

A confusing duo: *Calocybe cerina* and *Callistosporium pinicola* (Agaricales)

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The name *Calocybe cerina* has recently been applied for two different species of agarics. After studying collections from different European countries it is concluded that the true *Calocybe cerina* is very close to *C. chrysenteron* and best regarded as a variety. The new combination *Calocybe chrysenteron* var. *cerina* is proposed and a full description of that taxon is given. The majority of collections, identified as *C. cerina*, appear to belong to a fungus, provisionally described by Bon as *Callistosporium luteoolivaceum* fo. *minor*. It is described here as a new species: *Callistosporium pinicola*. *Calocybe juncicola* is another species that might be confused with the two species mentioned before and therefore a full description is provided. The status of the genera *Rugosomyces* and *Calocybe* is discussed. The new combinations *Calocybe obscurata* and *Calocybe pudica* are made.

Key words: *Callistosporium*, *Calocybe*, *Rugosomyces*

INTRODUCTION

In The Netherlands in recent years several collections were made of a fairly small, white-spored agaric with an orange-brown pileus and crowded, orange-yellow lamellae, growing on stumps of coniferous trees. It was initially identified as *Calocybe cerina* (Pers.: Fr.) Donk (Arnolds, Becker 1993). An important indication was the presence of granules in the basidia that were apparently siderophilous, staining dark violet in acetocarmine with addition of iron. However, some characters were deviating from most descriptions in literature, in particular the striking red to violet staining of all tissues in KOH and ammonia, the complete absence of clamp-connections and the lignicolous habitat, suggesting that it could be an undescribed taxon.

Recently I came across descriptions of *Callistosporium luteoolivaceum* var. *minor* M. Bon ined. (Ludwig 2001; Wilhelm 2003) that showed striking resemblance with our material, e.g. the red staining in ammonia and KOH. In this paper I shall try to unravel the identity of the collected material and I will discuss the taxonomic position of *Calocybe cerina* (Pers.: Fr.) Donk and the related *C. juncicola* (Heim) Sing.

WHAT IS *CALOCYBE CERINA*?

Agaricus cerinus was initially described by Persoon (1801: 321) as a fairly small agaric, growing in pine forests (substrate not explicitly mentioned) with dark wax-yellow ('flavo-cerinus opacus'), fleshy, flattened to depressed pileus; crowded, narrow lamellae and a taste becoming bitter after a while. In his sanctioning description Fries (1821:89) mainly copied Persoon's description, adding that the context and spore print are white. Most authors have interpreted the name as a species close to or identical with *Calocybe chrysenteron* (Bull.: Fr.) Sing. Persoon (1801) treated *Agaricus chrysenterus* Bull. immediately after his *A. cerinus*. The two taxa are microscopically characterized by e.g. very small, ellipsoid spores, a pileipellis in the form of a cutis with transitions to a trichodermium, and presence of clamp-connections.

A different interpretation of *Agaricus cerinus* was published by Arnolds & Becker (1993) and accepted by e.g. Kalamees (1995, 2004). The basidiocarps of that fungus occur on dead wood, are slightly smaller and thin-fleshed, their tissues turn reddish in alkaline solutions and clamp-connections are absent.

After comparing collections and modern descriptions of these taxa I believe that the first-mentioned interpretation is in better agreement with the original diagnosis, mainly in view of the larger size of the basidiocarps, the thicker context and the substrate on soil and litter. Therefore I present first a description of this little-known fungus.

Calocybe chrysenteron (Bull.:Fr.) Sing. var. *cerina* (Pers.: Fr.) Arnolds **nov. comb.** – Fig. 1.

Basionym: *Agaricus cerinus* Pers.: Fr., Syst. mycol. 1: 89. 1821.

Agaricus cerinus Pers., Syn. meth. Fung.: 321. 1801; *Agaricus cerinus* Pers.: Fr., Syst. mycol. 1: 89. 1821; *Tricholoma cerinum* (Pers.:Fr.) Qué., Champ. Jura Vosges 1; 81. 187; *Tricholoma chrysenteron* subsp. *cerinum* (Pers.: Fr.) Konr. & M., Icon. sel. Fung. 3: pl. 267, fig. 2. 1937; *Calocybe cerina* (Pers.: Fr.) Donk in Beih. Nova Hedwigia 5: 43. 1962; *Rugosomyces cerinus* M. Bon in Doc. mycol. 21 (82): 66. 1991. – *Tricholoma pseudoflammula* J. Lange in Dansk bot. Ark. 8(3): 24. 1933; Spec. Pl.: 1173. 1753; *Calocybe pseudoflammula* (J. Lange) Sing. in Sydowia 15: 47. ('1961') 1962; *Rugosomyces pseudoflammula* (J. Lange) M. Bon in Doc. mycol. 21(82): 65. 1991.

