

## Infrageneric division of the genus *Conocybe* – a classical approach

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**Abstract:** An infrageneric concept of the genus *Conocybe* including all hitherto known taxa worldwide is presented. New sections, subsections and series are proposed along with listing all representatives in the respective categories. *Gastrocybe* is included in *Conocybe* sect. *Candidae*.

**Zusammenfassung:** Ein infragenerisches Konzept der Gattung *Conocybe* auf Basis aller bisher weltweit bekannten Taxa wird vorgestellt. Neue Sektionen, Subsektionen und Serien werden vorgeschlagen und die jeweiligen Vertreter diesen zugeordnet. Die Gattung *Gastrocybe* wird in *Conocybe* sect. *Candidae* eingeordnet.

While preparing a monographical study of the European taxa of the genus *Conocybe*, the first author has studied nearly all type specimens worldwide. Only very few type specimens, marked by (\*) in the list, could not be examined microscopically so far. Subsequently, it is attempted to bring all resulting insights into a worldwide infrageneric concept of the genus.

Presently this infrageneric division can only rely upon macro- and microscopical characters and must be conservative in the basic concept in consideration of the existing genus classifications. In *Conocybe* up to know there is no comprehensive molecular biological study as in other genera. Within *Bolbitiaceae* MONCALVO & al. (2002) compared three taxa of *Agrocybe*, two of *Bolbitius*, one *Conocybe*, one *Pholiotina* and one *Gastrocybe*. They stated that the pair *Conocybe-Gastrocybe* builds a “conocyboid clade” and the pair *Bolbitius-Pholiotina* a “bolbitioid clade”. *Agrocybe* is far apart and not necessarily closely related to *Bolbitiaceae*. However, the *Panaeoloideae* (*Panaeolina*, *Panaeolus*, *Copelandia*) are much closer to *Bolbitiaceae* than to *Coprinaceae*. WALTHER & al (2005) studied mycelia and anamorphs of more than 150 species morphologically and molecular phylogenetically and also included ten *Conocybe* species (incl. one *Pholiotina*), one *Bolbitius*, four *Panaeolus* and six *Agrocybe* spp. They found anamorphs in all *Conocybe* species investigated. This had already been observed by the second author in cultural studies several years ago (unpubl.). *Bolbitius* and the

*Conocybe* species (incl. *Pholiotina*) appeared as a monophyletic clade, but *Bolbitius* and *Pholiotina* were nested in *Conocybe*. *Panaeolus* was the sister clade to *Conocybe* and *Agrocybe* again was far apart. As these studies are still based on few samples, they must be taken deliberately for a basic concept. They are not relevant for an infrageneric division of the genus *Conocybe*. HALLEN & al. (2003) examined molecular biological members of sect. *Candidae* and compared materials from North America and Europe. Out of it two conclusions can be drawn which are used in the present paper: sect. *Candidae* is not related with *Bolbitius*, as stated by BON (1990, 1991) but belongs to *Conocybe*; and *Gastrocybe* cannot be maintained as a separate genus but forms a part of sect. *Candidae*.

In the history of *Bolbitiaceae* KÜHNER was the first to suggest an infrageneric division of the species known by him from Europe and North Africa, but without specifying valid hierarchical categories. SINGER (1951) for the first time brings a classification of the up to then worldwide known species and divides the genus into two subgenera, *Euconocybe* (SINGER 1947) with smooth or indistinctly rough spores of >6 µm length, and *Ochromarasmus* (SINGER 1947) with warty spores of <6 µm length. This concept does not fit any more for all taxa presently known and thus has to be abandoned. WATLING (1982) brings a systematic arrangement of the *Bolbitiaceae* of Great Britain, but subsumes also *Pholiotina* and *Galerella* under *Conocybe*. In the meantime the independence of *Pholiotina* and *Galerella* as separate genera has been accepted by most authors (at last ARNOLDS 2005). The infrageneric division suggested by us below is based in many details on WATLING (1982), who did not validly publish his "stirps". We publish them now as "series". ARNOLDS (2005) assigns the Dutch species only to sections and includes the rough-spored *Conocybe dumetorum* in sect. *Candidae*.

Alltogether, until now the genus *Conocybe* comprises 150 accepted species and 21 varieties and forms, i.e. 171 taxa.

### Excluded or doubtful species

Not included in the 171 taxa are some which could not be examined microscopically so far and whereof a description is lacking or does not allow a classification in the infrageneric concept. These are: *Conocybe microgranulosa* BATYROVA (Asia), *Conocybe morenoi* RAITHELH. (South America), *Conocybe nivea* (MASSEE) WATLING (Europe), and *Conocybe oculispora* LOCQ. (Europe).

### Taxonomical survey

*Conocybe* FAYOD 1889, Ann. Sci. Nat. Sér. VII, 9: 357.

**Original diagnosis:** Subhyménium très développé, trame presque bilatérale. Cellules hyméniales (surtout les paraphyses) courtes, subcylindriques. Basides émergentes. Spores jaune-rouille (sous le microscope), ovoïdes-elliptiques ou plus ou moins lenticulaires, à pore germinatif distinct, sans dépression hilare.

**Type species:** *Conocybe tenera* (SCHAEFF.: FR.) FAYOD, fixed by conservation (DONK 1949, see also HORAK 1968).

**Characters** (predominantly following ARNOLDS 2005, amended on base of all species known worldwide): Basidiocarp mycenoid, rarely collybioid or tricholomatoid. Pileus hygrophanous, dry, greasy or glutinous, glabrous, pubescent or pruinose. Lamellae narrowly adnate or adnexed, sometimes free, close to distant, yellow, yellow-brown, rusty brown to fuscous brown. Stipe central, very rarely eccentric, slender, rarely stout, with equal, bulbous to distinctly radicate base. Partial veil usually absent, in some species present, fugacious or not, leaving small flocks adhering to margin of pileus, volva-like remains at base of stipe or a true membranous volva. Spore print yellow-brown, orange-brown to rusty brown, exceptionally ochre-yellow or blackish brown. Spores glabrous, very rarely nodulose or minutely to distinctly verrucose, thin- to thick-walled, generally yellow-brown to orange-brown, in some species nearly hyaline or blackish. Germ-pore present or not. Basidia clavate to suburniform, 4- or 2-spored. Clamp-connections present in most species. Cheilocystidia always lecythiform with thin, mostly short neck and globose capitulum. Pleurocystidia absent, except in one species. Hymenophoral trama made up of a narrow central strand of cylindrical hyphae surrounded by inflated elements. Stipitipellis a thin cutis, with clusters of lecythiform caulocystidia and/or non-lecythiform ones and long hairs. Pileipellis an epithelioid hymeniderm, made up of pyriform to spheropedunculate, in one species mixed with lageniform elements. Pileocystidia lecythiform or capilliform, sometimes absent. Development in most species paravelangiocarpic, sometimes gymangiocarpic. Habitat on soil, litter, humus, dung and small pieces of wood, rarely on living wood, solitary or gregarious, rarely subcaespitose; usually on subneutral to basic substrates rich in nutrients. Widespread, with worldwide distribution.

**Comments:** The original diagnosis by FAYOD (1889) had to be amended in many respects. The genus description by ARNOLDS (2005) was retained and amended primarily for including deviating characters of all extra-European taxa, – see also SINGER (1986).

### Section *Conocybe*

= *Farinosae* KÜHNER 1935: 51 inval., p. p.

**Characters:** basidiocarp mycenoid to collybioid, small to large, with equal, bulbous or radicate stipe. Stipe distinctly coloured, at least in older basidiocarps, more rarely pure white. Spore print ochre brownish, yellow-brown, rubiginous. Spores very small to very large, ellipsoidal, ovoid, limoniform, more rarely subhexagonal, lentiform or not, with very thin to thick wall. Germ-pore mostly present and distinct, in some species absent. Ammoniacal reaction negative to strongly positive. Cheilo- and caulocystidia small to voluminous, with small to large capitulum. Pleurocystidia and pseudoparaphyses absent. Stipitipellis mainly consisting of lecythiform caulocystidia, but in many species mixed with a few piliform, ellipsoidal, cylindrical to lageniform elements. Pileipellis hymeniform, lecythiform pileocystidia present or not. Meadows, grasslands, woods, bare soil, sand dunes, less often dung, also in connection with roots of grasses and herbs.



**Comments:** KÜHNERS (1935) *Farinosae* also comprised the rough-spored *Conocybe laricina* KÜHNER [= *C. dumetorum* (VELEN.) SVRČEK], which was later placed by SINGER (1947) in a separate subgenus.

**Series *Tenera* HAUSKN. & KRISAI, ser. nov.**

= Stirps *Tenera* WATLING 1982, British Fungus Flora Agarics and Boleti 3: 41, inval., p. p.

**Latin diagnosis:** Cystidia, stipitipellis pileipellisque ut in sectione *Conocybe*. Stipes cylindricus vel bulbosus, nunquam radicans, nunquam pure albus, minime vetuste distincte coloratus. Sporae grandes usque ad valde grandes, crasse tunicatae, poro germinativo grandi. Reactio ammoniacalis plerumque valde positiva, in nonnullis speciebus infirma vel nulla.

**Type species:** *Conocybe tenera* (SCHAEFF.: FR.) FAYOD.

**Characters:** Basidiocarp mycenoid, small to large, with equal to distinctly bulbous, never radicing stipe. Stipe colour never pure white, soon distinctly coloured. Spore print yellow-brown, rubiginous. Spores large to very large, ellipsoidal, limoniform, in one species subhexagonal, lentiform or not, with thick to very thick wall and distinct germ-pore. Ammoniacal reaction often strongly positive, in some species weak or absent. Cheilo- and caulocystidia small to voluminous, capitulum small to large. Stipitipellis mainly consisting of lecythiform caulocystidia, but in many species mixed with piliform, ellipsoidal, cylindrical to lageniform elements. Pileipellis hymeniform, lecythiform pileocystidia present or not.

**Representatives:** *C. macrocephala* KÜHNER & WATLING (Europe, Asia), *C. subpallida* ENDERLE (Europe, Africa), *C. subalpina* (SINGER) SINGER & HAUSKN. (Europe), *C. aurea* (JUL. SCHÄFF.) HONGO (presumably worldwide), *C. aurea* var. *hololeuca* HAUSKN. (Europe), *C. tenerrima* SINGER (South America), *C. tenera* (SCHAEFF.: FR.) FAYOD (Europe, Asia, Africa, South America?), *C. tenera* f. *excentrica* SINGER inval. (South America, at least a good variety), *C. subovalis* KÜHNER & WATLING (Europe), *C. semiglobata* KÜHNER & WATLING (worldwide), *C. cartilaginipes* WATLING (Africa), *C. subxerophytica* SINGER & HAUSKN. (Europe, Asia, South America), *C. subxerophytica* var. *brunnea* HAUSKN. (EUROPE), *C. mexicana* (MURRILL) WATLING (North America, Europe), *C. khasiensis* (BERK.) WATLING (Asia).

