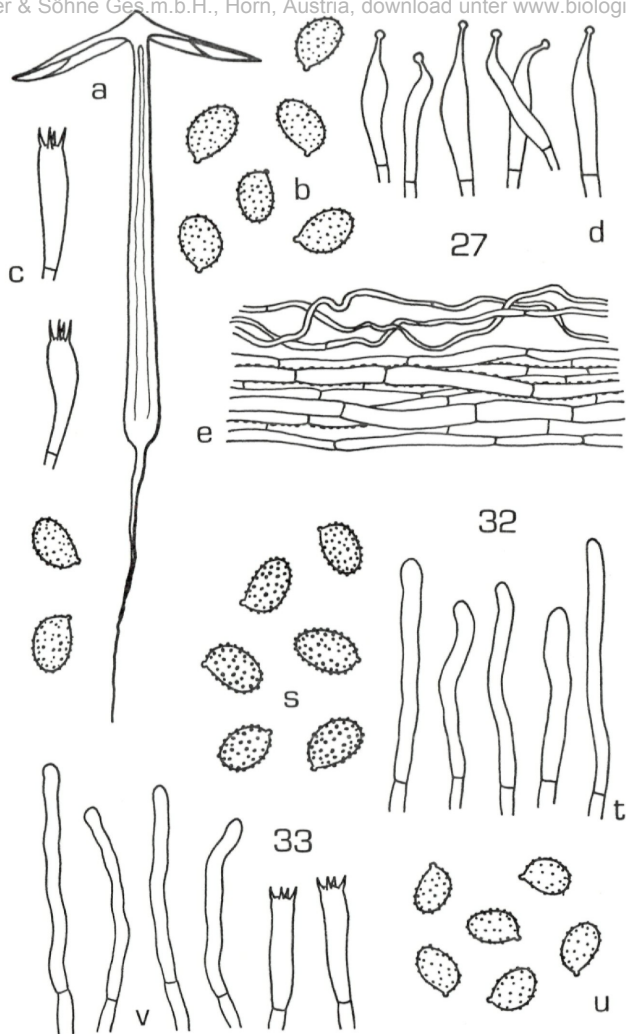


Fig. VII. 27. *Ph. querqueti* CORNER & HK. (ZT, RSNB 1759; holotype): a. carpophore. — b. spores. — c. basidia. — d. cheilocystidia. — e. cuticle.  
 32. *Ph. corneri* HK. (ZT, RSNB 2893; holotype): s. spores. — t. cheilocystidia.  
 33. *Ph. jennyi* (KARSTEN) HEIM (S; leg. Bresadola, VIII. 1898): u. spores. — v. basidia and cheilocystidia.

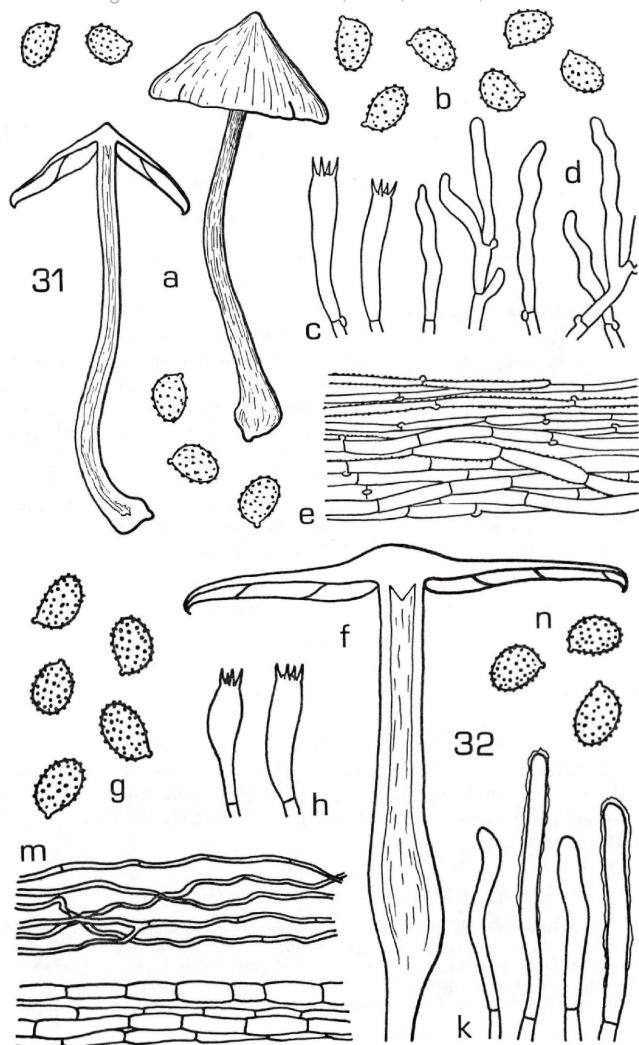


Fig. VIII. 31. *Ph. bicolor* Hk. (ZT, 71/363; holotype): a. carpophores. — b. spores. — c. basidia. — d. cheilocystidia. — e. cuticle. 32. *Ph. corneri* Hk. (ZT, RSNB 2893; holotype): f. carpophore. — g. spores. — h. basidia. — k. cheilocystidia. — m. cuticle. — (ZT, Naucoria 2d): n. spores.



furaceo; lamellis crassiusculis concoloribus. Pileus  $\frac{1}{2}$  inch across; stem  $\frac{1}{2}$  inch high".

Spores 6,5–7,5/4–5  $\mu$ , ovate to pip-shaped, brown, verrucose, plage and germ pore absent. Basidia not recovered on type material. Cheilocystidia 15–20/2–3  $\mu$ , cylindrical to fusoid and distinctly capitate, hyaline. Cuticle a cutis of cylindrical hyphae without clamp connections on septae.

Habitat: On soil.

Distribution: Australia (N. S. Wales).

Illustrations: PEGLER (1965: l. c.); — Tab. XIII, 16i, k.

Material examined: Australia: "N. S. Wales, Parramatta, Pennant Hills; June 1874, CHALLENGER (K; holotype)".

Unfortunately the type collection is in a rather poor condition. However, it is still possible to extract all necessary information from the material. *Ph. primulina* (BERKELEY) is obviously a close relative of *Ph. subattenuata* SINGER (see fig. 4, c–d) described from Bolivia. PEGLER transferred *M. primulinus* to *Gymnopilus* (PEGLER 1965). Due to the type of spores (plage absent), the shape of the cheilocystidia, the consistency of the carpophores ("*Marasmius*" ss. BERKELEY!) and the lack of any brilliant yellow, KOH-soluble pigments it would appear that this fungus is better placed in *Phaeocollybia*.

#### 17. *Phaeocollybia subattenuata* SINGER 1961

Sydowia 15: 78

Synonym: *Phaeocollybia amazonica* SINGER 1961: Sydowia 15: 77.

Habitat: On soil in tropical rain forest.

Distribution: Bolivia.

Illustrations: SINGER (1970: 5); — Tab. XIII, 17 m, n.