Excl. – *Calocybe cerina* sensu Arnolds & Becker in Coolia 36: 70-73, fig. 1. 1993 (*Callistosporium pinicola*); sensu Dermek in Fung. rar. Ic. col. 17: 10. 1987 (*C. fallax*); sensu Kalamees in Scripta mycol. 18: 84. 2004 (*Callistosporium pinicola*); *Rugosomyces pseudoflammula* sensu M. Bon, Fl. Mycol. Eur. 5, Collybio-Marasmioides: 110. 1999 (*C. chrysenteron*).

Sel. icon. – Cetto, Funghi Vero 3: pl. 1024. 1979; Flora Batava 25 : pl. 1994a. 1920; Konr. & M., Icon. sel. Fung. 3: pl. 267, fig. 2. 1927; J. Lange, Fl. Agar. Dan. 1: pl. 24B. 1935 (as *T. pseudoflammula*); Schweizer Pilzt. 5: pl. 42. 1972.

Sel. descr. & figs. – M. Bon, Fl. Mycol. Eur. 5, Collybio-Marasmioides: 111. 1999; Konr. & M., Icon. sel. Fung. 3: pl. 267 II. 1927; J. Lange, Fl. Agar. Dan. 1: 57. 1935 (as *T. pseudoflammula*).

Pileus 12-40(-50) mm, convex at first, with thin, involute margin, then plano-convex to flattened or slightly depressed with straight, often undulating margin, with or without weak umbo, not hygrophanous, brownish yellow, brownish orange to orange-brown from the beginning (e.g. K. & W. 5B7, 5C8, 6C7, 6C8), dull and dry,

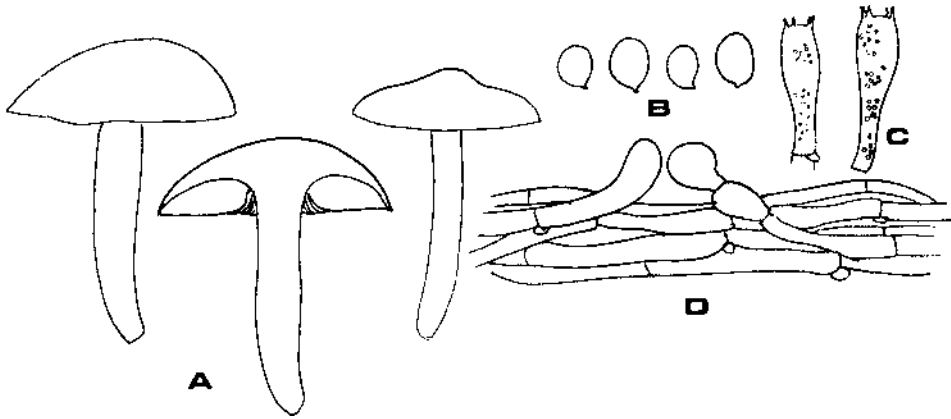


Fig. 1. *Calocybe chrysenteron* var. *cerina*. A. Basidiocarps x 1; B. Spores x 2000; C. Basidia x 1000; D. Pileipellis x 1000 (all from Arnolds 05 87).

smooth to slightly tomentose, especially at centre, not striate. Lamellae, L 38-60, l 1-7, adnexed, emarginate to adnate, very crowded, segmentiform, up to 5 mm broad, thin, lemon- to golden-yellow or orangeish yellow, with concolorous, entire edge. Stipe 20-50 x 2-6(-10) mm, cylindrical or compressed, often tapering to base, stuffed to fistulose, concolorous with pileus, sometimes weakly yellow striate lengthwise, at apex pruinose, at base white tomentose or strigose-hairy. Context whitish, pale yellow to lemon-yellow. Smell farinaceous when cut; taste first farinaceous, then often more or less bitter. Spore print white.

Spores 2.5-4.0(-4.5) x 2.0-3.0 μm , av. 3.1-3.5 x 2.3-2.5 μm , Q 1.2-1.5, Qav. 1.3-1.4, broadly ellipsoid to ellipsoid. Basidia 17-23 x 4.0-7.0 μm , clavate, 4-spored, with numerous small granules. Lamella edge fertile. Hymenophoral trama subregular, made up of hyphae with cylindrical or slightly inflated elements, 3.0-12 μm broad. Pileipellis a cutis of repent hyphae, 2.0-6.0 μm broad, often with some broader, ellipsoid to subglobose cells, often at centre with trichodermial tufts of erect and ascending hyphae, with yellowish intracellular pigment. Stipitipellis a cutis, made up of repent hyphae, 2.0-4.0 μm wide, at stipe apex with clusters of undifferentiated, erect hyphal tips up to 40 μm long, 2.0-5.0 μm wide. Clamp-connections present.