**Comments:** Stirps *Tenera* of WATLING (1982) also comprised *Conocybe dunensis* WALLACE, which is assigned a separate series by us due to the specific habitat and different stipe base.

**Series *Leucopus* HAUSKN. & KRISAI, ser. nov.**

= Stirps *Leucopus* WATLING 1982, British Fungus Flora Agarics and Boleti 3: 41, inval.

**Latin diagnosis:** Cystidia, stipitipellis pileipellisque ut in sectione *Conocybe*. Basidiocarpium medium usque ad grande. Stipes cylindricus vel leve bulbosus, non radicans, longe albus. Reactio ammoniacalis nulla.

**Type species:** *Conocybe leucopus* KÜHNER & WATLING.



**Characters:** Basidiocarp mycenoid or collybioid, medium large to large. Stipe equal or bulbous, not radicant, white and very long time so. Spore print rubiginous. Spores large, ellipsoidal, ovoid, hardly lentiform, with thick wall and large germ-pore. Ammoniacal reaction negative. Cheilo- and caulocystidia small to medium large. Stipitipellis mainly consisting of lecythiform caulocystidia, non-lecythiform elements sometimes present in small number. Pileipellis hymeniform, lecythiform pileocystidia present or not. Forest soil rich in nitrate, meadows, dry grassland, bare soil (sand).

**Representatives:** *C. ammophila* M. LANGE (North America, Asia), *C. leucopus* KÜHNER & WATLING (Africa, South America), *C. striatipes* (SPEG.) SINGER (South America, Europe), *C. striatipes* var. *sejuncta* SINGER & HAUSKN.\* (South America).

**Series *Dunensis* HAUSKN. & KRISAI, ser. nov.**

= Stirps *Tenera* WATLING 1982, British Fungus Flora Agarics and Boleti 3: 41, inval., p. p.

**Latin diagnosis:** Cystidia, stipitipellis pileipellisque ut in sectione *Conocybe*. Basidiocarpium medium usque ad grande. Stipes coloratus, basi radicante et profunde inserta arena. Reactio ammoniacalis positiva vel nulla.

**Type species:** *Conocybe dunensis* WALLACE.

**Characters:** Basidiocarp mycenoid, medium large to large. Stipe coloured, with base radicant to deeply fixed in sand. Spore print rubiginous. Spores medium large to large, ellipsoidal, not lentiform, to distinctly thick-walled, with large germ-pore. Ammoniacal reaction positive or negative. Cheilo- and caulocystidia small, with small to medium large capitula. Stipitipellis mainly consisting of lecythiform elements, but also mixed with a few hairs and non-lecythiform elements. Pileipellis hymeniform, lecythiform pileocystidia present or not. Only sand soils, fixed dunes.

**Representatives:** *C. sabulicola* HAUSKN. & ENDERLE (Europe), *C. dunensis* WALLACE (Europe), *C. macrorhiza* (SPEG.) SINGER (South America).

**Series *Mesospora* HAUSKN. & KRISAI, ser. nov.**

= Stirps *Mesospora* WATLING 1982, British Fungus Flora Agarics and Boleti 3: 41, inval.

**Latin diagnosis:** Cystidia, stipitipellis pileipellisque ut in sectione *Conocybe*. Basidiocarpium medium usque grande, non connexum graminibus vel herbis; Stipes non pure albus, basi cylindrica, bulbosa, non radicante. Sporae parvae ad mediae, ellipsoideae, limoniformes, tenuitunicatae, poro germinativo distincte. Reactio ammoniacalis (una specie excepto) nulla.

**Type species:** *Conocybe mesospora* KÜHNER & WATLING.

**Characters:** Basidiocarp mycenoid, small to medium large, not in connection with roots of grasses or herbs; Stipe not pure white, based equal to bulbous, not radicant. Spore print yellow-brown to rubiginous. Spores small to medium large, ellipsoidal, limoniform, thin-walled, with distinct germ-pore. Ammoniacal reaction (with one exception) negative. Cheilo- and caulocystidia small. Stipitipellis mainly consisting of lecythiform elements. Pileipellis hymeniform, lecythiform pileocystidia present or not.

Meadows, dry grassland, leaf or needle litter, up to the alpine area, rarely also on sanddunes.

**Representatives:** *C. roberti* SINGER & HAUSKN. (Europe), *C. microsperma* SINGER\* (South America), *C. microspora* (VELEN.) DENNIS (Europe, Asia), *C. microspora* var. *brunneola* (KÜHNER & WATLING) SINGER & HAUSKN. (Europe, South America), *C. brachypodii* (VELEN.) HAUSKN. & SVRČEK (Europe), *C. ochroalbida* HAUSKN. (Europe), *C. mesospora* KÜHNER & WATLING (worldwide), *C. xerophytica* SINGER (South America), *C. nigrodisca* HAUSKN. & KRISAI (Europe), *C. roseipes* HAUSKN. (Europe).

**Series *Enderlei* HAUSKN. & KRISAI, ser. nov.**

**Latin diagnosis:** Cystidia, stipitipellis pileipellisque ut in sectione *Conocybe*. Basidiocarpium valde parvum usque medium, basis stipitis aequalis vel bulbosa. Sporae ellipsoideae, guttiformes, parvae usque mediae, tenui- usque leve crassitunicatae, porus germinativus absens vel sole callus praesens.

**Type species:** *Conocybe enderlei* HAUSKN.

**Characters:** Basidiocarp mycenoid, very small to medium large, with equal or bulbous, never radicans stipe. Spore print yellow-brown to rubiginous. Spores ellipsoidal, drop-shaped, small to medium large at most, often of very different size within a species, thin- to moderately thick-walled. Germ-pore absent or only a callus present. Ammoniacal reaction negative. Stipitipellis mainly consisting of lecythiform elements. Pileipellis hymeniform, lecythiform pileocystidia present or not.

**Representatives:** *C. dennisii* HAUSKN. (South America), *C. enderlei* HAUSKN. (Europe, Asia), *C. enderlei* var. *variispora* HAUSKN. (Europe), *C. minima* SINGER & HAUSKN. (Europe), *C. haglundii* HAUSKN. (Europe).

**Series *Magnicapitata* HAUSKN. & KRISAI, ser. nov.**

= Stirps *Magnicapitata* WATLING 1982, British Fungus Flora Agarics and Boleti 3: 41, inval.

= Stirps *Rickeniana* WATLING 1982, British Fungus Flora Agarics and Boleti 3: 41, inval.

**Latin diagnosis:** Stipitipellis pileipellisque ut in sectio *Conocybe*. Basidiocarpium parvum usque grande, basis stipitis aequalis usque bulbosa. Sporae ellipsoideae, parvae usque mediae, tenui- usque leve crassitunicatae, poro germinativo. Cheilo- et caulocystidia voluminosa, capitulo grande. Reactio ammoniacalis nulla.

**Type species:** *Conocybe juniana* (VELEN.) HAUSKN. & SVRČEK.

**Characters:** Basidiocarp mycenoid, with equal to bulbous stipe base. Spore print ochre-yellow to rubiginous. Spores ellipsoidal, small to medium large, thin- to slightly thick-walled, with germ-pore. Ammoniacal reaction negative. Cheilo- and caulocystidia voluminous, with large capitulum. Stipitipellis mainly consisting of lecythiform caulocystidia, those being mostly more voluminous and with larger capitulum than the cheilocystidia. Pileipellis hymeniform, pileocystidia present or not. Meadows, woods.

**Representatives:** *C. spiculooides* KÜHNER & WATLING (Europe), *C. echinata* (VELEN.) SINGER (Europe, Asia), *C. rickeniana* P. D. ORTON (Europe), *C. proxima* SINGER (South America), *C. juniana* (VELEN.) HAUSKN. & SVRČEK (worldwide), *C. juniana* var. *sordescens* (P. D. ORTON) HAUSKN. (Europe), *C. juniana* var. *subsejuncta* HAUSKN. (Europe, Asia), *C. amazonica* SINGER\* (South America).

**Comments:** WATLING (1982) created a separate stirps for *Conocybe rickeniana*; but the species with large, voluminous cystidia with large capitula microscopically are so similar that we refrained from further subdivision.

**Series *Graminis* HAUSKN. & KRISAL, ser. nov.**

**Latin diagnosis:** Cystidia, stipitipellis pileipellisque ut in sectione *Conocybe*. Basidiocarpium parvum usque medium, stipes non pure albus, semper connexus radicibus graminum vel herbarum, basi radicans vel non radicans. Sporae ellipsoideae, mediae, poro germinativo. Pileocystidia nulla vel rarissima.

**Type species:** *Conocybe graminis* HAUSKN.

**Characters:** Basidiocarp mycenoid, small to medium large. Stipe not pure white, root-like elongation present or not, always connected to roots of grasses or herbs. Spore print yellow-brown to rubiginous. Spores ellipsoidal, medium large, thin- to moderately thick-walled, with germ-pore. Ammoniacal reaction negative. Stipitipellis mainly consisting of lecythiform caulocystidia, in between sporadically non-lecythiform elements present. Pileipellis hymeniform, pileocystidia absent or very rare. Dry grassland, exposed loess slopes, steppes, semi-deserts.

**Representatives:** *C. graminis* HAUSKN. (Europe, Asia, Africa), *C. herbarum* HAUSKN. (Europe, Asia).

**Series *Antipus* HAUSKN. & KRISAL, ser. nov.**

= Stirps *Antipus* WATLING 1982, British Fungus Flora Agarics and Boleti 3: 41, inval.

**Latin diagnosis:** Cystidia, stipitipellis pileipellisque ut in sectione *Conocybe*. Basidiocarpium medium usque grande, stipes (una specie excepto) longe radicans, juvenile saepe albus vel pallide coloratus. Sporae parvae usque grandes, ellipsoideae, ovoideae, submitriformes, angulatae usque hexagonae, lentiformes aut non lentiformes, plerumque crassitunicatae, poro germinativo distincte.