Material examined: Bolivia: "Pando, Madre de Dios, Las Piedras; 5. IV. 1957, leg. SINGER (LIL, B 2510; holotype)". — "Beni, Vaca Diez, Riberalta; 31. III. 1956, leg. SINGER (LIL, B 2372; holotype of *Ph. amazonica*)".

#### 18. *Phaeocollybia odorata* HORAK sp. n.

Pileo usque ad 30 mm lato, papillato-conico, viride-brunneo, viscido. Lamellis olivaceo-argillaceis. Stipite –45/–3 mm, cylindraco, olivaceo-brunneo ad apicem, brunneo basim versus, viscido. Odore ingrato. Sporis 8,5–9,5/5–6  $\mu$ , minute verrucosis. Cheilocystidiis 25–35/5–7  $\mu$ , fusoido-capitatis. Fibulis nullis. Ad terram in silvis Lithocarpi. Nova Guinea. Typus (ZT, 73/313).

Pileus 10–30 mm diam., conical or convex to plane with distinct and permanent conical papilla, aged specimens also with upturned margin; olive with brownish tinge when wet and young, turning brown with olive-greenish hue; slightly viscid, hygrophonous, striate towards

the margin. Lamellae adnexed to almost free, ventricose, densely crowded; at first olive-argillaceous turning argillaceous or light ferruginous; gill edge fimbriate, pale. Stipe 30—45/2—3 mm, cylindrical, equal or indistinctly attenuated towards the base, cartilaginous, often twisted; greenish-brownish at the apex, towards the base increasingly brown to dark brown; viscid when wet, glabrous, hollow, single in groups. Context greenish-brownish. Taste and smell very strong, unpleasant, like burnt hairs. Chemical reactions unknown.

Spore print brown. Spores 8,5—9.5/5—8  $\mu$ , amygdaliform to pip-shaped minutely warted or cloudy-marbled, plage or mucro absent, brown. Basidia 26—29/7—8  $\mu$ , 4-spored. Cheilocystidia 25—35/5—7  $\mu$ , fusoid, apex subcapitate, hyaline, thinwalled membranes. Cuticle a cutis composed of short cylindrical slightly gelatinized hyphae (1—3  $\mu$  diam.), membranes encrusted with brown pigment, subcutis cellular. Clamp connections absent.

Habitat: On soil in *Lithocarpus* forests (mixed with *Castanopsis*).

Distribution: Papua New Guinea.

Illustrations: Tab. III, 18 r—v; Tab. XIII, 18 o, p.

Material examined: Papua New Guinea: "Morobe District, Bulolo, Watut; leg. HORAK, 22. XI. 1972 (ZT, 73/313; holotype)".

*Phaeocollybia odorata* is distinguished from all other known olive coloured species by its cylindrical and not rooting stipe and the pip-shaped to amygdaliform spores.

### 19. *Phaeocollybia festiva* (Fr.) HEIM 1931

Encycl. Myc. 1: 70

Basionym: *Agaricus festivus* FRIES 1821: Syst. Myc. 1: 192.

Synonym: *Simocybe festiva* (Fr.) KARSTEN 1879: Bidr. Finl. Nat. & Folk, p. 416.

*Naucoria festiva* (Fr.) BRESADOLA 1882: Fungi Trid. 1: 19.

?*Phaeocollybia longipes* HORAK 1973: Beih. Nova Hedwigia 43: 188.

Habitat: On soil under conifers (*Picea*) in Europe; under *Nothofagus* in New Zealand.

Distribution: Europe, New Zealand.

Illustrations: *Bresadola* (1930: pl. 792); KÜHNER & ROMAGNESI (1957: 44); HORAK (1973: 188); — Tab. XIII, 19 q, r.

Material examined: Italy: "Trento, Castelfondo; VIII. 1902, leg. BRESADOLA (S)". — Austria: "Tirol, Innsbruck; VI. 1974, leg. MOSER (IB)". — Switzerland: "TI, Valle de Campo; 5. IX. 1974, leg. HORAK (ZT, 74/303)". — Germany: "Bayern, Augsburg; VIII. 1959, leg. BRESINSKY (M)". — New Zealand: "Westcoast, Waiuta; 2. IV. 1968, leg. HORAK (PDD 27100; holotype of *Ph. longipes*)".

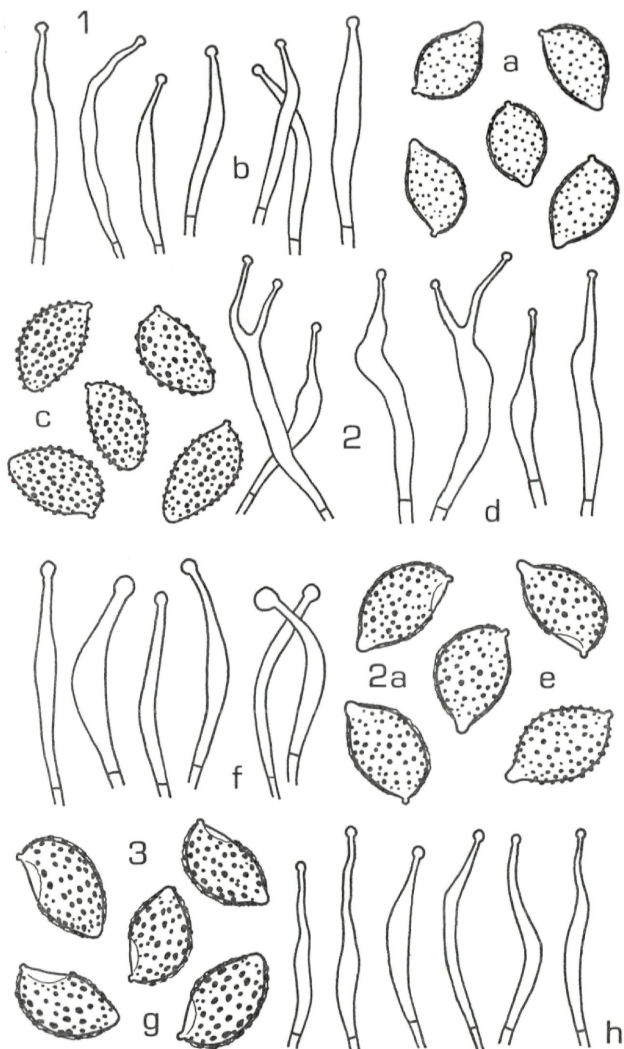


Fig. IX. 1. *Ph. pseudofestiva* SMITH (MICH, 8274; holotype): a. spores. — b. cheilocystidia. 2. *Ph. lugubris* (FR.) HELM (IB, 70/56): c. spores. — d. cheilocystidia. 2a: *Ph. olivacea* SMITH (MICH, 55767; holotype): e. spores. — f. cheilocystidia. 3. *Ph. californica* SMITH (MICH, 55610; holotype): g. spores. — h. cheilocystidia.

