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Infrageneric division of the genus *Pholiotina* – a classical approach

ANTON HAUSKNECHT
IRMGARD KRISAI-GREILHUBER
Fakultätszentrum für Botanik der Universität Wien
Rennweg 14
A-1030 Wien
Email: ahausknecht.oemg@aon.at, irmgard.greilhuber@univie.ac.at

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Key words: *Agaricales*, *Bolbitiaceae*, *Pholiotina*, *Galerella*. – Infrageneric classification of the genus *Pholiotina*. – New taxa, new combination.

Abstract: An infrageneric concept of the genus *Pholiotina* including all hithero known taxa worldwide is presented. New sections and series are proposed along with listing all representatives in the respective categories.

Zusammenfassung: Ein infragenerisches Konzept der Gattung *Pholiotina* auf Basis aller weltweit bekannten Taxa wird vorgestellt. Neue Sektionen und Serien werden vorgeschlagen und die jeweiligen Vertreter diesen zugeordnet.

In continuation of the survey of the infrageneric concept of the genus *Conocybe* (HAUSKNECHT & KRISAI-GREILHUBER 2006) the genus *Pholiotina* is treated, all for preparation of a monographical study of the European taxa of the genera *Conocybe* and *Pholiotina* by the first author. As in *Conocybe*, the first author has studied nearly all type specimens worldwide. Only very few type specimens (marked by *) could not be examined microscopically so far.

Concerning the history of the genus *Pholiotina* we refer to our earlier presentation in *Conocybe* (HAUSKNECHT & KRISAI-GREILHUBER 2006: 188). Altogether, until now the genus Pholiotina comprises 55 accepted species and four varieties, i.e. 59 taxa worldwide.

Excluded or doubtful species

Not included in the 59 taxa is *Conocybe weema* GRGUR. (GRGURINOVIC 1997), which is without doubt a member of the genus *Pholiotina* but could not be examinated microscopically so far and whereof the description does not allow a classification in the infrageneric concept.

Further, the recently described *Pholiotina rostratocystidiata* E. LUDW. (LUDWIG 2007: 514) is not yet included and will be treated in the monographical study.

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Taxonomic survey

***Pholiotina* FAYOD 1889,** Ann. Sci. Nat. Sér. VII, **9**: 359

Original diagnosis: angiocarpe (toujours?). – Voile général fibreux, formant l'épicutis; double et annuliforme sur le stipe. Cuticule piléique proprement dite hyméniforme typique, muqueuse, subhyménium et hyménopodium denses et à élements filoformes fins, peu distincts. Cellules hyméniales allongées, claviformes. Basidies, 4-, souvent 2-stérigmiques. Spores brun-rouille, ovoïdes, elliptiques, à dépression hilaire ordinairement dévelopée, appointies au sommet et munies quelquefois d'un pore apical. Cystides allongés, cylindracés, à parois minces.

Lectotype species: *Pholiota blattaria* FR. ss. FAYOD 1889 = *Pholiotina vexans* P. D. ORTON.

Characters (predominantly following ARNOLDS 2005, amended on base of all species known worldwide): Basidiocarp mycenoid, pileus usually hygrophanous, dry or slightly greasy, glabrous or pruinose, rarely sulcate; lamellae narrowly adnate to adnexed, pale brown, orange-brown to rubiginous when mature; stipe central, slender, often subbulbous, apex or entirely pruinose, often fibrillose striate downwards; partial veil absent or present and then leaving a membranaceous annulus at stipe or flocks adhering to margin of pileus; spore print pale brown, orange-brown to rubiginous. Spores smooth, rarely minutely verrucose, in one species distinctly warty, thin- or rather thick-walled, yellow, yellow-brown to orange-brown, very rarely yellowish hyaline, usually with germ pore but pore absent in some species; basidia clavate, 4- or 2-spored; cheilocystidia present, lageniform, fusiform, subcylindrical, utriform, sometimes nearly lecythiform with globose capitulum, in one species with resinaceous content; pleurocystidia absent. Hymenophoral trama consisting of a distinct central strand of cylindrical hyphae surrounded by inflated elements; pileipellis an epitheloid hymenoderm consisting of pyriform to spheropedunculate elements, occasionally mixed with pileocystidia; stipitipellis a thin cutis, often entirely covered by caulocystidia or at apex only; clamp-connections present in most species, sometimes only in primordial stages. Development in most species paravelangiocarp. Sapotrophic on soil, litter, humus, dung, and small pieces of wood, solitary or gregarious, usually on subneutral to basic substrates rich in nutrients. Widespread, with worldwide distribution.