**Type species:** *Conocybe antipus* (LASCH: FR.) FAYOD.

**Characters:** Basidiocarp mycenoid, Stipe long radicans (with one exception), young often white or pale, old slightly stronger coloured. Spore print yellow-brown to rubiginous. Spores small to large, ellipsoidal, ovoid, submitriform, angular to hexagonal, lentiform or not, mostly thick-walled with distinct germ-pore. Ammoniacal reaction negative. Stipitipellis consisting of mainly lecythiform caulocystidia (these often with narrow ventre and small capitulum). Pileipellis hymeniform, lecythiform pileocystidia present or not. Grassland, meadows, fertilized soils, dung.



**Representatives:** *C. antipus* (LASCH: FR.) FAYOD (Europe, North America), *C. humicola* (THIERS) HAUSKN., KRISAI & VOGLMAYR (North America), *C. alboradicans* ARNOLDS (Europe), *C. pragensis* HAUSKN. (Europe).

**Section *Mixtae* SINGER 1962 a, Sydowia 15: 68**

= *Mixtae* KÜHNER 1935: 85, inval.

**Latin diagnosis:** *Conocybe* sect. *Mixtae* KÜHN. (primitus subsectio!) ex SING. sect. nov. Dermatozystidiis stipitis et capitatis et non capitatis praesentibus; pilis stipitis etiam numerosis.

**Type species:** *Conocybe cryptocystis* (G. F. ATK.) SINGER.

**Characters:** Basidiocarp mycenoid, very small to large, with equal, distinctly bulbous to distinctly radicant stipe. Spore print ochre-yellow to rubiginous. Spores small to very large, ellipsoidal, naviculate, limoniform, in one species subhexagonal, barely lentiform, thin- to thick-walled, with distinct, often very large germ-pore. Pleurocystidia and pseudoparaphyses absent. Stipitipellis consisting of a mixture of lecythiform and non-lecythiform elements. Pileipellis hymeniform, often with capilliform, rarely lecythiform pileocystidia. Dung, compost, fertilised places, decomposing leaf- and needle litter, meadows, exceptionally wood.

**Comments:** The section *Mixtae* was created by SINGER (1962 a) for species with a mixture of lecythiform and non-lecythiform caulocystidia and in a very wide sense. WATLING (1986) and HAUSKNECHT (2003) only include species in this section which have a mixture ratio of ca. 1:5 to 5:1; species with only a very low proportion of lecythiform or non-lecythiform caulocystidia are excluded.

**Subsection *Pubescens* HAUSKN. & KRISAI, subsect. nova**

= *Stirps Pubescens* WATLING 1982, British Fungus Flora Agarics and Boleti 3: 41, inval.

**Latin diagnosis:** Basidiocarpium medium usque grande, stipes aequalis vel distincte bulbosus, non radicans. Sporae grandes usque valde grandes, ellipsoideae, poro germinativo grandi vel valde grandi. Stipitipellis caulocystidiis lecythiformibus et non lecythiformibus aequali numero consistens. Pileipellis hymeniformis, saepe pileocystidiis capilliformibus. In stercore, habitatione stercorata, acuis et foliis putridis.

**Type species:** *C. pubescens* (GILLET) KÜHNER.

**Characters:** Basidiocarp mycenoid, medium large to large, with equal or distinctly bulbous, not radicant stipe. Spore print yellow-brown to rubiginous. Spores large to very large, ellipsoidal, with large to very large, in one species eccentric germ-pore. Pleurocystidia and pseudoparaphyses absent. Stipitipellis consisting of almost equivalent lecythiform and non-lecythiform caulocystidia. Pileipellis hymeniform, often with capilliform pileocystidia. Dung, compost, fertilised places, rotting leaf- and needle litter.

**Representatives:** *C. subpubescens* P. D. ORTON (worldwide), *C. mixta* SINGER (South America), *C. pulchella* (VELEN.) HAUSKN. & SVRČEK (Europe, Asia, Africa),

*C. curta* (G. F. ATK.) WATLING (North America), *C. bulbifera* (KAUFFMAN) ROMAGN. (North America), *C. cryptocystis* (G. F. ATK.) SINGER (North America), *C. reticulato-rugosa* SINGER (South America), *C. merdaria* ARNOLDS & HAUSKN. (Europe, Asia, South America), *C. pubescens* (GILLET) KÜHNER (worldwide), *C. acutoconica* WATLING (Africa), *C. macrospora* (G. F. ATK.) HAUSKN. (worldwide).

**Comments:** In this very homogenous subsection all species are included with a mixture of almost equivalent lecythiform and non-lecythiform caulocystidia, it corresponds exactly stirps *Pubescens* (WATLING 1982).

### Subsection *Ambiguae* HAUSKN. & KRISAI, *subsect. nova*

**Latin diagnosis:** Basidiocarpium valde parvum usque grande, stipes aequalis, bulbosus vel radicans. Sporae parvae usque grandes, naviculatae, limoniformes, rariore ellipsoideae, etiam lentiformes et distincte angulatae, tenuiter usque crasse tunicatae, poro germinativo aut nullo. Stipitipellis mixtura elementis lecythiformibus usque 80 % et non-lecythiformibus, vel caulocystidiis non-lecythiformibus maximam partem. Pileipellis hymeniformis, pileocystidiis (capilliformibus, lecythiformibus) aut nullis.

**Type species:** *Conocybe ambigua* WATLING.

**Characters:** Basidiocarp mycenoid, very small to large. Stipe with equal, bulbous or distinctly radican base. Spore print ochre-yellow to rubiginous. Spores small to large, naviculate, limoniform, more rarely regularly ellipsoidal, in one species subhexagonal, hardly lentiform, thin- to thick-walled, with distinct germ-pore. Stipitipellis consisting of a mixture of lecythiform and non-lecythiform elements, either with up to 80 % lecythiform elements or with mainly non-lecythiform (capilliform, cylindrical, ellipsoidal to lageniform) caulocystidia. Pileipellis hymeniform, pileocystidia lecythiform, capilliform or absent. Meadows, forest soil, dung, rarely wood.

Type species: *Conocybe ambigua* WATLING.

**Comments:** This is a rather inhomogenous subsection. On the one hand it comprises species with mainly lecythiform caulocystidia (ser. *Cettoiana* and *Fragilis*), on the other hand such with mainly capilliform and non-lecythiform elements (ser. *Ambigua*). A further division into subsections does not seem to be meaningful, probably molecular biological examinations will provide a better insight into the relationships.

### Series *Ambigua*

= Stirps *Ambigua* WATLING 1982, British Fungus Flora Agarics and Boleti 3: 41, inval.

**Characters:** Basidiocarp mycenoid, medium large to large. Stipe with equal to bulbous, never radican base. Spore print ochre-yellow to rubiginous. Spores medium large to large, ellipsoidal, naviculate, limoniform, not to distinctly lentiform-hexagonal, thin- to thick-walled. Basidia 2- or 4-spored. Stipitipellis consisting of a mixture of lecythiform and non-lecythiform elements. Pileipellis hymeniform, (capilliform, lecythiform) pileocystidia present or not. Meadows, forest soil, one species on wood of a living tree.

**Representatives:** *C. ambigua* WATLING (Europe, Asia, North America), *C. alba* SINGER (South America), *C. acutoconica* WATLING (Africa), *C. siligineoides* R. HEIM (North America), *C. zuccherellii* HAUSKN. (Europe).

**Comments:** WATLING (1982) created this stirps for *Conocybe ambigua*; we include here all species with non-radicant stipe, in which capilliform and non-lecythiform caulocystidia, respectively, prevail and/or shape and size of spores deviates from subsection *Pubescens*.

**Series *Cettoiana* HAUSKN. & KRISAI, ser. nov.**

**Latin diagnosis:** Basidiocarpium medium usque grande, stipite distincte radicante. Sporae mediae usque grandes, ellipsoideae, limoniformes, non lentiformes, tenuiter usque crasse tunicatae, poro germinativo. Stipitipellis consistens caulocystidiis lecythiformibus maximam partem, sed elementa capilliformia et alia elementa non-lecythiformia semper numerosa. Pileipellis hymeniformis, pileocystidia lecythiformia praesens aut non.

**Type species:** *Conocybe cettoiana* HAUSKN. & ENDERLE.

**Characters:** Basidiocarp mycenoid, medium large to large, with distinctly radicant stipe base. Spore print yellow-brown to rubiginous. Spores medium large to large, ellipsoidal, limoniform, not lentiform, thin- to thick-walled, with distinct germ-pore. Stipitipellis consisting of mainly lecythiform caulocystidia, but capilliform and other non-lecythiform elements always numerous (20-30 %). Pileipellis hymeniform, pileocystidia lecythiform or absent. Dung, compost, but also sand and forest soil.

**Representatives:** *C. izonetae* SINGER (South America), *C. cettoiana* HAUSKN. & ENDERLE (Europe), *C. solitaria* K. A. THOMAS, HAUSKN. & MANIM. (Asia), *C. fiorii* (D. SACC.) WATLING (Europe).

**Series *Fragilis* HAUSKN. & KRISAI, ser. nov.**

= Stirps *Fragilis* WATLING 1982, British Fungus Flora Agarics and Boleti 3: 41, inval., p. p.

**Latin diagnosis:** Basidiocarpium valde parvum usque medium, basi stipitis aequali usque bulbosa. Sporae parvae usque mediae, ellipsoideae, ovoido-ellipsoideae, tenuiter usque leviter crasse tunicatae, poro germinativo praesens aut non. Stipitipellis consistens maximam partem caulocystidiis lecythiformibus, numerosa elementa non-lecythiformia immixta. Pileipellis hymeniformis, pileocystidia lecythiformia, capilliformia praesentia aut non.

**Type species:** *Conocybe fragilis* (PECK) SINGER.

**Characters:** Basidiocarp mycenoid, very small to medium large. Stipe not radicant, equal or bulbous. Spore print yellow-brown to rubiginous. Spores small to medium large, ellipsoidal, ovoid, not lentiform, thin- to thick-walled, germ-pore present or not. Stipitipellis consisting of mainly lecythiform caulocystidia, mixed with ca. 20-50 % non-lecythiform elements. Pileipellis hymeniform, pileocystidia lecythiform, capilliform or absent. Dry meadow, meadows, forest soil, also on wood.



**Representatives:** *C. fragilis* (PECK) SINGER (North America), *C. xylophila* SINGER\* (South America), *C. monicae* HAUSKN. (Europe, Africa), *C. tetrasporoides* HAUSKN. (North America, Europe), *C. tuxlaensis* SINGER (North- and South America, Europe), *C. lobauensis* SINGER & HAUSKN. (Europe).

**Comments:** This series also is not very homogenous, especially *C. tuxlaensis* and *C. lobauensis* have some characters deviating more from the other species in the series.