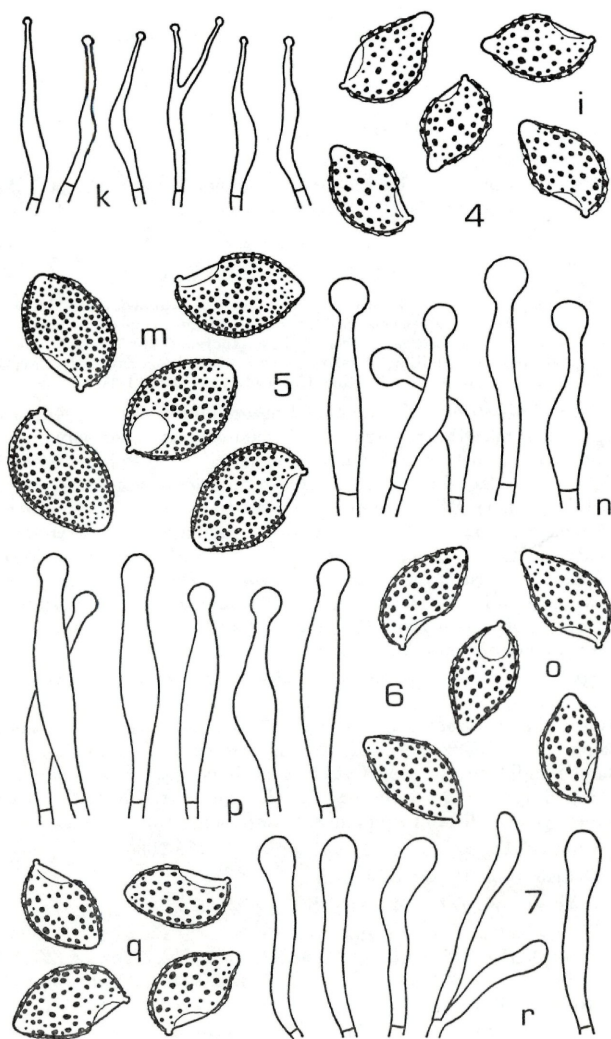


Fig. X. 4. *Ph. mexicana* CORNER & HK. (ZT; holotype): i. spores. — k. cheilocystidia. 5. *Ph. columbiana* SINGER (F; holotype): m. spores. — n. cheilocystidia. 6. *Ph. spoliata* HK. (L. 14167; holotype): o. spores. — p. cheilocystidia. 7. *Ph. fallax* SMITH (MICH, 3342; holotype): q. spores. — r. cheilocystidia.

20. *Phaeocollybia deceptiva* SMITH & TRAPPE 1972

Mycologia 64: 1142

Habitat: Under conifers (*Tsuga*).

Distribution: USA (Idaho).

Illustrations: Tab. XIV, 20 s, t.

Material examined: USA: "Idaho, Bonner County, Priest Lake; 7. X. 1968, leg. SMITH (MICH, 77000; holotype)".

21. *Phaeocollybia procera* HORAK sp. n.

Pileo usque ad 80 mm lato, e conico umbonato, brunneo, sicco. Lamellis adnexis vel subliberis, argillaceis. Stipite 20/12 mm, e fuscoideo attenuato basim versus, castaneobrunneo, sicco. Odore saporeque subfarinaceo. Sporis 8-9.5/4.5-5  $\mu$ , amygdaliformibus, minute verrucosis, Cheilocystidiis clavatis. Ad terram in silvis nothofaginis. Nova Guinea. Typus (ZT, 71/380).

Pileus 40-80 mm diam., conical becoming broadly umbonate to campanulate, margin strongly inrolled when young; uniformly brown, without reddish or greenish tints; dry, margin not striate, innately fibrillose. Lamellae adnexed to almost free, ventricose, edge concolorous, densely crowded; beige-yellowish to argillaceous in young and old specimens. Stipe 120-200 (or more)/8-12 mm, gradually attenuating towards the long rooting base, sometimes fusoid; apex concolorous with pileus, reddish brown towards the base; longitudinally fibrillose, hollow, cartilaginous, dry, single. Odor and taste farinaceous or acidulous, not distinctive. Context brownish in stipe and pileus. Chemical reactions on pileus unknown.

Spores 8-9.5/4.5-5  $\mu$ , almond-shaped, usually with distinct micro, brown, covered with low warts, ornamentation often cloudy-marbled, plage absent. Basidia 24-27/6-7  $\mu$ , 4-spored. Cheilocystidia 20-30/5-8  $\mu$ , clavate, membranes thin-walled, septae without clamp connections. Cuticle a cutis consisting of cylindrical gelatinized hyphae (2-3  $\mu$  diam.), cells of subcutis up to 8  $\mu$  diam. and encrusted with brown pigment. Clamp connections absent.

Habitat: On soil in *Nothofagus* forests; above 2000 m.

Distribution: Papua New Guinea.

Illustrations: Tab. I, 21 h; Tab. XIV, 21 u, v.

Material examined: Papua New Guinea: "Eastern Highlands, Mt. Michael, Frigano, Hut Track; 6. XII. 1971, leg. HORAK (ZT, 71/380; holotype)". - "Morobe District, Wau, Mt. Kaindi; 17. V. 1973, leg. HORAK (ZT, 73/235)".

Due to its shape, size and colour *Ph. procera* Hk. is an outstanding fungus in the otherwise rather monotonous fungus flora of the New Guinean *Nothofagus* forests.

22. *Phaeocollybia minuta* HORAK 1973

Beih. Nova Hedwigia 43: 187

Habitat: On soil under *Nothofagus* (*N. menziesii*, *N. cliffortioides*).

Distribution: New Zealand.

Illustrations: HORAK (1973: l. c.); — Tab. XIV, 22 w, x.

Material examined: New Zealand: "Southland, Milford Sound; 1. IV. 1969, leg. HORAK (PDD, 27099; holotype)".

23. *Phaeocollybia intermedia* CORNER & HORAK sp. n.

Pileo —70 mm lato, umbonato-convexo, stramineo-brunneo, sicco. Lamellis adnexis, ex stramineo ferrugineis, densis. Stipite —150/—6 (—9) mm, fusiformi, radicato, pileo concolori, velo nullo, sicco. Caro pallida, brunnea basim versus. Odore nullo. Sporis 6—8/4—5 m $\mu$  ovoideis, asperulatis, ferrugineis. Cystidiis rotundato-cylindraceis, —4 m $\mu$  latis. Septis defibulatis. Ad terram in silvis. Borneo. Typus (ZT, RSNB 5121).

Pileus —70 mm diam., convex to convex-plane with acute to subacute umbo; dark fawn brown to subferrugineous, slightly darker at the disc; margin strongly incurved at first, wholly minutely fibrilloso-furfureaceous and subsquamulose, not striate, dry. Lamellae adnexed by a minute uncinatate tooth or free, very crowded, up to 8 mm wide; pale fawn turning subferrugineous, edge whitish and subserrulate. Stipe —150/—6 (—9) mm, fusiform, tapering into a deep pseudorhiza; fawn brown to paler than pileus, darker at ground level; horny, cartilagineous, tough, twisted, thinly appressedly fibrillose, subpruinose at the apex, hollow, single or in small clusters. Context pallid white in the pileus, brownish towards the base of the stem, firm, rather tough. Smell and taste not distinctive.