Comments: The diagnosis by FAYOD (1889) originally comprised only annulate species and had to be amended in many respects. Therefore the genus description by ARNOLDS (2005) was used and supplemented with characters of extra-European species.

FAYOD (1889) selected *Pholiota blattaria* FR. as type and designated a lectotype from France, Devans, Forêt du Montet. This specimen was investigated by HORAK (1968: 466). It is a large-spored, annulate species with fusiform cheilocystidia. As *Agaricus blattarius* FR.: FR. cannot be interpreted unequivocally – the taxon was used for almost all annulate species of the genus – it must be rejected as a nomen dubium (ARNOLDS 2005). Thus the lectotype designated by FAYOD (1889) is now called *Pholiotina vexans*.

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Section *Cyanopodae* SINGER 1973, Sydowia Beiheft **7**: 79
= Subsection *Cyanopodinae* (SINGER) ARNOLDS 2003, Persoonia **18**: 229.

Latin diagnosis: Stipite laeso cyanescente vel virescente; dermatocystidiis plerumque praesentibus vel absentibus in epicute pilei; velo paullum evoluto vel haud persistente; fibulis praesentibus.

Type species: *Pholiotina cyanopus* (G. F. ATK.) SINGER.

Characters: Basidiocarp mycenoid. Pileus hygrophanous, smooth, in one species with faint, fibrillous, quickly vanishing veil. Pileus or stipe base with bluegreen to blue colours (presence of psilocybin). Stipe slightly fibrillous, not entirely pruinose-hairy. Spores medium, thin- to slightly thick-walled, smooth, with germ-pore. Cheilocystidia lageniform to fusiform. Pileipellis with or without pileocystidia. Forest soil, meadows, grassland.

Comments: In his description ARNOLDS (2005) amends the original diagnosis by SINGER (1973), who included here only species with blueing stipe, including *Pholiotina aeruginosa*, a species also containing psilocybin. This placement seems to be somewhat artificially. Therefore a separate series is proposed for the latter.

Series *Cyanopus*
= Stirps *Cyanopus* WATLING 1982, British Fungus Flora Agarics and Boleti 3: 42, inval.

Characters: Basidiocarp mycenoid. Pileus hygrophan, smooth, ± brown, no blue colours, without or only very young with faint, fibrillous, quickly vanishing veil. Stipe white, slightly fibrillous, not entirely pruinose-hairy, base changing to bluegreen. Spores medium, more thin-walled, smooth, with germ-pore. Cheilocystidia lageniform to fusiform. Pileipellis with or without pileocystidia. Meadows, grassland, forest soil, also in moss.

Representatives: *P. cyanopus* (G. F. ATK.) SINGER (Asia, Europe, North America), *P. smithii* (WATLING) ENDERLE (North America), *P. sulcatipes* (PECK) BON (North America).

Series *Aeruginosa* HAUSKN. & KRISAI, ser. nova

Latin diagnosis: Characteres ut in sectione *Cyanopodae,* sed solum pileus coloribus caeruleis vel cyaneis, basis stipitis immutabilis. Velum tote absens.

Type species: *Pholiotina aeruginosa* (ROMAGN.) M. M. MOSER.

Characters: Basidiocarp mycenoid, with psilocybin. Pileus hygrophanous, moist striate, smooth, especially in centre with blue, pale greyish blue to dark blue colours, veil absent. Stipe whitish, slightly pruinose, base never blueing. Spores medium, thin-walled, smooth, with germ-pore. Cheilocystidia lageniform to fusiform. Pileocystidia present. Forest soil, preferably in wet forests, meadows.

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Representatives: *P. aeruginosa* (ROMAGN.) M. M. MOSER* (Europe), *P. aeruginosa* var. *caeruleopallida* HAUSKN. (Europe), *P. atrocyanea* ESTEVE-RAV., HAUSKN. & REJOS (Europe).

Section *Piliferae* HAUSKN. & KRISAI, sect. nova
= *Piliferae* KÜHNER 1935, Le genre *Galera*: 124, inval.
= Section *Piliferae* SINGER 1951, Lilloa **22**: 487, inval.
= Subsection *Piliferinae* ss. ARNOLDS 2005, Flora Agaricina Neerlandica **6**: 196.
= *Conocybe* subgen. *Piliferae* (KÜHNER ex SINGER) WATLING 1965, Notes Roy. Bot. Garden Edinburgh **26**: 298, inval.