#### Subsection *Mitrisporae* HAUSKN. & KRISAI, subsect. nova

**Latin diagnosis:** Basidiocarpium medium, stipite leviter radicanti. Sporae parvae, distincte mitrifformes, crasse tunicatae, poro germinativo truncato. Stipitipellis consistens caulocystidiis capilliformibus, cylindricis, ellipsoideis, lageniformibus et multis lecythiformibus. Pileipellis hymeniformis, pileocystidia absentia. Solo silvarum.

**Type species:** *Conocybe mitrispora* WATLING.

**Characters:** Basidiocarp mycenoid, medium large, with long, slightly radicant stipe base. Spore print colour unknown. Spores in front view distinctly mitriform, in side view ellipsoidal, lentiform, thick-walled with truncate germ-pore. Stipitipellis consisting of capilliform, cylindrical, ellipsoidal, lageniform and many lecythiform caulocystidia. Pileipellis hymeniform, pileocystidia absent. Forest soil.

**Single representative:** *C. mitrispora* WATLING (Asia).

**Comments:** WATLING (1994) states that within the genus *Conocybe* the exceptional form of spores is not correlated with the structure of the stipitipellis, there are species with similar form of spores also in sect. *Pilosellae*. Within sect. *Mixtae* there is no other species with similar spores.

#### Section *Nodulosporae* WATLING 1976 a, Kew Bull. 31: 594

**Latin description:** *Conocybe* section *nodulosporae* WATLING, sect. nov. Pileo epicate ex elementis pyriformibus vel elongato-clavatis; cheilocystidia lecythiformia; caulocystidia cylindrica vel clavata; basidiosporae ellipsoideae, nodulosae.

**Type species:** *Conocybe nodulospora* (HONGO) WATLING.

**Characters:** Basidiocarp mycenoid, medium large to large, with equal, eventually radicant stipe base. Spore print colour unknown. Spores nodulous, cruciform, triangular, thick-walled, with distinct germ-pore. Stipitipellis consisting of non-lecythiform elements. Pileipellis hymeniform, pileocystidia present or not. Forest soil.

**Representatives:** *C. nodulospora* (HONGO) WATLING\* (Asia), *C. javanica* SINGER (Asia).

**Comments:** WATLING published the Latin description for this section in the year 1976 two times in different papers and journals (WATLING 1976 a, b). Due to the numbering of his „Observations“ and according to some other hints the publication in Kew Bulletin may have been earlier, but the exact date of issuing is admittedly unknown to us.

**Section *Pilosellae* SINGER 1962 a, Sydowia 15: 68**

= *Pilosellae* KÜHNER 1935: 91, inval.

**Latin diagnosis:** *Conocybe* sect. *Pilosellae* KÜHN. (primitus ut subsectio!) ex SING. sect. nov. Stipite haud toto albo; hyphis pilosis numerosis; dermatocystidiis capitatis in stipite nullis.

**Type species:** *Conocybe pilosella* (PERS.: FR.) KÜHNER.

**Characters:** Basidiocarp mycenoid, small to large. Stipe mostly coloured, at least when old, with equal, bulbous or radicant base. Pileus expanded, in one species elongated, cylindrical-ovoid. Spore print ochre-, yellow-brown to rubiginous. Spores very small to very large, ellipsoidal, ovoid, naviculate, limoniform or subcylindrical, lenticiform or not, thin- to thick-walled, germ-pore present or not. Pleurocystidia and pseudoparaphyses absent. Stipitipellis mainly consisting of non-lecythiform elements, but in many species lecythiform caulocystidia present, at least near the stipe apex. Pileipellis hymeniform, consisting of sphaeropedunculate elements. Pileocystidia mostly capilliform, rarely absent or lecythiform. Meadows, woods, dung, decomposing plant debris, rarely also on wood.

**Subsection *Pilosellae***

**Characters:** Basidiocarp mycenoid, small to large, Stipe with equal, bulbous or distinctly radicant base. Spore print yellow-brown to rubiginous. Spores very small to very large, ellipsoidal, ovoid, limoniform, lenticiform or not, thin- to thick-walled, germ-pore present or not. Stipitipellis mainly consisting of non-lecythiform elements, in many species also lecythiform caulocystidia present, at least near the stipe apex. Pileipellis hymeniform, consisting of sphaeropedunculate elements. Pileocystidia mostly capilliform, rarely absent or also lecythiform. Meadows, woods, dung, decomposing plant debris, rarely also on wood.

**Series *Pilosella***

= Stirps *Pilosella* WATLING 1982, British Fungus Flora Agarics and Boleti 3: 41, inval.

**Characters:** Stipitipellis and pileipellis as for the section. Basidiocarp mycenoid, medium large, with bulbous, not radicant stipe base. Pileus moist striate. Spore print yellow-brown to rubiginous. Spores very small to small, ellipsoidal, ovoid, thin-walled, hardly visible germ-pore present or not. Meadows, woods.

**Representatives:** *C. pilosella* (PERS.: FR.) KÜHNER (nearly worldwide), *C. pilosella* var. *brunneonigra* HAUSKN. & KRISAI (Europe), *C. pallidospora* KÜHNER & WATLING (Europe, Asia, North America).

**Series *Sienophylla* HAUSKN. & KRISAI, ser. nov.**

= Stirps *Siliginea* WATLING 1982, British Fungus Flora Agarics and Boleti 3: 41, inval., p. p.

**Latin diagnosis:** Stipitipellis et pileipellis ut in sectione *Pilosellae*. Basidiocarpium parvum usque medium, base stipitis aequalis vel bulbosa, non radicans. Pileus ochraceo-brunneus usque prope ater, plerumque distincte striatus. Sporae parvae usque mediae, ellipsoideae vel limoniformes, amygdaliformes, lentiformes aut non, tenuiter usque leviter crasse tunicatae, poro germinativo.

**Type species:** *Conocybe sienophylla* (BERK. & BROOME) SINGER.

**Characters:** Basidiocarp mycenoid, small to medium large, with equal or bulbous, never radican stipe base. Pileus ochre, pale brown, dark brown to almost black, moist mostly distinctly striate. Spore print pale brown, yellow-brown to rubiginous. Spores small to medium large, ellipsoidal, lemon- or almond-shaped, lentiform or not, thin- to moderately thick-walled, with germ-pore. Stipitipellis mainly consisting of capilliform, cylindrical, ellipsoidal to lageniform elements, but lecythiform caulocystidia often present near the stipe apex. Pileipellis hymeniform, capilliform pileocystidia present or not. Meadows, woods, up to the alpine area, greenhouses.

**Representatives:** *C. rostellata* (VELEN.) HAUSKN. & SVRČEK (nearly worldwide), *C. sienophylla* (BERK. & BROOME) SINGER (nearly worldwide), *C. halophila* SINGER (Asia, Europe), *C. ochrostriata* HAUSKN. (nearly worldwide), *C. ochrostriata* var. *favrei* HAUSKN. (Europe), *C. mazatecorum* SINGER\* (North America), *C. nigrescens* HAUSKN. & GUBITZ (Europe, South America), *C. moseri* WATLING (Europe, Asia, Africa), *C. moseri* var. *bisporigera* HAUSKN. & KRISAI (Europe), *C. moseri* var. *robustior* HAUSKN. & H.-J. HÜBNER (Europe).

**Comments:** WATLING (1982) included in his stirps *Siliginea* also the species around *Conocybe sienophylla* and *C. kuehneriana* (= *C. velutipes*). We retain the species with pale, non-striate pileus there and place all other species in two new series, mainly because many new taxa, especially in Europe, have been detected. The taxa with small spores belong now to ser. *Sienophylla*, *C. velutipes* with large spores is included in the following ser. *Anthracophila*.

**Series *Anthracophila* HAUSKN. & KRISAI, ser. nov.**

= Stirps *Anthracophila* WATLING 1982, British Fungus Flora Agarics and Boleti **3**: 41, inval.

= Stirps *Siliginea* WATLING 1982, British Fungus Flora Agarics and Boleti **3**: 41, inval., p. p.

**Latin diagnosis:** Stipitipellis et pileipellis ut in sectione *Pilosellae*. Basidiocarpium medium usque grande, base stipitis aequalis vel bulbosa, non radicans. Pileus plerumque valde coloratus, umide fere distincte striatus. Sporae grandes, ellipsoideae, ovoideae, lentiformiter compressae aut non, crasse tunicatae, poro germinativo grandi.

**Type species:** *Conocybe anthracophila* KÜHNER & WATLING.

**Characters:** Basidiocarp mycenoid, medium large to large. Stipe not radican, base equal or bulbous. Pileus mostly strongly coloured, moist mostly distinctly striate. Spore print yellow-brown to strongly rubiginous. Spores large, ellipsoidal or ovoid, partly lentiform compressed, thick-walled with large germ-pore. Stipitipellis consisting of non-lecythiform elements, lecythiform caulocystidia very rarely present near the



stipe apex. Pileipellis hymeniform, capilliforme pileocystidia present or not. Meadows, woods, fire places, also on fertilised soil.

**Representatives:** *C. anthracophila* KÜHNER & WATLING (Europe, Asia, Africa, South America), *C. anthracophila* var. *ovispora* HAUSKN. (Europe), *C. raphanacea* WATLING (Africa), *C. alachuana* (MURRILL) HESLER (North America), *C. caespitosa* (MURRILL) WATLING (North America), *C. velutipes* (VELEN.) HAUSKN. & SVRČEK (nearly worldwide), *C. peroxydata* (BERK.) D. A. REID (Africa), *C. ochraceodisca* WATLING (Africa).

**Series *Bispora* HAUSKN. & KRISAI, ser. nov.**

**Latin diagnosis:** Stipitipellis et pileipellis ut in sectione *Pilosellae*. Basidiocarpium parvum usque medium, base stipitis aequalis vel bulbosa, non radicante. Sporae naviculatae, limoniformes, subcylindricae, tenuiter usque crasse tunicatae, porus germinativus praesens aut non.

**Type species:** *Conocybe bispora* (SINGER) HAUSKN.

**Characters:** Basidiocarp mycenoid, small to medium large, with cylindrical, equal or slightly bulbous stipe, not radicate. Spore print yellow-brown to rubiginous. Spores naviculate, limoniform, subcylindrical, never markedly symmetrical ellipsoidal, germ-pore present or not, thin- to thick-walled. Basidia 2-, in one species also mostly 4-spored. Stipitipellis mainly consisting of non-lecythiform elements, sometimes mixed with a minor number of lecythiform caulocystidia. Pileipellis hymeniform. Pileocystidia absent, rarely capilliform and lecythiform. Meadows, forest soil.