Spores 6—8/4—5 m $\mu$ , ovoid, mucro absent, asperulate, ferrugineous. Basidia 25—33/6 m $\mu$ , 4-spored. Cheilocystidia 20—40/2—4 m $\mu$ , cylindrical, occasionally apex subcapitate. Cuticle composed of cylindrical hyphae (3—6 m $\mu$  diam.) forming a cutis, membranes not gelatinized, encrusted with brown pigment. Clamp connections absent.

Habitat: On soil in forests, —1700 m alt. (Borneo).

Distribution: Borneo (type), Malaya, China (Yünnan).

Illustrations: Tab. IV, 23 a—h; Tab. XIV, 23 y, z.

Material examined: Borneo: "Mt. Kinabalu, Bembangan River; 25. I. 1964, leg. CORNER (RSNB 5121, ZT; holotype)". — "Mt. Kinabalu, Mesilau; 25. IV. 1964, leg. CORNER (RSNB 5121 A, ZT)". — Malaysia: "Pahang, Cameroon Hills; 4. VIII. 1934, leg. CORNER (ZT)". — China: "Prov. Yünnan, Lidjiang, Ngulukö; IX.—X. 1916, leg. HANDEL-MAZZETTI (WU, Nr. 1306, Iter sinense)".

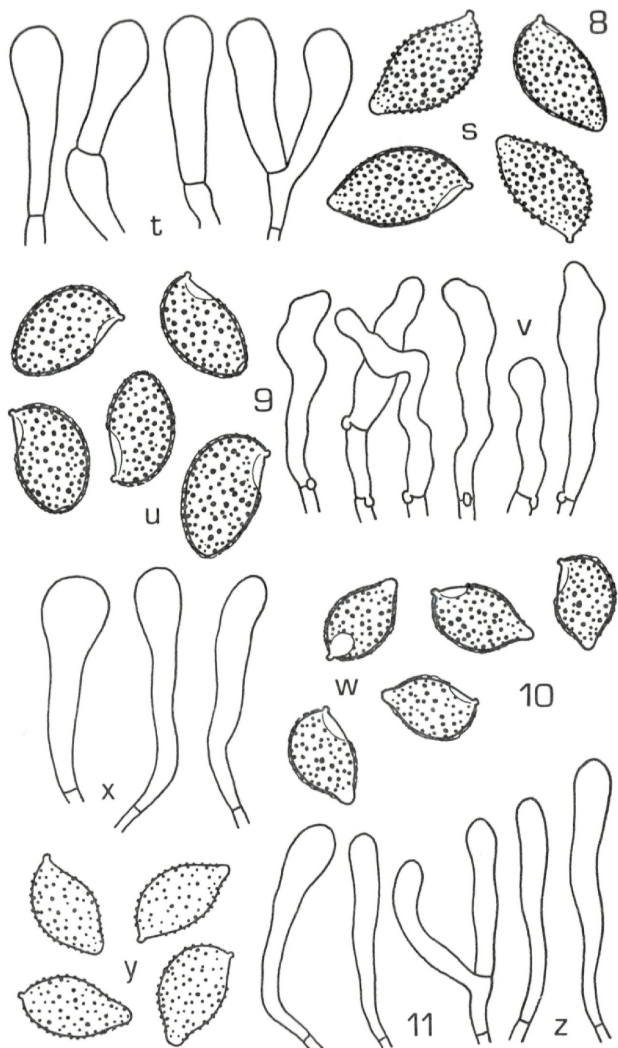


Fig. XI. 8. *Ph. muscicolor* Hk. (ZT, 72/115; holotype): s. spores. — t. cheilocystidia. 9. *Ph. viridis* Hk. (ZT, 72/357; holotype): u. spores. — v. cheilocystidia. 10. *Ph. attenuata* (SMITH) SINGER (MICH, 3343; holotype): w. spores. — x. cheilocystidia. 11. *Ph. Kauffmannii* (SMITH) SINGER (MICH, 3532; holotype): y. spores. — z. cheilocystidia.

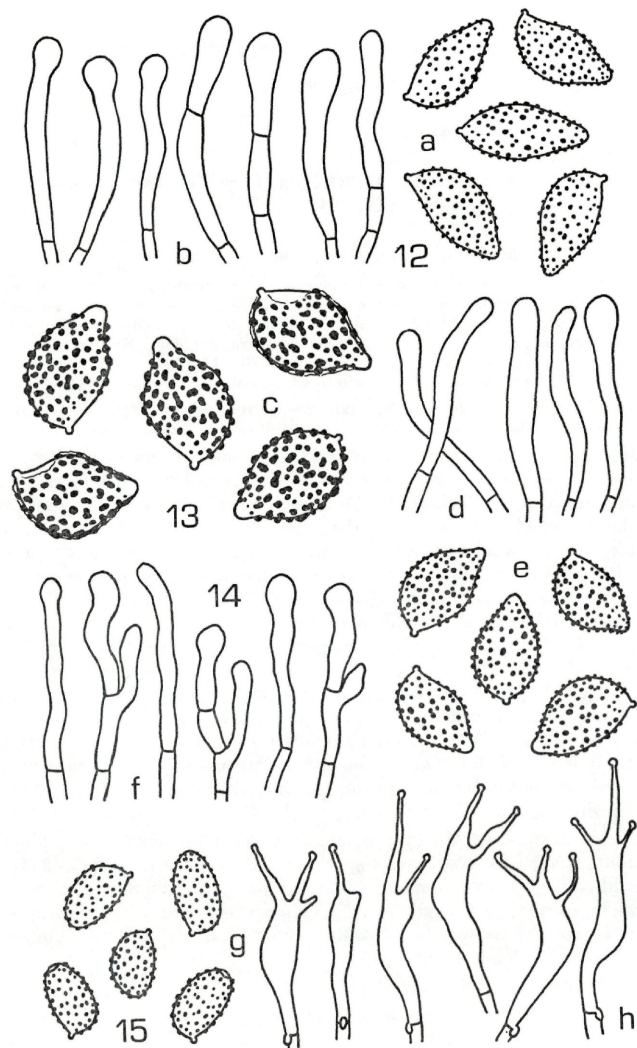


Fig. XII. 12. *Ph. christinae* (FR.) HEIM (IB, 64/52): a. spores. — b. cheilocystidia. 13. *Ph. similis* (BRES.) SINGER (WU, 12690; holotype): c. spores. — d. cheilocystidia. — 14. *Ph. piceae* SMITH & TRAPPE (MICH, 79085; holotype): e. spores. — f. cheilocystidia. 15. *Ph. tentaculata* Hk. (ZT, 73/259; holotype): g. spores. — h. cheilocystidia.



24. *Phaeocollybia oregonensis* SMITH & TRAPPE 1972

Mycologia 64: 1145

Habitat: On soil under conifers.

Distribution: USA (Oregon).

Illustrations: Tab. XV, 24 a, b.

Material examined: USA: "Oregon, Larch Mt. Columbia Gorge; 20. X. 1947, leg. SMITH (MICH, 28420; holotype)".

25. *Phaeocollybia parvispora* CORNER & HORAK sp. n.