Latin diagnosis: Basidiocarpium mycenoideum, grande vel parvum, velum absens, sine coloribus coeruleis vel cyaneis, pileus laevis, hygrophaneus, saepe pruinosus, striatus vel non, rarissime crenulatus. Sporae parvae ad grandes, tenuiter vel crasse tunicatae, plerumque poro germinativo, hyalino-luteae ad rubiginosae. Cheilocystidia lageniformia, subcylindrica vel utriformia capitulo indistincto. Caulocystidia insignia et grandia, pileocystidia praesentia vel absentia.

Type species: *Pholiotina pygmaeoaffinis* (FR.) SINGER.

Description by KÜHNER (1935: 124): Chapeau non fissuré radialement au dos des feuillets. Arête des lames à cystides atténuées au sommet mais dépourvues de bouton globuleux. Trame des lames à médiostrate plus ou moins large. Revêtement piléique en general muni de dermatocystides nombreuses et saillantes.

Characters: Basidiocarp mycenoid, veil absent, no blue or bluegreen colours, very large to very small. Pileus smooth, mostly hygrophanous, often pruinose, striate or not, in one species distinctly crenulate at margin. Spores small to large, thin- to thick-walled, mostly with distinct germ-pore, hyaline yellow to rubiginous. Cheilocystidia lageniform, subcylindrical or utriform without well-delimitated capitulum. Caulocystidia remarkable and large, mostly covering the entire stipe. Pileocystidia normally present and well-developed, only in a few species absent. Forests, meadows, grassy roadsides, dung, compost.

Comments: The description by KÜHNER (1935) is invalid, as it has no latin description. The diagnosis by SINGER (1951) is invalid, a short hint towards an invalid taxon is insufficient. Also WATLING (1965) did not include a latin description. Thus the taxon had to be described as new.

In this section SINGER (1951) originally included all species without veil, including the blueing *Pholiotina cyanopus*, which he lateron (SINGER 1973) placed into the separate section *Cyanopodae*. In the description of KÜHNER (1935) *Conocybe plicatella* (PECK) ss. KÜHNER is excluded, which he listed in his *Plicatellae*.

Series *Coprophila* HAUSKN. & KRISAI, ser. nova
= Stirps *Coprophila* WATLING 1982, British Fungus Flora Agarics and Boleti **3**: 42, inval.

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Latin diagnosis: Characteres ut in sectione *Piliferae*, sed pileus saepe dilute viscidus, plerumque estriatus. Sporae grandes, crasse tunicatae, fortiter rubiginosae ad aurantiobrunneae, cheilocystidia lageniformia. Ad fimum et plantas putrescentes.

Type species: *Pholiotina coprophila* (KÜHNER) SINGER.

Characters: Basidiocarp small to medium; pileus smooth, moist partly viscid to greasy, mostly unstriate. Spores medium to large, thick-walled with wide germ-pore, rubiginous to orange-brown in KOH. Cheilocystidia lageniform, partly subcapitate, pileocystidia mostly present. On dung or rotting plant debris.

Representatives: *P. coprophila* (KÜHNER) SINGER (Asia, Europe, North America), *P. flava* (PECK) HAUSKN., KRISAI & VOGLMAYR (North America), *P. plumbeitincta* (G. F. ATK.) HAUSKN., KRISAI & VOGLMAYR (North America), *P. ealaensis* (BEELI) SINGER (Africa), *P. altoandina* SINGER* (South America).

Series *Keniensis* HAUSKN. & KRISAI, ser. nova

Latin diagnosis: Characteres ut in serie *Coprophila*, sed sporae minores, tenuiter tunicatae, luteolae in KOH, pileocystidia absentia. Non ad fimum et plantas putrescentes, sed in pratis vel ad ramos emortuos.

Type species: *Pholiotina keniensis* (PEGLER) HAUSKN.

Characters: Basidiocarp rather small, pileus striate or not, smooth. Spores medium, thin-walled, pale yellow in KOH, with single wall. Cheilocystidia lageniform to subutriform, often capitate. Pileocystidia absent. In meadows or on dead twigs.

Representatives: *P. keniensis* (PEGLER) HAUSKN. (Africa), *P. arnoldsii* HAUSKN. (Europe).