**Representatives:** *C. phaeodropis* (BERK. & BROOME) PEGLER (Asia), *C. bispora* (SINGER) HAUSKN. (Europe, North America), *C. umbellula* (MONT.) SINGER (South- and North America, Asia).

**Comments:** Representatives of this series differ from the preceding mostly by spore shape and basidia mainly 2-spored.

**Series *Microrrhiza* HAUSKN. & KRISAI, ser. nov.**

**Latin diagnosis:** Stipitipellis et pileipellis ut in sectione *Pilosellae*. Basidiocarpium parvum usque medium, stipite cylindrici, radicante, basis stipitis numquam bulbosa. Sporae parvae usque grandes, naviculatae, limoniformes usque ellipsoideae, non-numquam lentiformes, tenuiter usque crasse tunicatae, poro germinativo.

**Type species:** *Conocybe microrrhiza* HAUSKN.

**Characters:** Basidiocarp mycenoid, small to medium large, with cylindrical, radicate stipe; Stipe base never bulbous. Spore print yellow-brown to rubiginous. Spores small to large, very variabel, naviculate, limoniform, ellipsoidal, in some species lentiform, with thin to thick wall, with germ-pore. Stipitipellis consisting of capilliform, cylindrical, ellipsoidal to lageniform elements, in some species with mixed with a few lecythiform caulocystidia. Pileipellis hymeniform, scarce lecythiform pileocystidia present or not.

**Representatives:** *C. leporina* (VELEN.) SINGER (Europe, Asia), *C. microrrhiza* HAUSKN. (Europe), *C. microrrhiza* var. *parvispora* (HAUSKN.) HAUSKN. (Europe), *C. microrrhiza* var. *tetraspora* (SINGER & HAUSKN.) HAUSKN. (Europe), *C. radicans* K. A. THOMAS, HAUSKN. & MANIM. (Asia), *C. myosura* SINGER\* (South America), *C. incarnata* (JUL. SCHÄFF.) HAUSKN. & ARNOLDS (Europe).

**Series *Inocybeoides* HAUSKN. & KRISAI, ser. nov.**

= Stirps *Inocybeoides* WATLING 1982, British Fungus Flora Agarics and Boleti 3: 41, inval.

**Latin diagnosis:** Stipitipellis et pileipellis ut in sectione *Pilosellae*. Basidiocarpium grande, stipiti albo, crasso et basi stipitis valde tumefacta usque bulbosa, non radicante. Sporae grandes, ellipsoideae, leviter cylindricae usque irregulaes, crasse tunicatae, poro germinativo grandi.

**Type species:** *Conocybe inocybeoides* WATLING.

**Characters:** Basidiocarp mycenoid, large. Stipe white, old whitish, thick, with strongly inflated to broadly bulbous base, not radicate. Spore print yellow-brown to rubiginous. Spores large, ellipsoidal, slightly cylindrical to irregular, at most weakly lentiform, thick-walled with large germ-pore. Basidia 2- or 4-spored. Pleurocystidia and pseudoparaphyses absent. Stipitipellis consisting of non-lecythiform elements, lecythiform caulocystidia extremely rare near the stipe apex. Pileipellis hymeniform, with capilliform pileocystidia. Meadows, woods, disturbed sites, plant debris, compost.

**Representatives:** *C. apala* (FR.: FR.) ARNOLDS (Europe), *C. inocybeoides* WATLING (Europe).

**Series *Cylindracea* HAUSKN. & KRISAI, ser. nov.**

**Latin diagnosis:** Stipitipellis et pileipellis ut in sectione *Pilosellae*. Basidiocarpium tenerum. Pileus cylindricus, haud expansus, semper altior ut latus. Sporae mediae, ellipsoideae, tenuiter tunicatae, distincte poro germinativo.

**Type species:** *Conocybe cylindracea* KÜHNER & WATLING.

**Characters:** Basidiocarp mycenoid, brittle. Pileus cylindrical to elongate ovoid, hardly expanding, always higher than wide. Stipe base slightly bulbous. Spore print yellow-brown. Spores medium large, ellipsoidal, thin-walled with distinct germ-pore. Pleurocystidia and pseudoparaphyses absent. Stipitipellis consisting of only capilliform, cylindrical to fusiform elements. Pileipellis hymeniform, with capilliform pileocystidia. Dry grassland, fire places.

**Single representative:** *C. cylindracea* KÜHNER & WATLING (Africa, Europe).

**Subsection *Siligineae* HAUSKN. & KRISAI, subsect. nova**

**Latin diagnosis:** Stipitipellis et pileipellis ut in sectione *Pilosellae*. Basidiocarpium medium usque grande, rare parvius, basis stipitis aequalis, bulbosa vel distincte radicans. Sporae grandes, ellipsoideae, lentiformes aut non, subhexagonae aut non, plerumque crasse tunicatae, poro germinativo grandi.

**Characters:** Basidiocarp mycenoid, mostly medium large to large, rarely small. Stipe with equal, bulbous to distinctly radicans base. Spore print yellow-brown to rubiginous. Spores large, ellipsoidal, lentiform or not, subhexagonal or not, mostly thick-walled, with large germ-pore. Stipitipellis consisting of capilliform, cylindrical, ellipsoidal to slightly lageniform elements, lecythiform caulocystidia absent or present (in few species) in moderate number. Pileipellis hymeniform, capilliform pileocystidia present or not. Dung, fertilised soil, compost, few species also on meagre places in meadows and woods.

**Comments:** The mostly dung-inhabiting species of this subsection correspond to those of subsect. *Pubescens* within sect. *Mixtae*, but in the stipitipellis there are no or only exceptionally lecythiform caulocystidia. Especially representatives of ser. *Fimetaria* are macroscopically similar to the *C.-pubescens*-group.

### Series *Siliginea*

= Stirps *Siliginea* WATLING 1982, British Fungus Flora Agarics and Boleti 3: 41, inval., p. p.

**Characters:** Basidiocarp mycenoid, small to large, stipe base equal or bulbous. Pileus relatively pale coloured, moist never striate. Spore print yellow-brown to rubiginous. Spores large, ellipsoidal, never lentiform, thick-walled with large germ-pore. Basidia 2- or 4-spored. Stipitipellis mainly consisting of non-lecythiform elements, lecythiform caulocystidia sporadically present near the stipe apex. Pileipellis hymeniform, often with capilliform pileocystidia. Dung, rich and meagre meadows, grassland.

**Representatives:** *C. fuscimarginata* (MURRILL) SINGER (worldwide), *C. crocospora* (BERK. & M. A. CURTIS) KÜHNER inval. (North America), *C. siliginea* (FR.: FR.) KÜHNER (Europe, Asia, North America), *C. capillaripes* (PECK) WATLING (North America), *C. rickenii* (JUL. SCHÄFF.) KÜHNER (worldwide).

### Series *Fimetaria* HAUSKN. & KRISAI, ser. nov.

**Latin diagnosis:** Stipitipellis et pileipellis ut in sectione *Pilosellae*. Basidiocarpium medium usque grande, basi stipitis aequali, numquam bulbosa, sed radicans vel substrato profunde inserta. Sporae grandes, ellipsoideae, crasse tunicatae, poro germinativo grandi. In stercore.

**Type species:** *Conocybe fimetaria* WATLING.

**Characters:** Basidiocarp mycenoid, medium large to large, with equal, never bulbous stipe; stipe mostly distinctly radicans or deeply inserted in the substrate. Spore print rubiginous. Spores large, ellipsoidal, seldom weakly lentiform or indistinctly angular, with large germ-pore. Pleurocystidia and pseudoparaphyses absent. Stipitipellis consisting of non-lecythiform elements, lecythiform caulocystidia present in one species in low number. Pileipellis hymeniform, capilliform pileocystidia present or not. Dung.

**Representatives:** *C. fimetaria* WATLING (Europe, Africa, North America), *C. diemii* SINGER (South America), *C. watlingii* HAUSKN. (Europe).



**Series *Murinacea* HAUSKN. & KRISAI, ser. nov.**

= Stirps *Murinacea* WATLING 1982, British Fungus Flora Agarics and Boleti **3**: 41, inval.

**Latin diagnosis:** characteres ut in serie *Fimetaria*, sed basis stipitis aequalis usque distincte bulbosa, non radicans. In stercore, solo stercoreato, una species acuis putridis.

**Type species:** *Conocybe murinacea* WATLING.

**Characters:** Basidiocarp mycenoid, small to large, with equal to distinctly bulbous, never radicant stipe. Spore print yellow-brown to rubiginous. Spores large to very large, ellipsoidal, slightly lentiform or subhexagonal, with large, in one species eccentric germ-pore. Stipitipellis consisting of non-lecythiform elements, very rarely mixed with lecythiform caulocystidia. Pileipellis hymeniform, capilliform pileocystidia present or not. Dung, compost, droppings, heavily fertilised soil, one species on needle litter.

**Representatives:** *C. murinacea* WATLING (Europe, Asia), *C. farinacea* WATLING (Europe), *C. atkinsonii* WATLING (North America), *C. pseudopubescens* K. A. THOMAS, HAUSKN. & MANIM. (Asia), *C. singeriana* HAUSKN. (Europe, Asia, Africa, Oceania), *C. pinetorum* WATLING, ESTEVE-RAV. & G. MORENO (Europe), *C. magnispora* (MURRILL) SINGER (North- and South America, Europe, Asia), *C. gigasperma* ENDERLE & HAUSKN. (Europe, Asia).

**Series *Lenticulospora* HAUSKN. & KRISAI, ser. nov.**

= Stirps *Fragilis* WATLING 1982, British Fungus Flora Agarics and Boleti **3**: 41, inval., p. p.

**Latin diagnosis:** Stipitipellis et pileipellis ut in sectione *Pilosellae*. Basidiocarpium parvum usque medium, basi stipitis aequali usque leviter bulbosa, non radicante. Sporae parvae usque grandes, semper distincte lentiformes et leviter angulatae usque subhexagonae, tenuiter usque crasse tunicatae, poro germinativo.

**Characters:** Basidiocarp mycenoid, small to medium large. Stipe cylindrical, equal or slightly bulbous, not radicant. Spore print yellow-brown to rubiginous. Spores small to large, always distinctly lentiform and in addition slightly angular to subhexagonal, thin- to thick-walled, with germ-pore. Pleurocystidia and pseudoparaphyses absent. Stipitipellis consisting of non-lecythiform elements. Pileipellis hymeniform, with capilliform pileocystidia. Dung, compost, meadows, woods, rarely on wood.