Pileo —65 mm lato, umbonato-convexo, ex umbrino lilacino tincto, subsquamuloso, sicco. Lamellis adnexis, lilacinis, dein cinnamomeis, densissimis. Stipite —150/—7 mm, fusioideo-radicato, pileo concolori, fibrilloso, sicco, velo nullo. Caro pallide lilacina brunnescenti. Odore raphanoideo. Sporis 3,5—4,5/2,5—3 m $\mu$ , ovatis, asperulatis, ferrugineis. Cystidiis 15—30/2—3 m $\mu$ , fusioideo-capitatis. Septis defibulatis, Ad terram in silvis. Singapore. Typus (ZT).

Pileus —65 mm diam., conico-convex then expanded with  $\pm$  distinct umbo, margin strongly incurved when young; umber brown, lilac-purple towards the margin; faintly striate at the margin when moist, drying light tawny ochraceous with the disc subferrugineous; thinly appressedly fibrillose-squamulose with spot-like subferrugineous scales crowded over the disc, dry. Lamellae adnexed to somewhat emarginate; lilaceous or violaceous when young turning pallid fawn and finally pallid cinnamon fawn; very dense and very narrow, edge concolorous, uneven, blunt. Stipe 40—150/2—5 (—7) mm, subcylindric slightly thickened at ground level and tapering into a long pseudorhiza buried in the ground, cartilagineous, easily separable from the pileus; watery umber, concolorous with pileus, somewhat lilaceous at the pallid apex when young; rather coarsely appressed-fibrillose and subsquamulose towards the base, minutely fibrillose-furfuraceous towards the apex, dry, hollow; single or in clusters. Context whitish in the pileus, pale lilaceous at the upper portion of the stipe, brownish towards the base; dry, firm rather tough in the stem. Smell and taste: radish-like.

Spores 3.5—4.5/2.5—3 m $\mu$ , ovate, asperulate, ferruginous, plage absent. Basidia 15—24/4 m $\mu$ , 4-spored. Cheilocystidia 15—30/2—3 m $\mu$ , fusoid-capitate, capitulum up to 2 m $\mu$  diam. Pleurocystidia absent. Cuticle consisting of cylindrical hyphae (2—5 m $\mu$  diam.) forming a cutis, membranes partly gelatinized, encrusted with brown pigment. Clamp connections absent.

Habitat: On soil in forests.

Distribution: Singapore, Malaysia.

Illustrations: Tab. V, 25 m—t; Tab. XV, 25 c, d.

Material examined: Singapore: "Gardens Jungle; 11. XI. 1934, leg. CORNER (ZT, holotype)". — Malaysia: "Pahang, Frazer's Hill,

1200 m alt.; 27. XI. 1930, leg. CORNER (ZT, *Naucoria* 2a)". — "Pahang, Frazer's Hill; 1200 m; 26. XI. 1930, leg. CORNER (ZT, *Naucoria* 2)".

26. *Phaeocollybia raticauda* HORAK 1973

Beih. Nova Hedwigia 43: 184

Habitat: On soil under *Nothofagus* spp.

Distribution: New Zealand, New Guinea.

Illustrations: HORAK (1973: l. c.); — Tab. VI, 26 a–d; Tab. XV, 26 e, f.

Material examined: New Zealand: "Westcoast, Lake Hochastetter; 29. III. 1968, leg. HORAK (PDD, 27098; holotype)". — "Fjordland, Mt. Luxmore; 9. IV. 1969, leg. HORAK (ZT, 69/329)". — New Guinea: "Eastern Highlands, Mt. Michael, Frigano; 6. XII. 1971, leg. HORAK (ZT, 71/383)". — „Morobe District, Wau, Mt. Kaindi; 1. III. 1972, leg. R. JOHNS (ZT, 72/162)".

27. *Phaeocollybia querqueti* CORNER & HORAK sp. n.

Pileo usque ad 60 mm lato, acuto-conico, cinnamomeo, viscido. Lamellis adnexis, pallide brunneis. Stipite —110/—6 mm, fusosideo-radicato, pallide cinnamomeo, siccio, cartilagineo. Odore ingrato. Sporis 4,5–5,5/3–3,5  $\mu$ m, ovoideis, minute verrucosis. Cheilocystidiis 15–30/2–4  $\mu$ m, fusosideo-capitatis. Ad terram in querquetis. Borneo. Typus (ZT, RSNB 1759).

Pileus 30–60 mm diam., acutely conical with inflexed margin, later plano-convex and acutely umbonate, margin exceeding the gills; cinnamon-fawn, paler with age; opaque, viscid, gluten washed off with rain, smooth, not striate. Lamellae adnexed to nearly free, very crowded and narrow; pale brownish, turning cinnamon fawn, edge minutely uneven. Stipe 60–110/3–6 mm, fusoid at ground level (5–8 mm diam.), rooting, cespitose; pallid fawn, turning to cinnamon-fawn, darker towards base; smooth, cartilagineous, dry, hollow, single. Context pallid white in pileus, concolorous in stipe. Odour and taste unpleasant, like soap (not of radish). Chemical reactions on pileus unknown.

Sporos 4,5–5,5/3–3,5  $\mu$ m, ovoid, asperulate, perisporium and plage absent, germ pore none. Basidia 20–25/5  $\mu$ m, 4-spored. Cheilocystidia 15–30/2–4  $\mu$ m, fusoid-capitate, capitulum —2  $\mu$ m diam., hyaline. Cuticle a cutis of gelatinized, cylindrical hyphae (2–4  $\mu$ m diam.), membranes encrusted with brown pigment. Clamp connections absent.

Habitat: In humus under *Quercus* sp.

Distribution: Borneo (Mt. Kinabalu).

Illustrations: Tab. VII, 27 a–e; Tab. XV, 27 g, h.

Material examined: Borneo: "Mt. Kinabalu, Bembangan River; 15. VIII. 1961, leg. CORNER (ZT, RSNB 1759; holotype)".