Comments: Both taxa placed here lack a veil and have small, thin-walled, pale spores. They are the only representatives of section *Piliferae* without pileocystidia, which distinguishes them from the following series *Pygmaeoaffinis*, with also has small, pale spores, but remarkably many and large pileocystidia.

Series *Pygmaeoaffinis* HAUSKN. & KRISAI, ser. nova
= Stirps *Pygmaeoaffinis* WATLING 1982, British Fungus Flora Agarics and Boleti **3**: 42, inval.

Latin diagnosis: Basidiocarpium medium ad grande, pileus et stipes omnino pruinosi, juventute saepe guttuliferus. Stipes semper albus. Sporae parvae, tenuiter tunicatae, poro germinativo praesenti vel absenti. Cheilo-, caulo- et pileocystidia grandia, lanceolata ad lageniformia.

Type species: *Pholiotina pygmaeoaffinis* (FR.) SINGER.

Characters: Basidiocarp medium to large, pileus and stipe entirely pruinose, young often with guttules. Pileus mostly pale, stipe for a long time white. Spores small, thin-walled, germ-pore absent or present. Cheilo-, caulo- and pileocystidia large, lanceolate to lageniform. Single or in small groups in forests, meadows, grassland, on litter or plant debris.

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Representatives: *P. alba* (ENDERLE) HAUSKN. & ENDERLE (Europe), *P. pygmaeoaffinis* (FR.) SINGER (Europe), *P. striipes* (COOKE) SINGER (Europe, North America).

Series *Filipes* HAUSKN. & KRISAI, ser. nova
= Stirps *Sulcatipes* WATLING 1982, British Fungus Flora Agarics and Boleti **3**: 42, inval.

Latin diagnosis: Basidiocarpium parvum ad medium, pileus et stipes omnino pruinosi. Basis stipitis vetiore distincte colorata. Cheilo-, caulo- et pileocystidia ut in serie *Pygmaeoaffinis*.

Type species: *Pholiotina filipes* (G. F. ATK.) SINGER.

Characters: Basidiocarp small to at most medium, stipe relatively long. Pileus and stipe entirely pruinose. Stipe first whitish to pale, in age distinctly browing from base upwards. Spores small, thin-walled, with germ-pore. Cheilo-, caulo- and pileocystidia large and remarkable, lanceolate, subcylindrical to lageniform. Forests, on soil or litter, also rotting wood.

Representatives: *P. filipes* (G. F. ATK.) SINGER (Asia, Europe, North America), *P. novae-zelandiae* (WATLING & G. M. TAYLOR) HAUSKN. (Oceania), *P. pilosa* E. HORAK, HAUSKN. & DESJARDIN (Asia).

Series *Mairei* HAUSKN. & KRISAI, ser. nova
= Stirps *Mairei* WATLING 1982, British Fungus Flora Agarics and Boleti **3**: 42, inval.

Latin diagnosis: Basidiocarpium parvum, parvissimum, brevistipitatum. Pileus et stipes omnino pruinosi, juventute saepe guttuliferus. Stipes pallidus. Sporae parvae ad parvissimae, tenuiter tunicatae, poro germinativo. Cheilo-, caulo- et pileocystidia abunde praesentia, sed parva ad media, lanceolata ad lageniformia.

Type species: *Pholiotina mairei* (WATLING) ENDERLE.

Characters: Basidiocarp small to tiny, pileus and stipe pruinose, young often with guttules. Stipe pale, thin, short. Spores small to very small, thin-walled, with germpore. Cheilo-, caulo- and pileocystidia abundant, but small to medium, lanceolate to lageniform. Forests, along paths, on soil, also in grass.

Representatives: *P. mairei* (WATLING) ENDERLE (Europe), *P. maireiaffinis* SINGER (North America), *P. parvula* (DØSSING & WATLING) BON (Europe).

Series *Sulcata* HAUSKN. & KRISAI, ser. nova
= *Plicatellae* KÜHNER 1935, Le genre *Galera*: 137, inval.

Latin diagnosis: Characteres ut in sectione *Piliferae*, sed margo pilei distincte sulcato-plicatus ad dimidium radii. Velum absens. Sporae mediae, tenuiter ad moderate crasse tunicatae, interdum poro germinativo eccentrico. Pileocystidia absentia vel rarissima.

Type species: *Pholiotina sulcata* ARNOLDS & HAUSKN.