Chemical reactions: No part of basidiocarp reddening with KOH or ammonia. Granules in basidia staining dark purple in acetocarmine with iron (siderophilous).

Habitat and distribution: Mainly on needle litter in coniferous forests (*Picea*, *Abies*), also reported under broad-leaved-trees (*Quercus*); on mesic to dry, calcareous soil. Probably widespread in Europe but much rarer than var. *chrysenteron*. Exact distribution unknown in view of taxonomic confusion (see notes). With certainty recorded from Denmark, Germany, Switzerland (Konrad & Maublanc 1937) and The Netherlands (Flora Batava, 1920).

Collections examined. – DENMARK: Rubjerg, Knude Plantage, 26 Sept. 1990, J. Vesterholt 90-505 (C); Same loc., 21 Oct. 1991, J. Vesterholt 91-801 (C) – GERMANY: Bavaria, Frankische Schweiz, Ebermannstadt, Aufsesstal, 19 Sept. 2005, E. Arnolds 05-87 (L).

The studied collections differ from typical *Calocybe chrysenteron* morphologically only in the duller, more brownish colours of pileus and stipe and the paler context. In var. *chrysenteron* all parts of the basidiocarps are bright yellow to orange-yellow (e.g. Ludwig 2000). In addition var. *cerina* seems to be almost confined to coniferous forests, whereas var. *chrysenteron* is mostly (but not always) found in deciduous forests. Both taxa are calciphilous. Some modern authors synonymize *C. chrysenteron* and *C. cerina* (e.g. Ludwig 2001), others treat them as separate species (e.g. Bon 1999; Horak 2005). The differences are small but seem to be rather constant and warrant in my opinion a distinction in the rank of variety.

Many modern authors regard *Tricholoma pseudoflammula* J. Lange as a synonym of *Calocybe chrysenteron* (e.g. Ludwig 2001; Kalamees 2004), but Lange's plate (24B) is typical of var. *cerina* in view of the orange-brown pileus, already in young basidiocarps, and the pale context.

For differences with *C. cerina* sensu Arnolds and Becker (*Callistosporium pinicola*) see notes on that species.

A DOUBLE OF *CALOCYBE CERINA*: *CALLISTOSPORIUM PINICOLA*

Callistosporium pinicola Arnolds **nov. spec.** – Fig. 2.

Pileus (5-)10-30 mm convexus margine involutus, dein planiusculus vel depressus, haud vel leviter hygrophanus, flavo-brunneus, aurantio-brunneus, rufo-brunneus, numquam striatus, siccus, centro tomentosus. Lamellae adnatae vel emarginatae, confertae, tenuae, flavae vel aurantio-flavae. Stipes (12-)14-32 x (1,5-)2-3,5 mm, cylindricus vel compressus, pileo subconcolorus. Caro tenuis, fragilis, pallide flava. Odor nullus vel farinaceus. Sapor nullus vel amarescens.

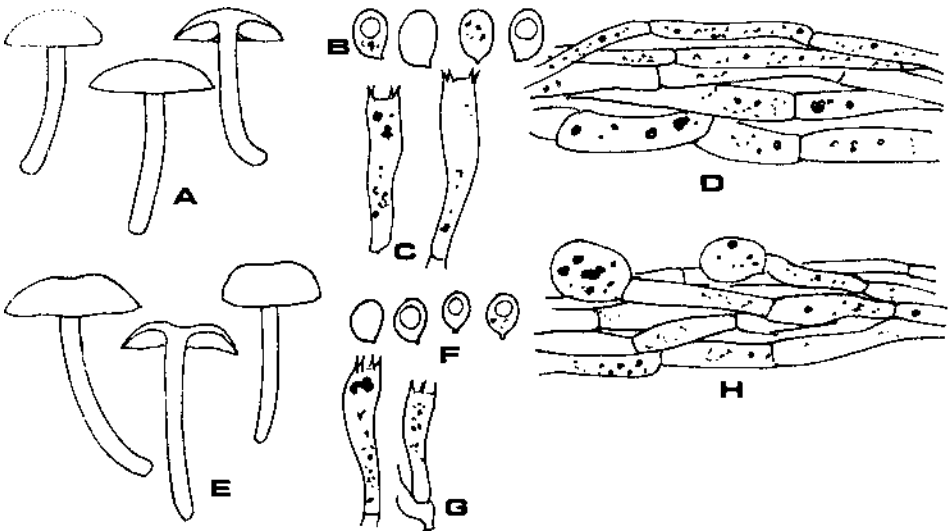


Fig. 2. *Callistosporium pinicola*. A, E. Basidiocarps x 1; B, F. Spores x 2000; C, G. Basidia x 1000; D, H. Pileipellis x 1000 (A D from Arnolds 6100 (holotype), E H form A. Becker, 6 Oct. 1990).