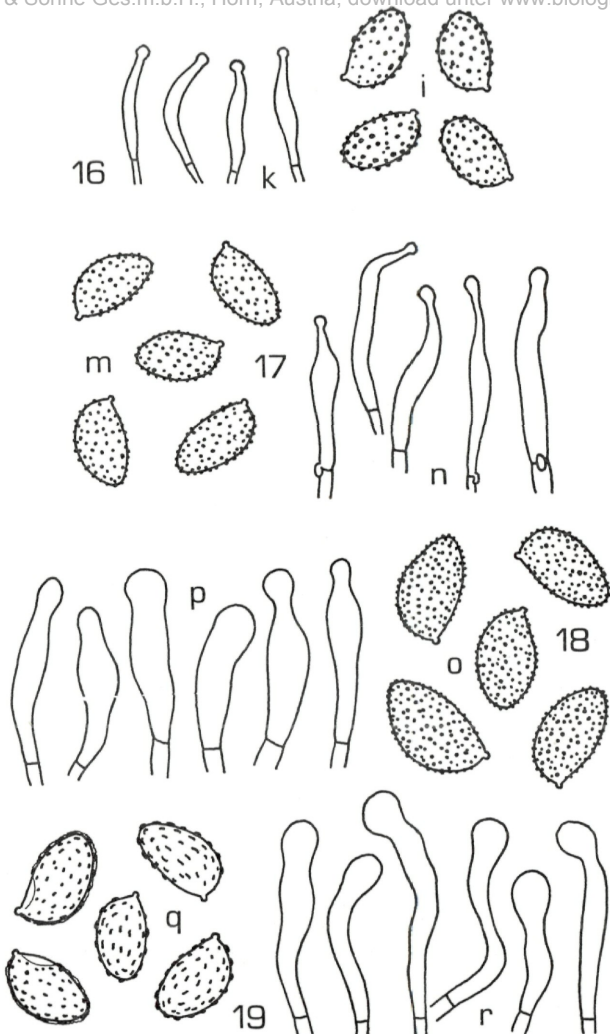


Fig. XIII. 16. *Ph. primulina* (BERK.) HK. (K, holotype): i. spores. — k. cheilocystidia. 17. *Ph. subattenuata* SINGER (LIL, B 2372; holotype): m. spores. — n. cheilocystidia. 18. *Ph. odorata* HK. (ZT, 73/313; holotype): o. spores. — p. cheilocystidia. 19. *Ph. festiva* (FR.) HEIM (ZT, 74/303): q. spores. — r. cheilocystidia.

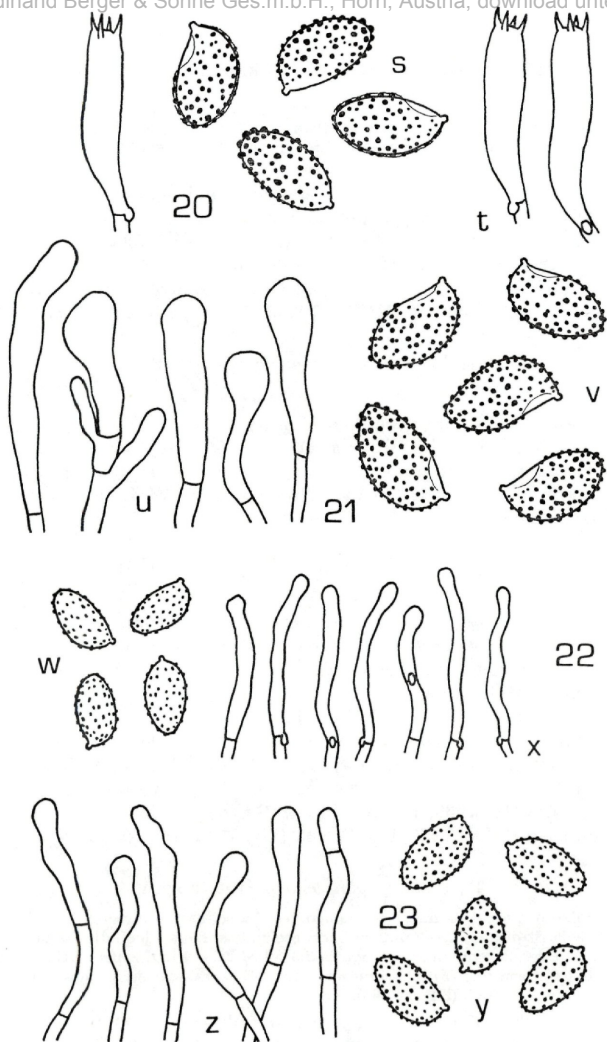


Fig. XIV. 20. *Ph. deceptiva* SMITH & TRAPPE (MICH, 77000; holotype): s. spores. — t. basidia. 21. *Ph. procera* Hk. (ZT, 71/380; holotype): v. spores. — u. cheilocystidia. 22. *Ph. minuta* Hk. (PDD, 27099; holotype): w. spores. — x. cheilocystidia. 23. *Ph. intermedia* CORNER & Hk. (ZT, RSNB 5121; holotype): y. spores. — z. cheilocystidia.

28. *Phaeocollybia radicata* (MURRILL) SINGER 1951

Lilloa 22: 567

Basionym: *Naucoria radicata* MURRILL 1917: N. Am. Flora 10: 181.

Synonym: *Phaeocollybia dissiliens* SMITH & TRAPPE 1972: Mycologia 64: 1143.

Habitat: On soil under *Picea sitchensis* and *Sequoia* sp.

Distribution: USA (Oregon, California).

Illustrations: SMITH (1957: l. c.); — Tab. XVI, 28 i, k.

Material examined: USA: "California, Oric; 3. XII. 1935, leg. SMITH (MICH, 3746)". — "Oregon, Cape Lookout State Park; 23. X. 1970, leg. SMITH (MICH, 79252; holotype of *Ph. dissiliens*)".

29. *Phaeocollybia rancida* HORAK 1974

Acta Botanica Indica 2: 70

Habitat: On soil under *Picea-Pineus*.

Distribution: India (Himalaya).

Illustrations: HORAK (1974: l. c.); — Tab. XVI, 29 m, n.

Material examined: India: "Narkanda; 10. VIII. 1964, leg. BAS (L, 4102; holotype)".

30. *Phaeocollybia hilaris* (FR.) HEIM 1931

Encycl. Myc. 1: 71

Basionym: *Agaricus hilaris* (FR) 1821: Syst. Myc. I: 254.

Synonym: *Phaeocollybia cidaris* (FR.) ss. BRESINSKY (1958: 1).

Habitat: On soil under *Picea*.

Distribution: Europe.

Illustrations: Tab. XVI, 30 o, p.

Material examined: Germany: "Bayern, Wellenburg-Augsburg; VIII. 1960, leg. BRESINSKY (M)". — "Bayern, Augsburg, Bergheim; 13. VIII. 1960, leg. BRESINSKY (M)". — "Bayern, Augsburg, Bergheim; 13. VIII. 1960, leg. STANGL & BRESINSKY (M)". — "Bayern, Bodenmais; 6. IX. 1967, leg. MOSER (IB, 67/113)".

31. *Phaeocollybia bicolor* HORAK sp. n.

Pileo usque ad 35 mm lato, conico, avellaneo, sicco. Lamellis lilaceis dein argillaceis. Stipite — 70/—8 mm, cylindraceo ad basim fusoideobulboso, brunneo, sicco. Sapore odoreque ingrato. Sporis 3,5—4,5/ 2,5—3  $\mu$ , asperulatis. Cheilocystidiis filiformibus. Fibulis praesentibus. Ad terram in silvis nothofagineis. Nova Guinea. Typus (ZT, 71/363).

Pileus 20—35 mm diam., young and old conical, margin strongly inrolled; avellaneous to light brown; dry, innately fibrillose, not hygrophanous or striate. Lamellae adnexed to almost free, narrow, densely intermixed; at first lilac becoming beige with conspicuous bluish gill edge. Stipe 50—70/2,5—7 mm, cylindrical, equal or slightly

attenuated towards the apex, bulbous to short fusoid at the base, not rooting; concolorous with pileus, brown towards the base; cartilaginous, dry, glabrous, hollow, single. Context beige in pileus, orange-brown in stipe especially towards the base. Smell and taste strongly unpleasant, like burnt hairs. Chemical reaction on pileus: KOH, HCl and  $\text{NH}_3$  — negative.