Characters: Basidiocarp small to medium, veil absent. Pileus plicate-sulcate up to half of radius, splitting in places. Stipe pruinose especially at apex, otherwise faintly

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longitudinally striate. Spores medium, ochre-yellow to brownish orange, thin- to moderately thick-walled, sometimes with eccentrical germ-pore. Cheilocystidia rather variable, mostly lageniform. Pileocystidia absent or very rare. Meadows, grassland, also in subalpine habitats on gravely or sandy soils.

Representatives: *P. sulcata* ARNOLDS & HAUSKN. (Europe), *P. sulcata* var. *oreina* HAUSKN. (Europe).

Comments: For a long time *Pholiotina sulcata* was considered to be conspecific with *Galerella plicatella* (PECK) SINGER, although already WATLING (1982) expressed doubts. ARNOLDS & HAUSKNECHT (2003) recognised, that the species known from Europe belonged to the genus *Pholiotina* und assigned the new name *Pholiotina sulcata*. HAUSKNECHT & CONTU (2003) presented a worldwide survey of the genus *Galerella* and discussed its delimitation from the related genera *Bolbitius* and *Pholiotina*.

Section *Vesiculosae* E. HORAK & HAUSKN. 2002, Österr. Z. Pilzk. **11**: 248

Latin diagnosis: Differt cheilocystidiis (et caulocystidiis) late vesiculosis vel subuteriformibus. Pileipellis hymeniformis, pileocystidia nulla.

Type species: *Pholiotina vesiculosa* E. HORAK & HAUSKN.

Characters: Basidiocarp small. Pileus hygrophanous, striate, veil absent. Stipe coloured, pruinose at apex. Spores medium, rubiginous, thin-walled. Cheilo- and caulocystidia vesiculous, balloon-shaped to lageniform. Pileocystidia absent. On leaf litter in tropical rain forest.

Single representative: *P. vesiculosa* E. HORAK & HAUSKN. (Oceania).

Section *Verrucisporae* SINGER 1973, Sydowia Beiheft **7**: 79
= Subsection *Verrucisporae* (SINGER) ARNOLDS 2003, Persoonia **18**: 229.

Latin Diagnosis: Sporis verrucosis vel marmoratis exosporii ornamentatione causa. Dermatocystidiis praesentibus vel absentibus in epicute pilei; velo paullum evoluto, si adest, mox gelatinascit et disparet. Fibulis praesentibus.

Type species: *Pholiotina verrucispora* SINGER.

Characters: Basidiocarp small to medium. Pileus smooth to slightly rugulose, dry, slightly glutinous to distinctly viscid. Veil absent or weakly developed, soon vanishing. Spores in light microscope almost smooth, slightly punctate to coarsely verrucose, small to medium, distinct germ-pore present or absent. Cheilocystidia utriform to clavate-subcapitate. Pileocystidia present, versiform. Forests, on soil or litter, rarely also in grassland.

Series *Verrucispora*

Characters: Basidiocarp mycenoid, small, pileus dry, slightly rugulose. Veil absent. Spores small, coarsely verrucose like a *Cortinarius*, brown in KOH, with germ-pore, plage absent. Cheilocystidia versiform to subcapitate, pileocystidia large, frequent. On soil or litter, rarely on wood.

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Single representative: *P. verrucispora* SINGER (South America).

Series *Utriformis* HAUSKN. & KRISAI, ser. nova
= Stirps *Utriformis* WATLING 1982, British Fungus Flora Agarics and Boleti **3**: 42, inval.

Latin diagnosis: Characteres ut in serie *Verrucispora*, sed sporae solum subtiliter punctatae ad quasi glabrae sub microscopio, pileus viscosus ad glutinosus, juventute velum interdum praesens, cheilocystidia maximam partem utriformia.

Type species: *Pholiotina dasypus* (ROMAGN.) P.-A. MOREAU.

Characters: Basidiocarp small to medium. Pileus smooth, in fresh condition slightly glutinous to distinctly viscid, veil present or absent. Spores in light microscope almost smooth to faintly punctate, ellipsoidical to slightly phaseoliform, with germ-pore, in scanning electron microscope faintly marmorate to slightly punctate. Cheilocystidia mostly utriform or clavate-subcapitate. Caulocystidia similar, pileocystidia present or absent. Forests, on soil or litter, rarely wood.

Representatives: *P. dasypus* (ROMAGN.) P.-A. MOREAU (Asia, Europe), *P. australis* SINGER (South America), *P. glutinosa* E. HORAK & HAUSKN. (Oceania).