**Representatives:** *C. lentispora* SINGER (South America), *C. hexagonospora* HAUSKN. & ENDERLE (Europe, Asia), *C. brunneoaurantiaca* K. A. THOMAS, HAUSKN. & MANIM. (Asia, Australia), *C. lenticulospora* WATLING (Europe, Asia, North- and South America), *C. pulchra* (CLEM.) HAUSKN., KRISAI & VOGLMAYR (North- and South America, Europe).

**Section *Obscurae* HAUSKN. & KRISAI, sect. nova**

**Latin diagnosis:** Basidiocarpium validum, stipite cylindrico. Sporae parvae, ellipsoideae, poro germinativo distincte. Pleurocystidia et pseudoparaphyses nulla. Stipes

caulocystidiis cylindricis et grandibus late fusiformibus. Pileipellis hymeniformis, mixtura elementis sphaerico-pedunculatis et late fusiformibus.

**Type species:** *Conocybe obscura* WATLING.

**Characters:** Basidiocarp mycenoid, robust, with cylindrical stipe. Spore print pale cinnamon. Spores small, ellipsoidal, with small germ-pore. Pleurocystidia and pseudoparaphyses absent. Caulocystidia not lecythiform, cylindrical, mixed with large, broadly fusiform elements. Pileipellis hymeniform, consisting of a mixture of sphaeropedunculate and broadly fusiform, partly rostellate elements (similar to *Pluteus* subsect. *Mixtini* SINGER, see SINGER 1958). Forest soil.

**Single representative:** *C. obscura* WATLING (Africa).

**Comments:** This is the only species in the genus *Conocybe* with a mixed pileipellis structure. WATLING (1974) states that this fact together with additional macroscopical informations gives a hint towards using *C. obscura* as type of a new section.

#### **Section *Conocybella* (SINGER) HAUSKN. & KRISAI, comb. nova**

Basionym: *Psathyrella* subg. *Conocybella* SINGER 1948, *Sydowia* 2: 36.

= *Conocybe* sect. *Conocybella* WATLING 1975, *Notes Roy. Bot. Gard. Edinburgh* 34: 248, inval. (wrong basionym cited).

**Latin diagnosis:** *Psathyrella* subgenus *Conocybella* A. H. SMITH in litt. Cheilocystidiis vesiculososis vel conocyboideis, i. e. ventricosis et globulo parvo stipitato ad apicem praeditis; cystidiis ad latera lamellarum nullis; sporis exiguis (i. e. minoribus quam 10  $\mu$  longitudine).

**Type species:** *Conocybe michiganensis* (A. H. SM.) WATLING.

**Characters:** Basidiocarp mycenoid. Lamellae mature "fuscous brown", Stipe stiff. Spore print "Benzo-brown". Spores ellipsoidal, with germ-pore, under 10  $\mu$ m long, nearly black in potassium hydroxide. Cheilocystidia lecythiform, pleurocystidia and pseudoparaphyses absent. On sawdust and pieces of wood.

**Single representative:** *C. michiganensis* (A. H. SM.) WATLING (North America).

**Comments:** *Conocybe michiganensis* was originally described as *Psathyrella* because of the colour of spores and spore print (SMITH 1941). WATLING (1975) made the new combination into *Conocybe* and erected the new sect. *Conocybella*, but invalid, as he cited a wrong basionym. Thus it proved to be necessary to validate sect. *Conocybella*.

#### **Section *Candidae* SINGER 1962 a, *Sydowia* 15: 69**

= *Candidae* KÜHNER 1935: 120 inval.

= *Bolbitius* sect. *Candidi* (KÜHNER ex SINGER) BON 1990, *Doc. Mycol.* 20/78: 39

**Latin diagnosis:** *Conocybe* sect. *Candidae* KÜHNER (primitus subsectio!). Stipite candido – dermatocystidiis stipitis nullis capitatis; hyphis piliformibus numerosis; pileo frequenter striato; pseudoparaphysibus frequenter numerosis. Typus sectionis: *C. lateritia* (FR.) KÜHNER sensu KÜHNER.

**Type species:** *Conocybe albipes* (G. H. OTTH) HAUSKN.

**Characters:** Basidiocarp mycenoid or gasteroid, small to large. Pileus dry or slimy, partly higher than wide, often with slightly crenulate margin. Lamellae, in one species also pileus deliquescent when mature. Stipe base equal to bulbous, stipe not radicans. Spore print ochre-yellow to rubiginous. Spores medium large to large, ellipsoidal, lentiform, in one species hexagonal-mitriform, thin- to thick-walled, with one exception with distinct germ-pore. Pseudoparaphyses present. Pleurocystidia absent. In meadows, grassland, woods, on dung, tropical species in Europe mostly in greenhouses.

**Comments:** BON (1990) included sect. *Candidae* in the genus *Bolbitius* due to the presence of pseudoparaphyses. HALLEN & al. (2003) provided molecular biological evidence that this section is clearly situated in the genus *Conocybe* and far apart from *Bolbitius*. *Bolbitius* rather is closer to *Pholiotina* than to *Conocybe*.

### Subsection *Candidae*

**Characters:** Basidiocarp mycenoid, small to large, with often slightly crenulated pileus margin. Lamellae mature deliquescent. Stipe base equal to bulbous. Spore print ochre-yellow to rubiginous. Spores medium large to large, mostly ellipsoidal, sometimes lentiform, in one species hexagonal-mitriform. Pseudoparaphyses present. meadows, grassland, woods, on dung, in greenhouses.

#### Series *Albipes* HAUSKN. & KRISAI, ser. nov.

= Stirps *Lactea* WATLING 1982, British Fungus Flora Agarics and Boleti 3: 41, inval.

**Latin diagnosis:** Sporae grandes, ellipsoideae, lentiformes aut non, numquam hexagono-mitriformes, crasse usque tenuiter tunicatae, porus germinativus praesens aut non. Pseudoparaphyses praesentes.

**Type species:** *Conocybe albipes* (G. H. OTTH) HAUSKN.

**Characters:** Basidiocarp mycenoid, medium large to large. Pileus whitish to orange brown, often with slightly crenulate margin. Lamellae mature deliquescent. Stipe base equal to slightly bulbous. Spore print ochre-yellow to rubiginous. Spores ellipsoidal, thick-walled, germ-pore present or not. Pseudoparaphyses present. In meadows, grassland, woods, on dung, in greenhouses.

**Representatives:** *C. albipes* (G. H. OTTH) HAUSKN. (worldwide), *C. albipes* var. *crispa* (LONGYEAR) HAUSKN. (North America), *C. albipes* var. *rugata* HAUSKN. (Europe), *C. romagnesii* HAUSKN. & G. MORENO (Europe), *C. candida* (COOKE & MASSEE) WATLING (Australia), *C. fracticeps* (PAT. & DEM.) Z. L. YANG (Asia), *C. pseudo-crispa* (HAUSKN.) ARNOLDS (Europe), *C. crispella* (MURRILL) SINGER (worldwide), *C. subcrispa* (MURRILL) SINGER (North America), *C. zeylanica* (PETCH) BOEDIJN (worldwide), *C. zeylanica* var. *marginata* HAUSKN. (Africa).

#### Series *Umbonata* HAUSKN. & KRISAI, ser. nov.

**Latin diagnosis:** Sporae mediae, lentiformes, hexagono-mitriformes, crasse tunicatae, poro germinativo. Pseudoparaphyses praesentes.

**Type species:** *Conocybe umbonata* (MASSEE) WATLING.



**Characters:** Basidiocarp mycenoid, with bulbous stipe base. Pileus distinctly coloured, brown to dark brown, with crenulate margin. Stipe base distinctly bulbous. Spore print rubiginous. Spores medium large, lentiform, hexagonal-mitriform, thick-walled with distinct germ-pore. Pseudoparaphyses present. In greenhouses.

**Single representative:** *C. umbonata* (MASSEE) WATLING (Europe).

**Comments:** This species, rediscovered only quite recently (HAUSKNECHT & al. 2005), has completely different and much smaller spores as taxa of ser. *Albipes* and differs also macroscopically. The erection of a new series seemed to be adequate.

**Subsection *Deliquescens* HAUSKN. & KRISAI, subsect. nova**

= Genus *Gastrocybe* WATLING 1968, The Michigan Botanist 7: 19

**Latin diagnosis:** Pileus primo glandiformis vel ellipticus, vel cylindrico-ovoideus vix vel numquam expansus, unctus vel viscidus denique gelatinosus et informis. Stipes aequalis vel subaequalis, vulgo bulbillosus, albido-hyalinus dein pallidus, fragilis, gracilis, saepe elongatus. Lamellae adnatae vulgo ventricosae ad faciem venosae vel intervenosae, ferrugineae. Caro tenuis, albida vel pallida. Cellulae cuticulae pilei pyriformes vel sphaeropedunculatae. Basidia et sterigmata aliquantam crassitunicatae. Basidiosporae fere symmetrica, Cheilocystidia copiosa; pleurocystidia nulla. Type species: *G. lateritia*, by original designation.

**Type species:** *Conocybe deliquescens* HAUSKN. & KRISAI, nov. nom.

= *Gastrocybe lateritia* WATLING 1968, The Michigan Botanist 7: 20.

**Characters:** Basidiocarp gasteroid. Pileus glandiform to ovoid-cylindrical, hardly expanding, slimy. Stipe very long, with bulbous base. Lamellae anastomosing. Spore print rubiginous. Spores ellipsoidal, with germ-pore. Pleurocystidia absent, pseudoparaphyses present. Meadows.

**Single representative:** *C. deliquescens* HAUSKN. & KRISAI (North America, Europe).

**Comments:** HALLEN & al. (2003) examined *Gastrocybe*, a genus with gasteroid basidiocarps erected by WATLING (1968), molecular biologically and recognized it as a good member of *Conocybe* sect. *Candidae*. The sliminess of the pileus is caused by a bacterium of the *Chryseobacterium gleum/indologenes*-group, so that HALLEN & al. (2003) were uncertain, if it would eventually be an already known species, disturbed in its growth by the bacteria. However, the combination of the microscopical data do not fit to any other species known of the section.

The epitheton *lateritia* already exists in the genus *Conocybe* [*Conocybe lateritia* (BATTARRA per FRIES) KÜHNER, Le Genre Galera 1935: 121], and thus cannot be used for the present species. Consequently, we propose the new name *Conocybe deliquescens*.