Spore print brown. Spores 3,5—4,5/2,5—3  $\text{m}\mu$ , oval, asperulate, plage or mucro absent, brownish. Basidia 20—27/4—5  $\text{m}\mu$ , 4-spored. Cheilocystidia 20—30/3  $\text{m}\mu$ , filiform to cylindrical, apex neither clavate nor capitate, membranes hyaline. Cuticle a cutis consisting of cylindrical not gelatinized hyphae (2—3  $\text{m}\mu$  diam.), hyphae of hypoderm up to 8  $\text{m}\mu$  diam., encrusted with yellowish-brownish pigment. Clamp connections numerous.

Habitat: On soil in *Nothofagus* forests; above 2000 m.

Distribution: Papua New Guinea.

Illustrations: Tab. VIII, 31 a—e; Tab. XVI, 31 q, r.

Material examined: Papua New Guinea: "Eastern Highlands, Mt. Michael, Frigano, Okapa Track; 4. XII. 1971, leg. HORÁK (ZT, 71/363; holotype)".

### 32. *Phaeocollybia corneri* HORÁK sp. n.

Pileo usque ad 95 mm lato, acuto-umbonato vel campanulato, ferrugineo cinnamomeo, subviscido. Lamellis adnexis, densis, ochraceo-cinnamomeis. Stipite —130/—10 mm, fusoido-radicato, ferrugineo, sicco, cartilagineo. Odore saporeque raphanoideo. Sporis 4,5—5,5/3—3,5  $\text{m}\mu$ , ovoideis, asperulatis. Cheilocystidiis 15—45/3—4  $\text{m}\mu$ , filiformibus, ad apicem rotundatis. Fibulis nullis. Ad terram in quercetis. Borneo. Typus (ZT, RSNB 2893).

Pileus 50—95 mm diam., convex to plane with subacute to umbonate papilla, campanulate with drooping margin, margin undulate; bay to ferruginous or dull cinnamon-fawn; smooth or slightly floccose or squamulose over the disc, estriate, subviscid. Lamellae adnexed to nearly free, narrow (1,5—2 mm wide), very crowded; pallid fawn to cinnamon ochraceous, edge uneven and irregularly serrate. Stipe 55—130/4—8 mm, fusoid (—10 mm at ground level), tapering into long root, gradually attenuate towards apex; ferruginous or concolorous with pileus; dry, single or cespitose, hollow, cartilaginous, smooth. Odour and taste raphanoid. Chemical reactions on pileus unknown. Spores 4,5—5,5/3—3,5  $\text{m}\mu$ , ovoid, punctate to asperulate, perispodium and plage absent. Basidia 20—25/4—5  $\text{m}\mu$ , 4-spored. Cheilocystidia 15—45/3—4  $\text{m}\mu$ , filiform to cylindrical, apex rounded, neither clavate nor capitate, with yellow-brown plasmatic or encrusting pigment. Cuticle a cutis of subgelatinized cylindrical hyphae (2—4  $\text{m}\mu$  diam.), membranes in subcutis encrusted with yellow-brown pigment. Clamp connections absent.

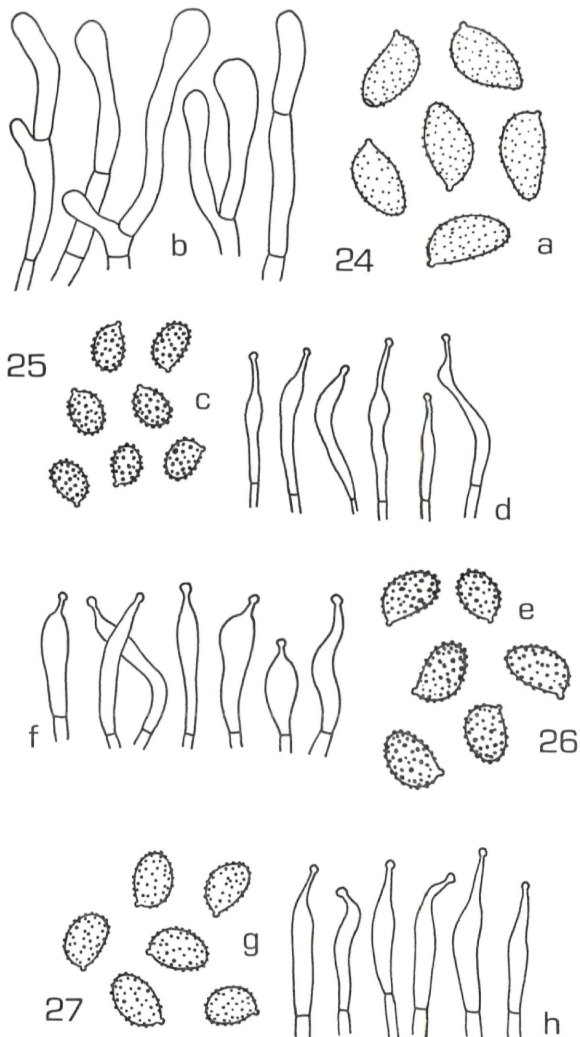


Fig. XV. 24. *Ph. oregonensis* SMITH & TRAPPE (MICH, 28420; holotype): a. spores. — b. cheilocystidia. 25. *Ph. parvispora* CORNER & HK. (ZT; holotype): c. spores. — d. cheilocystidia. — 26. *Ph. ratticauda* HK. (PDD, 27098; holotype): e. spores. — f. cheilocystidia. 27. *Ph. querqueti* CORNER & HK. (ZT, RSNB 1759; holotype): g. spores. — h. cheilocystidia.