Section *Intermediae* (WATLING) SINGER 1973, Sydowia Beiheft **7**: 79
= *Conocybe* subgen. *Pholiotina* sect. *Intermediae* WATLING 1971, Persoonia **6**: 328.
= Subsect. *Intermediae* (WATLING) ARNOLDS 2003, Persoonia **18**: 229.

Latin diagnosis: Pileus hygrophanus, aliquantum viscidus, subinde paulum humidus vel siccus, laevis vel subtiliter pubescens propter capitatas pileocystidias, sive interdum praeditus fibrillis vel squamis minutis ad aciem propter albidos vel ochraceos flocculos. Velo annulato vel appendiculato ad marginem pilei dentato. Pleurocystidia absentia; cheilocystidia subcapitata vel distincte capitata, irregulariter tibiiformia sed tum numquam lecythiformia; caulocystidia similia. Basidiosporae phaseoliformes e latere.

Type species: *Pholiotina intermedia* (A. H. SM.) SINGER.

Characters: Basidiocarp mycenoid, small to medium. Pileus hygrophanous, slightly glutinous, dry micaceous to pruinose, smooth. Veil present as fringes at pileus margin or as distinct ring striate on the upper side. Spores smooth, often slightly phaseoliform, in one species broadly ellipsoidical, with germ-pore. Cheilocystidia distinctly capitate with thin neck, often almost lecythiform. Caulo- and pileocystidia similar. Forests, on soil or litter.

Comments: This is the only section of the genus *Pholiotina*, in which species with distinct, on the upper side striate ring, and such with only velar fringes at the pileus margin are united, because more value is attached to the characters of cheilocystidia than to the veil conditions (WATLING 1971).

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Series *Intermedia*

Characters: Basidiocarp mycenoid, medium. Pileus hygrophanous, slightly glutinous, dry pruinose. Veil present as distinct ring striate on the upper side. Cheilo-, caulo- and pileocystidia capitate with thin neck, often almost lecythiform. Forests.

Single representative: *P. intermedia* (A. H. SM.) SINGER (Europe, North America).

Series *Brunnea* HAUSKN. & KRISAI, ser. nova
= Stirps *Brunnea* WATLING 1982, British Fungus Flora Agarics and Boleti **3**: 42, inval.

Latin diagnosis: Characteres ut in series Intermedia, sed velum appendiculatum ad marginem pilei denticulatum, non annuliforme. Sporae leviter phaseoliformes vel ellipsoideae, tenuiter tunicatae.

Type species: *Pholiotina brunnea* (WATLING) SINGER.

Characters: Basidiocarp mycenoid, small to medium. Pileus hygrophanous, slightly glutinous or not, dry pruinose, young and in fresh condition pileus margin with denticulate veil or not. Stipe smooth, pruinose above, slightly fibrillose, not annulate. Spores smooth, often slightly phaseoliform, in one species broadly ellipsoidical, with germ-pore. Cheilo-, caulo- and pileocystidia capitate with thin neck, often almost lecythiform. Forests, on soil or litter, along paths, and on plant debris.

Representatives: *P. brunnea* (WATLING) SINGER (Asia, Europe, North America), *P. caricicola* SINGER (South America).

Section *Vestitae* (WATLING) HAUSKN. & KRISAI, comb. nova
Basionym: *Conocybe* subgen. *Pholiotina* sect. *Vestitae* WATLING 1965, Notes Roy. Bot. Garden Edinburgh **26**: 298.

Latin diagnosis: Pileus hygrophanus, siccus, subinde paulum humidus, laevis vel subtiliter pubescens propter pileocystidias, interdum praeditus fibrillis vel squamis minutis ad aciem propter albidos vel ochraceos flocculos vel cum velo appendiculato. Annulus absens. Pleurocystidia absentia, cheilocystidia fere elongato-utriformia altera elongato-clavato ad apicem semper obtusa, etiam lageniformia vel inaequaliter subcapitata vel distincte capitata sed tum numquam lecythiformia; caulocystidia similia.

Type species: *Pholiotina vestita* (FR.) SINGER.