**Section *Giganteae* SINGER 1948, Sydowia 2: 36**

**Latin diagnosis:** Sect. *Giganteae* SING. sectio nov. Stipite albo; dermatocystidiis pilisque praesentibus in habitu *Cortinarii*; carpophoris carnosis. Species typica: *Cono-*

*cybe detrusa* (PECK) SING. comb. nov. (*Cortinarius detrusus* PECK).

**Type species:** *Conocybe intrusa* (PECK) SINGER.

**Amended description by WATLING (1977: 293):**

Pileus convex, expanding or not, thick-fleshy usually fairly brightly coloured in the range salmon buff or ochraceous buff, viscid under favourable conditions; pileipellis a well-developed palisadoderm but lacking distinctive dermatocystidia. Stipe robust, swollen at base, bulbous to clavate, white to yellowish (even primuline yellow), striate throughout or at apex only, with well-developed lecythiform caulocystidia. Cheilocystidia lecythiform. Basidiospores fairly to strongly pigmented, darkening in aqueous alkali solutions, fairly to strongly thick-walled with either a small narrow and indistinct germ-pore or a distinct thinning at the apical end giving a small hyaline patch. Basidia pyriform to clavate, normally 4-spored. Development typically gymangiocarpic. Basidiocarp developing on base-rich and nitrogen-rich soil in some way connected with man.

**Single representative:** *C. intrusa* (PECK) SINGER (presumably worldwide).

**Comments:** SINGER (1948) states the type species as *Conocybe detrusa* (mis-spelt by SINGER, see SINGER 1950: 134, WATLING & GREGORY 1981: 112).

**Section *Ochromarasmius* (SINGER) HAUSKN. & KRISAI, comb. & stat. nov.**

Basionym: *Conocybe* subgenus *Ochromarasmius* SINGER 1947, *Mycologia* **39**: 88

**Latin diagnosis:** 8. *Conocybe* FAYOD, subgenus *Ochromarasmius* SING., subgen. nov. A sectionibus generis *Conocybis* omnibus differt sporis minutis, distincte verrucosis stipiteque tenuissimo, cartilagineo. Ad truncos putridos caespitose in Brasilia.

**Type species:** *Conocybe juruensis* (HENN.) SINGER.

**Characters:** Basidiocarp small to medium large, mycenoid, with slightly bulbous, in one species additionally radicant stipe. Spore print yellow-brown to rubiginous. Spores s. m. mostly verrucous-rough, when smooth s. m., then in scanning electron microscope distinctly uneven, verrucous or crested. Pleurocystidia mostly absent, in one species present, Pseudoparaphyses absent. Stipitipellis consisting of lecythiform caulocystidia or a mixture of capilliform, lecythiform, ellipsoidal to lageniform elements. Pileipellis hymeniform, often with lecythiform pileocystidia, in one species heteromorph (elements with rostellate protuberances intermixed). Meadows, forest soil, on rotting wood.

**Comments:** SINGER (1947) erected a separate subgenus *Ochromarasmius* for species with rough spores. As he limited spore size in the original diagnosis to "smaller than 6  $\mu\text{m}$ ", he later had to amend this diagnosis for the newly-discovered *Conocybe radicata* (SINGER 1962 b). Also the "distinctly warty" spores do not fit within the present concept, as in the meantime taxa were detected with spores seemingly smooth in the light microscope but distinctly uneven-rough in SEM. As in the present concept of the authors and also of other experts of *Bolbitiaceae* the spore surface is not any more that relevant, we suggest downgrading to the category of a section.

**Subsection *Dumetorae* HAUSKN. & KRISAI, subsect. nova**

= Stirps *Dumetorum* WATLING 1982, British Fungus Flora Agarics and Boleti 3: 41, inval.

**Latin diagnosis:** Cystidia et pileipellis ut in sectione *Ochromarasmius*. Basidiocarpium parvum. Sporae per microscopum luminis visum leves usque subtile punctatae, per microscopum electronicum visum semper distincte asperae. Pleurocystidia et pseudoparaphyses nulla. Stipitipellis consistens elementis lecythiformibus vel mixtura elementis lecythiformibus et non-lecythiformibus.

**Type species:** *Conocybe dumetorum* (VELEN.) SVRČEK.

**Characters:** Basidiocarp mostly small, mycenoid, Stipe base often slightly bulbous, not radicans. Spore print yellow-brown to rubiginous. Spores tuberculous or rough, in one species smooth s. m., but distinctly rough in SEM. Cheilocystidia partly with large capitula. Pleurocystidia and pseudoparaphyses absent. Stipitipellis consisting of lecythiform elements or a mixture of lecythiform, capilliform, clavate-cylindrical or sphaerical elements. Pileipellis often with lecythiform pileocystidia. Forest soil, meadows, on rotting wood.

**Representatives:** *C. dumetorum* (VELEN.) SVRČEK (Europe), *C. dumetorum* var. *laricina* (KÜHNER) HAUSKN. (Europe), *C. dumetorum* var. *phaeoleiospora* HAUSKN. (Europe), *C. abjecta* (BERK. & BROOME) PEGLER (Asia), *C. spinulosa* HAUSKN. & KRISAI (Africa), *C. stictospora* SINGER (South America), *C. misionum* SINGER (South America, Australia), *C. horakii* WATLING (Oceania).

**Subsection *Juruensis* HAUSKN. & KRISAI, subsect. nova**

**Latin diagnosis:** Basidiocarpium parvum. Sporae etiam per microscopum luminis visum distincte tuberculoso-asperae. Pleurocystidia et pseudoparaphyses nulla. Pileipellis hymeniformis, heteromorpha, elementis sphaerico-pedunculatis consistens, sub eis multis rostellatis.

**Type species:** *Conocybe juruensis* (HENN.) SINGER.

**Characters:** Basidiocarp mycenoid, small. Stipe base not radicans. Spore print rubiginous. Spores also s. m. distinctly tuberculous-rough. Cheilocystidia with medium large capitula, Pleurocystidia and pseudoparaphyses absent. Stipitipellis nearly exclusively consisting of lecythiform caulocystidia. Pileipellis hymeniform, heteromorph, consisting of sphaeropedunculate elements, often with rostellate protuberances. On rotting wood.

**Single representative:** *C. juruensis* (HENN.) SINGER (South America).

**Comments:** In the pileipellis of *Conocybe juruensis* there are many sphaerico-pedunculate elements with rostrate protuberances. These were also observed by SINGER (1969) and HORAK (pers. comm.). In the type material, investigated by the first author, the pileipellis elements were very much collapsed, but in another collection from Bolivia made by SINGER such elements could be found. This is a unique character within the genus and in our opinion justifies the erection of a separate subsection.



**Subsection *Pleurocystidiatae* HAUSKN. & KRISAI, subsect. nova**

**Latin diagnosis:** Basidiocarpium mycenoideum, stipite radicante. Sporae valde verrucosae. Cheilo- et pleurocystidiis lecythiformibus.

**Type species:** *Conocybe radicata* SINGER.

**Characters:** Basidiocarp medium large, mycenoid, with strongly bulbous, distinctly radicate stipe base. Spore print rubiginous. Spores also s. m. distinctly tuberculous-rough. Pleurocystidia present, abundant, lecythiform, similar to cheilocystidia. Pseudoparaphyses absent. Stipitipellis consisting of lecythiform, capilliform and ellipsoidal-cylindrical elements. Pileipellis hymeniform, with lecythiform pileocystidia. On rotting wood.

**Single representative:** *C. radicata* SINGER (South America).

**Comments:** Pleurocystidia are not mentioned in the original description (SINGER 1953). The first author could examine the holotype (LIL) as well as the isotype (MICH) and found abundant pleurocystidia in both of them, not only near the lamellar edge, but also scattered over the whole area of the lamellae. Thus *Conocybe radicata* is the only representative of the genus with pleurocystidia.

**Section *Singerella* WATLING 1979, Sydowia Beiheft 8: 408**

*Conocybe* subgenus *Conocybe* Section *Singerella* WATLING sectio nova.

? *Agaricus* ser. *Dermini* sect. *Acetabularia* BERK. in J. Linn. Soc. (Bot.) London **18**: 389, 1881

= ? *Acetabularia* (BERK.) MASSEE, Brit. Fungi Fl. **2**: 232, 1893 (non *Acetabularia* LAOUROUX 1912 (*Dasycladaceae*, *Chlorophyta*))

= ? *Cyphellopus* FAYOD, Ann. Sci. Nat. (Bot.) VII **9**: 365, 1889

= *Conocybe* subgenus *Singerella* (WATLING) BON 1991, Doc. Mycol. **21/83**: 38

**Latin diagnosis:** Pileus hygrophanus, siccus, subinde paulum humidus, laevis vel subtiliter pubescens, propter pilocystidia. Annulus absens. Stipes cylindricus, laevis vel subtiliter pubescens. Pleurocystidia absentia; Cheilocystidia lecythiformia.

**Type species:** *Conocybe corneri* WATLING.

**Characters:** Basidiocarp mycenoid, medium large to large. Veil mostly a volva or a volva-like zone, rarely as fringes on the pileus margin and as girdle-like zones around the stipe. Stipe not radicate. Spore print yellow-brown, rubiginous or dark brown. Pseudoparaphyses absent or insignificant. Stipitipellis only consisting of non-lecythiform elements or a mixture of lecythiform and non-lecythiform caulocystidia. Dung, rotting plant and wood debris, fertilised soil, also in tropical deciduous woods.

**Comments:** For species of *Conocybe* with veil (fringes on the pileus margin or volvalike zone on the stipe) WATLING (1979) segregated the section *Singerella*. He critically studied all hitherto known species with veil or volva, respectively. He also discusses the eventual use of older names for the section (WATLING 1979 – see also above). A classification in the higher category of a subgenus, as suggested by BON (1991), does not seem to be appropriate in the present concept.

**Subsection *Subvelatae* HAUSKN. & KRISAI, subsect. nova**

**Latin diagnosis:** Basidiocarpium cum velo, margo pilei velo fimbriatus, sine volva; base stipitis non radicans. Pseudoparaphyses absentes vel non significantes, stipitipellis solum caulocystidiis non lecythiformibus consistens.

**Type species:** *Conocybe subvelata* SINGER.

**Characters:** Basidiocarp mycenoid; veil present as fine fringes on the pileus margin, stipe base volva or volva-like zone absent, not radicans. Spore print yellow-brown. Pseudoparaphyses absent or insignificant. Stipitipellis only consisting of clavate, lageniform and capilliform elements, lecythiform caulocystidia absent. Spores smooth, with germ-pore.