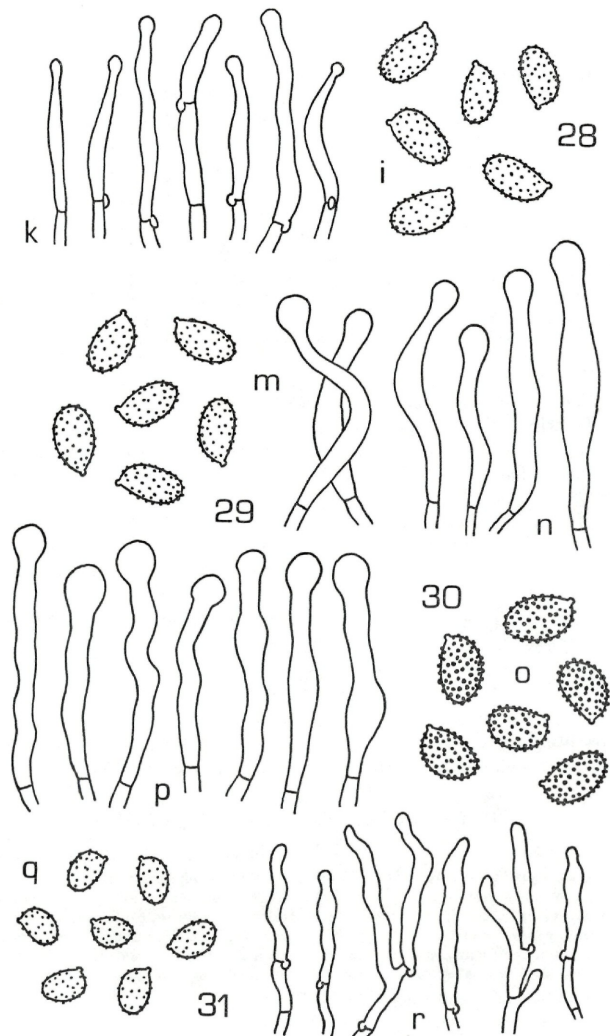


Fig. XVI. 28. *Ph. radicata* (MURRILL) SINGER (MICH, 3746): i. spores. — k. cheilocystidia. 29. *Ph. rancida* HK. (L, 4102; holotype): m. spores. — n. cheilocystidia. 30. *Ph. hilaris* (KARSTEN) HEIM (IB, 67/113): o. spores. — p. cheilocystidia. 31. *Ph. bicolor* HK. (ZT, 71/363; holotype): q. spores. — r. cheilocystidia.



Habitat: On soil under *Quercus* sp. (type), 5000 feet.  
 Distribution: Borneo, Singapore.  
 Illustrations: Tab. VII, 32 s, t; Tab. VIII, 32 f—n.  
 Material examined: Borneo: "Mt. Kinabalu, Tenompok; 8. IX. 1961, leg. CORNER (ZT, RSNB 2893; holotype)". — Singapore: "Garden's Jungle; 16. XI. 1934, leg. CORNER (ZT, *Naucoria* 2d)".

### 33. *Phaeocollybia jennyi* (KARSTEN) HEIM

Encycl. Myc. 1: 70

Basionym: *Naucoria jennyi* KARSTEN 1881: Hedwigia 12: 178.  
 Synonym: *Phaeocollybia christinae* (Fr.) ss. HEIM 1930: Bull. Soc. Myc. France 46: tab. XXXVIII.  
*Naucoria cidaris* (Fr.) ss. RICKEN 1915: Blätterpilze, p. 216.  
*Phaeocollybia cidaris* (Fr.) ss. KÜHNER & ROMAGNESI 1956—1957: Bull. Soc. Nat. Oyonnax 10—11: 50.

Habitat: On soil under *Picea* and *Pinus*.  
 Distribution: Europe.  
 Illustrations: FRIES, Icon. Sel. Hym. 123, 2; HEIM (1930: l. c.); KÜHNER & ROMAGNESI (1957: 50); — Tab. VII, 33 u, v. — Tab. XVII, 33 a, b.

Material examined: Finland: "Syrjä; 13. VIII. 1881, leg. KARSTEN (H, 1612, holotype)". — "Mustiala; 20. VIII. 1866, leg. KARSTEN (H, 1597)". — "Mustiala; 11. VIII. 1892, leg. KARSTEN (H, 1596)". — "Sarkijärvi versus Mustiala; 26. VIII. 1892, leg. KARSTEN (H, 1607)". — Italy: "Trento, Cavelonte; VIII. 1896, leg. BRESADOLA (S)".

### Additions

1. After completion of the manuscript material from the KARSTEN herbarium (H) was studied. Among the exsiccata the following species was found best believed to represent a typical *Ph. cidaris* (Fr.).

### 34. *Phaeocollybia cidaris* (Fr.) HEIM 1931

Encycl. Myc. 1: 71

Basionym: *Agaricus cidaris* FRIES 1836—1838, Epicrisis, 192.  
 KARSTEN's notes read as follow: "Pileo caroso, tenacissimo, conico-expanso, viscido, laevi, glaberrimo, subnitente, expanente, alutaceo, lutescente, 1—2 unc. repando, stipite e faretto subfistuloso, pallido dein deorsam rufescente, cartilagineo, fusiformi, radicato, laevi, glabro, 2—5 unc. longo, lamellis liberis, confertis, latis, crenatis, plerumque rufomaculatis. Mustiala, in pineto."

Habitat: On soil under *Pinus*.  
 Distribution: Europe.  
 Illustrations: Tab. XVII, 34 a—e.  
 Material examined: Finland: "Mustiala; 8. VIII. 1866, leg. KARSTEN (H, 1611)".

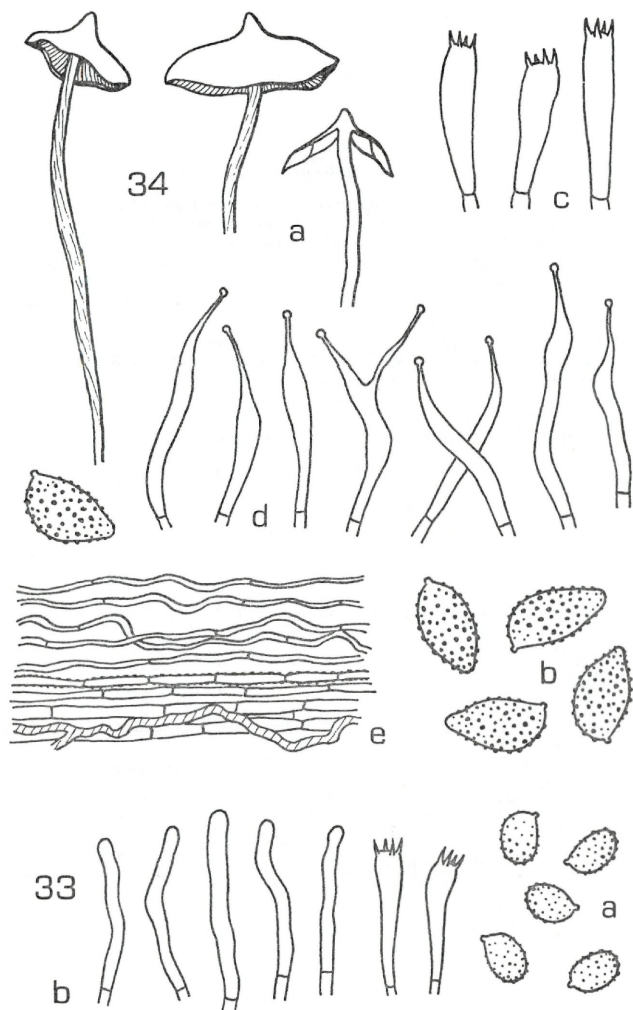


Fig. XVII. 34. *Ph. cidaris* (Fr.) HEIM (H, 1611): a. carpophores (drawn from dried material). — b. spores. — c. basidia. — d. cheilocystidia. — e. cuticle. 33. *Ph. jennyi* (KARSTEN) HEIM (H, 1612, holotype): a. spores. — b. basidia and cheilocystidia.

2. *Phaeocollybia perplexa* ORTON 1976: Notes on British Agarics. V. —  
Kew Bull. 31: 709—721

From ORTON's description it remains doubtful whether or not this fungus represents a species of *Phaeocollybia*. No type material was studied by this author.

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