Characters: Basidiocarp mycenoid, small to large. Pileus hygrophanous, mostly striate, smooth, dry slightly pruinose. Veil at pileus margin faintly flocculose or appendiculate. Stipe often longitudinally fibrillose, pruinose at apex, annulus absent. Spores small to medium, thin- to faintly thick-walled, smooth, germ-pore present or absent. Cheilocystidia very versiform, lageniform, utriform, cylindrical to cylindrical-capitate with broad apex, never lecythiform; in one species cheilo- and caulocystidia clavate to pedicellate-capitate, densely incrusted with thick plaques of resin. Caulocystidia similar, pileocystidia absent or very rare. Forests, on soil or litter, along paths, rarely in grassland.

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Series *Vestita*
= Stirps *Vestita* WATLING 1982, British Fungus Flora Agarics and Boleti **3**: 42, inval.

Characters: Basidiocarp small. Pileus hygrophanous, no papilla, veil strongly developed, at pileus margin often densely denticulate. Spores thin-walled, germ-pore absent. Cheilo- and caulocystidia subcylindrical to slightly lageniform, mostly with wide neck and equal, rarely slightly capitate apex, pileocystidia absent. Forests, often along paths, also on rotting wood.

Single representative: *P. vestita* (FR.) SINGER* (Asia, Africa, Europe).

Series *Resinosocystidiata* HAUSKN. & KRISAI, ser. nova

Latin diagnosis: Characteres ut in serie *Vestita*, sed pileus papillosus, cheilo- et caulocystidia clavata ad pedicellato-capitata, dense incrustata crassis tabulis resinosis.

Type species: *Pholiotina resinosocystidiata* E. HORAK & HAUSKN.

Characters: Pileus small, papillate, hygrophan, striate. Veil at pileus margin in form of white fugaceous flocculi. Stipe pruinose at apex. Spores small, amygdaliform, thin-walled, germ-pore or callus indistinctive. Cheilo- and caulocystidia clavate to pedicellate-capitate, densely incrusted with thick plaques of resin. Pileocystidia absent. Forest, on rotting wood.

Single representative: *P. resinosocystidiata* E. HORAK & HAUSKN. (Oceania).

Series *Appendiculata* HAUSKN. & KRISAI, ser. nova
= Stirps *Appendiculata* WATLING 1982, British Fungus Flora Agarics and Boleti **3**: 42, inval.

Latin diagnosis: Characteres ut in sectione *Vestitae*, sed sporae poro germinativo et cheilocystidia nunquam tabulis resinosis.

Type species: *Pholiotina velata* (VELEN.) HAUSKN.

Characters: Pileus small to large, smooth, hygrophanous, moist mostly striate. Veil at pileus margin as fringes and/or fine flocculi. Stipe cylindrical, thin to relatively thick, pruinose at apex, otherwise smooth to slightly longitudinally fibrillose, no ring-like zone. Spores small to medium, smooth, thin- to slightly thick-walled, with germ-pore. Cheilocystidia very variable, lageniform, utriform, versiform, cylindrical to cylindrical-capitate with wide apex, never lecythiform. Caulocystidia similar, pileocystidia mostly absent or very rare. Forests, on soil, litter, rarely on wood, also outside of forests on plant debris.

Representatives: *P. velata* (VELEN.) HAUSKN. (Asia, Africa, Australia, Europe), *P. exannulata* (KÜHNER & WATLING) COURTEC.* (Europe), *P. exannulata* var. *maculata* HAUSKN. (Europe), *P. ruiz-lealii* SINGER (South America), *P. nemoralis* (HARMAJA) BON (Europe, North America), *P. nemoralis* var. *dentatomarginata* (WATLING) HAUSKN.* (Africa, Europe).

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Section *Pholiotina*
= *Togulares* KONR. & MAUBLANC 1924-1927, Icones Selectae Fungorum, inval.

Characters: Basidiocarp mycenoid, small to medium. Pileus hygrophanous, mostly striate, smooth or rugulose, occasionally with velar flocculi at pileus margin. Stipe with distinct, striate, rarely incomplete ring, sometimes also additionally with velar flocculi below ring. Spores small to large, thin- to thick-walled, ellipsoidical, germ-pore present or not. Cheilocystidia very variable, lageniform, utriform, clavate, vesiculose, cylindrical, cylindrical-capitate, partly bent. Caulocystidia above ring similar, often more variable. Pileocystidia absent or extremely rare. Forests, on soil or litter, wood-sticks, also in meadows and grassland, on dung etc.

Comments: For this section KONRAD & MAUBLANC (1924-1927) used the name *Togulares*. This is only adopted by SINGER (1951), it is not mentioned in the monograph by KÜHNER (1935).