**Single representative:** *C. subvelata* SINGER (South America).

**Subsection *Vaginatae* HAUSKN. & KRISAI, subsect. nova**

**Latin diagnosis:** Basidiocarpium volva membranacea vel zona similis volvae, interdum etiam margo pilei velo fimbriatus; base stipitis non radicans. Pseudoparaphyses absentes vel non significantes. Stipitipellis solum vel praecipue consistens caulocystidiis non lecythiformibus.

**Type species:** *Conocybe vaginata* WATLING.

**Characters:** Basidiocarp mycenoid; veil present as membranous volva or as volva-like zone, additionally sometimes girdle-like zones around the stipe and fringes on the pileus margin; stipe base not radicans. Spore print yellow-brown, rubiginous to dark brown. Pseudoparaphyses absent or insignificant. Stipitipellis consisting of capilliform, ellipsoidal, sphaerical or lageniform elements, lecythiform caulocystidia present in one species near the stipe apex. Spores smooth, thick-walled, often limoniform, lentiform to subhexagonal, with germ-pore. Dung, rotting plant and wood debris, fertilised soil, also in tropical deciduous woods.

**Series *Locellina* HAUSKN. & KRISAI, ser. nov.**

**Latin diagnosis:** Characters ut in subsectione *Vaginatae*, sed basidiocarpium zona similis volvae vel volva infirma non membranacea, interdum etiam margo pilei velo fimbriatus. Pulvis sporarum rubiginosus vel brunneus.

**Type species:** *Conocybe locellina* (MURRILL) WATLING.

**Characters:** Basidiocarp with *Mycena*-habit; veil present as vanishing volva-like zone or (when young) as weak, non-membranous volva, additionally sometimes with veilar fringes at the pileus margin or girdle-like zones around the stipe. Stipe base not radicans. Spore print rubiginous to dark brown. Pseudoparaphyses absent. Stipitipellis only consisting of capilliform, ellipsoidal, sphaerical to lageniform caulocystidia, lecythiform elements absent. Spores smooth, thick-walled, with germ-pore. Dung, rotting plant or wood debris.

**Representatives:** *C. locellina* (MURRILL) SINGER (North America), *C. hornana* SINGER & HAUSKN. (Europe), *C. hornana* var. *subcylindrospora* HAUSKN., VAURAS, KYTÖV. & OHENOJA (Europe).

**Series *Corneri* HAUSKN. & KRISAI, ser. nov.**

**Latin diagnosis:** Characters ut in subsectione *Vaginatae*, sed basidiocarpium volva membranacea persistente, stipes sine velo fimbriato. Pulvis sporarum luteo-brunneus usque rubiginosus.

**Type species:** *Conocybe corneri* WATLING.

**Characters:** Basidiocarp mycenoid; veil a membranous, persisting volva, veilar fringes at the pileus margin or girdle-like zones around the stipe absent. Stipe base not radicans. Spore print yellow-brown to rubiginous. Pseudoparaphyses absent. Stipitipellis consisting of capilliform, ellipsoidal, sphaerical to lageniform elements, in one species also with some lecythiform caulocystidia near the stipe apex. Spores smooth, thick-walled, often limoniform, lentiform to subhexagonal, with germ-pore. Dung, rotting plant or wood debris, forest soil.

**Representatives:** *C. corneri* WATLING (Asia, Oceania), *C. vaginata* WATLING (Asia, Oceania), *C. volvata* K. A. THOMAS, HAUSKN. & MANIM. (Asia), *C. volviornata* E. HORAK, HAUSKN. & DESJARDIN (Asia), *C. discorosea* E. HORAK, HAUSKN. & DESJARDIN (Asia), *C. anthurii* WATLING & HAUSKN. (Africa).

**Subsection *Vinaceobrunneae* HAUSKN. & KRISAI, subsect. nova**

**Latin diagnosis:** Basidiocarpium tenuiter volva infirma furfuracea, stipes sine velo fimbriato, non radicans. Pseudoparaphyses absentes. Stipitipellis consistens elementis lecythiformibus et non lecythiformibus.

**Type species:** *Conocybe vinaceobrunnea* HAUSKN.

**Characters:** Basidiocarp mycenoid; volva weakly developed, young present as narrow scaly-mealy girdle, soon vanishing; veilar fringes at the pileus margin or girdle-like zones around the stipe absent; Stipe not radicans. Spore print rubiginous. Pseudoparaphyses absent. Stipitipellis consisting of lecythiform, ellipsoidal, lageniform to capilliform caulocystidia. Spores smooth, with germ-pore. Dung, fertilised soil.

**Single representative:** *C. vinaceobrunnea* HAUSKN. (Oceania).

**Comments:** *Conocybe vinaceobrunnea* differs from all other species of the section in two characters: the veil is narrow and scaly-mealy, and the stipitipellis conforms to that of sect. *Mixtae* (HORAK & HAUSKNECHT 2002).

## References

- ARNOLDS, E., 2005: *Conocybe*. – In NOORDELOOS, M. E., KUYPER, T. W., VELLINGA, E. C., (Eds.): Flora Neerlandica 6. – Boca Raton: Taylor & Francis.
- BON, M., 1990: Combinaisons nouvelles et validations. – Doc. Mycol. 20/78: 37-40.
- 1991: Espèces „galéro-naucoroïdes“: Stat. et comb. nov. (Clé en préparation D. M. no 84). – Doc. Mycol. 21/83: 37-39.



- DONK, M. A., 1949: Nomina generica conservanda and confusa for *Basidiomycetes* (Fungi). – Bull. Bot. Gard. Buitenzorg **17**: 155-197.
- FAYOD, V., 1889: Prodrome d'une histoire naturelle des Agaricinées. – Ann. Sci. Nat. Bot. VII, **9**: 181-411.
- HALLEN, H. E., WATLING, R., ADAMS, G. C., 2003: Taxonomy and toxicity of *Conocybe lactea* and related species. – Mycol. Res. **107**: 969-979.
- HAUSKNECHT, A., 2003: Beiträge zur Kenntnis der *Bolbitiaceae* 9. *Conocybe* Sekt. *Mixtae*. – Österr. Z. Pilzk. **12**: 41-83.
- VAURAS, J., KYTÖVUORI, I., OHENOJA, E., 2005: Die Gattung *Conocybe* in Finnland. – Karstenia **45**: 1-32.
- HORAK, E., 1968: Synopsis generum *Agaricalium* – Die Gattungstypen der *Agaricales*. – Beiträge zur Kryptogamenflora der Schweiz 13. – Wabern, Bern: Buechler.
- HAUSKNECHT, A., 2002: Notes on extra-European taxa of *Bolbitiaceae* (*Agaricales*, *Basidiomycota*). – Österr. Z. Pilzk. **11**: 213-264.
- KÜHNER, R., 1935: Le genre *Galera*. – Paris: Lechevalier.
- MONCALVO, J.-M., VILGALYS, R., REDHEAD, S. A., JOHNSON, J. E., JAMES, T. Y., AIME, M. C., HOFSTETTER, V., VERDUIN, S. J. W., LASSON, E., BARONI, T. J., THORN, R. G., JACOBSSON, S., CLÉMENÇON, H., MILLER, JR., O. K., 2002: One hundred and seventeen clades of agarics. – Molec. Phylogenet. Evol. **23**: 357-400.
- SINGER, R., 1947: New genera of Fungi III. – Mycologia **39**: 77-89.
- 1948: Diagnoses Fungorum novorum *Agaricalium*. – Sydowia **2**: 26-42.
- 1950: New and interesting species of *Basidiomycetes* III. – Sydowia **4**: 130-157.
- „1949“ 1951: The *Agaricales* in modern taxonomy, 1<sup>st</sup> edn. – Lilloa **22**: 1-831.
- 1953: Quelques Agarics nouveaux de l'Argentine. – Rev. Mycol. Paris **18**: 3-23.
- 1958: Monographs of South American basidiomycetes I. – Lloydia **21**: 159-299.
- 1962 a: Diagnoses Fungorum novorum *Agaricalium* II. – Sydowia **15**: 45-83.
- 1962 b: The *Agaricales* in modern taxonomy, 2<sup>nd</sup> edn. – Weinheim: Cramer.
- 1969: Mycoflora Australis. – Nova Hedwigia **29**: 1-405.
- 1986: The *Agaricales* in modern taxonomy, 4<sup>th</sup> edn. – Koenigstein: Koeltz.
- SMITH, A. H., 1941: Studies of North American Agarics 1. – Contrib. Univ. Mich. Herbarium **5**: 1-73.
- WALTHER, G., GARNICA, S., WEISS, M., 2005: The systematic relevance of conidiogenesis modes in the gilled *Agaricales*. – Mycol. Res. **109**: 525-544.
- WATLING, R., 1966: Observations on the *Bolbitiaceae*. IV. A new genus of gastromycetoid fungi. – The Michigan Botanist **7**: 19-24.
- 1974: Flore illustrée des champignons d'Afrique Centrale 3. *Bolbitiaceae*. – Meise: Jardin Botanique de Belgique.
- 1975: Observations on the *Bolbitiaceae* 12: The affinities of two anomalous species. – Notes Roy. Bot. Gard. Edinburgh **34**: 245-251.
- 1976 a: Observations on the *Bolbitiaceae*, 13 & 14. – Kew Bull. **31**: 587-594.
- 1976 b: Observations on the *Bolbitiaceae* XV. The taxonomic position of those species of *Conocybe* possessing ornamented basidiospores. – Rev. Mycol. **40**: 31-37.
- 1977: Observations on the *Bolbitiaceae* 16: *Conocybe* sect. *Giganteae*. – Notes Roy. Bot. Gard. Edinburgh **35**: 281-295.
- 1979: Observations on the *Bolbitiaceae* XVII. Volvate species of *Conocybe*. – Sydowia, Beih. **8**: 401-415.
- 1982: *Bolbitiaceae*: British Fungus Flora Agarics and Boleti 3: *Agrocybe*, *Bolbitius* & *Conocybe*. – Edinburgh: Royal Botanic Garden.
- 1986: Observations on the *Bolbitiaceae*. 28. The *Conocybe pubescens* (C. GILLET) KÜHNER complex. *Galera neoantipus* and its various interpretations. – Bol. Soc. Micol. Madrid **11**: 91-96.
- 1994: Observations on Malaysian *Bolbitiaceae* with records from Solomon Islands. – Garden's Bull. Singapore **45**: 359-381.
- GREGORY, N., 1981: Census catalogue of world members of the *Bolbitiaceae*. – Biblioth. Mycol. **82**.

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