Series *Aporos* HAUSKN. & KRISAI, ser. nova
= Stirps *Aporos* WATLING 1982, British Fungus Flora Agarics and Boleti **3**: 42, inval.

Latin diagnosis: Characteres ut in sectione *Pholiotina*, sed sporae sine poro germinativo et annulus nonnumquam imperfectus et dependens margine pilei.
Type species: *Pholiotina aporos* (KITS VAN WAV.) CLÉMENÇON.

Characters: Basidiocarp small to medium. Pileus hygrophanous, slightly striate, at pileus margin sometimes with velar remnants. Stipe annulate, ring sometimes incomplete, easily falling of. Spores small, slightly thick-walled, germ-pore absent. Cheilocystidia subcylindrical to narrowly clavate, partly with capitate enlarged apex; caulocystidia similar, pileocystidia absent. Forests, on soil or litter, also on rotting wood, often in spring.
Representatives: *P. aporos* (KITS VAN WAV.) CLÉMENÇON (Africa, Europe, North America), *P. microspora* SINGER (North America).

Series *Vexans* HAUSKN. & KRISAI, ser. nova
= Stirps *Arrhenii* WATLING 1982, British Fungus Flora Agarics and Boleti **3**: 42, inval., p. p.

Latin diagnosis: Characteres ut in sectione *Pholiotina*, sporae poro germinativo, tenuiter ad crasse tunicatae, cheilo- et caulocystidia lageniformia, clavata, cylindrica, cylindrico-capitata, elementa utriformia vel vesiculosa raro immixta.
Type species: *Pholiotina vexans* (P. D. ORTON) BON.

Characters: Basidiocarp mycenoid, small to medium. Pileus hygrophanous, striate, smooth or rugulose. Stipe with striate, complete or incomplete, in one species deep-seated ring, sometimes with velar flocculi below ring. Spores small to large, thin- to thick-walled, mostly with distinct germ-pore. Basidia 4-spored. Cheilo- and caulocystidia lageniform, clavate, cylindrical, cylindrical-capitate, rarely utriform or vesiculous

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elements immixed. Pileocystidia absent. Forests, on soil or litter, also rotting wood, rarely also on dung in grassland.

Representatives: *P. arrhenii* (FR.) SINGER* (Europe), *P. peronata* (KÜHNER & WATLING) BON* (Africa), *P. fimicola* (WATLING) ENDERLE (North America), *P. hadrocystis* (KITS VAN WAV.) COURTEC. (Europe), *P. rugosa* (PECK) SINGER (world-wide), *P. austrofilaris* SINGER (South America), *P. pinguis* (WATLING) ENDERLE (North America), *P. vexans* (P. D. ORTON) BON (nearly world-wide), and *Conocybe gracilenta* WATLING & TAYLOR* (Oceania).

Series *Teneroides* HAUSKN. & KRISAI, ser. nova
= Stirps *Arrhenii* WATLING 1982, British Fungus Flora Agarics and Boleti **3**: 42, inval., p. p.

Latin diagnosis: Characters ut in sectione *Pholiotina*, sporae plerumque crasse tunicatae, distincte poro germinativo. Cheilo- et caulocystidia utriformia vel vesiculosa, solum rarissime singularibus elementis lageniformibus rostellatis immixtis.

Type species: *Pholiotina teneroides* (J. E. LANGE) SINGER.

Characters: Basidiocarp mycenoid, small to medium. Pileus hygrophanous, striate, smooth or rugulose. Stipe with striate ring, below ring sometimes with velar flocculi. Spores medium to large, mostly thick-walled, occasionally thin-walled, with distinct germ-pore. Basidia 4- or 2-spored. Cheilo- and caulocystidia utriform or vesiculous, in one species only mixed with single lageniform elements with rostellate apex. Pileocystidia absent or hardly developed. Habitat often on dung or fertilised soil.

Representatives: *P. utricystidiata* ENDERLE & H.-J. HÜBNER (Asia, Europe, South America), *P. teneroides* (J. E. LANGE) SINGER* (Asia, Africa, Europe), *P. tucumana* SINGER (South America), *P. altaica* SINGER (Asia), *P. flexipes* (WATLING) ENDERLE (North America), *P. stercoraria* (WATLING) ENDERLE (North America), *P. indica* K. A. THOMAS, HAUSKN. & MANIM. (Asia, Oceania), *P. procera* SINGER (Asia).

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