Sporae (2,5-)2,8-4,7 x 2,0-3,5 μm , ellipsoideae vel late ellipsoideae, laeves, hyalinae, saepe corpusculis xanthis vel brunneis. Basidia 12-25 x 3,5-6,0 μm , clavatae, tetraspora. Lamellarum trama regularis. Cystidia nulla. Pileipellis cutis vel trichodermium, hyphis 2,0-5,5 μm latis, interdum ex cellulis inflatae ad 8,0 μm . Fibulae absentes. Basidia, trama et pileipellis granulis numerosis brunneis in aqua, rubescentis vel violascentis in KOH et ammonia.

Habitatio ad truncos putridos coniferarum. Aestate- automno.

Holotypus: 'The Netherlands, Dwingeloo, Lheederzand, 4 Oct. 1990, E. Arnolds 6100' (L).

Synon.: *Callistosporium xanthophyllum* (Malenc. & Bert) M. Bon fo. *minor* M. Bon ad int., in Flore mycol. Europe 2: 83. 1991 (invalid, without latin diagnosis and without designation of type).

Misapplied names: *Calocybe cerina* sensu Arnolds & Becker in Coolia 36: 70. 1993; sensu Kalamees in Scripta mycol. 18: 84. 2004.

Sel. plates. – Ludwig, Pilzkompedium 1: pl. 15, fig. 6.2 A, C. 2000 (as *Callistosporium luteoolivaceum* var. *minor* M. Bon ined.); Wilhelm in Schweiz. Z. Pilzk. 81: 64. 2003 (as *Callistosporium luteoolivaceum* var. *minor* M. Bon).

Sel. descr. & figs. – Arnolds & Becker in Coolia 36: 70-73, fig. 1. 1993 (as *Calocybe cerina*); Ludwig, Pilzkompedium 1: 37-38. 2001 (as *Callistosporium luteoolivaceum* var. *minor* M. Bon ined.); Wilhelm in Schweiz. Z. Pilzk. 81: 62-66. 2003 (as *Callistosporium luteoolivaceum* var. *minor* M. Bon).

Pileus (5-)10-30 mm, first convex with narrow, involute margin, then plano-convex to flattened with straight margin, often with slightly depressed centre, not or weakly hygrophanous, usually vividly yellow-brown, orange-brown, rusty-brown to red-brown, occasionally with olivaceous hue near centre (e.g. K. & W. 5D7, 6D7, 7E7; Mu. 5 YR 6/6, 10 YR 4/6, 5/8), rarely entirely butter-yellow (K. & W. 4A5), not striate, dry, smooth or slightly radially fibrillose, often at centre tomentose. Lamellae, L 28-36, l (1-)3-7, adnate to strongly emarginate, crowded to very crowded, segmentiform, up to 4 mm broad, thin, butter-yellow, golden-yellow to yellowish orange (Mu. 2.5 Y 6/8; K. & W. 4A5, 5C6, 4C6), with concolorous, entire edge, becoming dark red-brown to almost black in exsiccata. Stipe (12-)14-32 x (1.5-)2-3.5 mm, cylindrical or sometimes compressed, solid or narrowly fistulose, concolorous with pileus or paler yellow-brown, slightly aerenchymatic at first, then smooth or white striate lengthwise, at apex slightly pruinose, at base often white tomentose. Context in pileus thin, up to 2 mm thick, fragile, concolorous with surface, inside stipe pale yellow. Smell almost absent or weakly farinaceous; taste mild to slightly bitter. Spore print pale cream-coloured.

Spores (2.5-)2.8-4.5 x 2.0-3.5 μm , av. 3.0-4.2 x 2.3-3.4 μm , Q 1.1-1.5(-1.8), Qav. 1.2-1.4, in majority broadly ellipsoid or ellipsoid, some subglobose or oblong, smooth, not amyloid, in water colourless or with yellow, refractive body, in part also with brown granules ('necropigment'), staining reddish in ammonia and KOH, dark red to violet-brown in congo red and acetocarmine. Basidia 12-25 x 3.5-6.0 μm , clavate, 4-spored, in water with numerous brown granules and larger clots, staining like spores. Lamella edge fertile. Hymenophoral trama subregular, made up of rather narrow hyphae with cylindrical or slightly inflated elements, 13-90 x 3.0-14 μm , with numerous brown granules and clots. Pileipellis mainly a poorly differentiated cutis, made up of repent, interwoven hyphae, 2.0-5.5 μm broad, with yellow intracellu-

lar pigment, towards the centre often with trichodermial fascicles of ascending and erect hyphae, often with ellipsoid to subglobose terminal cells up to $8.0\ \mu\text{m}$ wide, with brown granules and clots. Stipitipellis a cutis, made up of repent hyphae, $2.0\text{--}4.0\ \mu\text{m}$ wide. Clamp-connections absent.

Chemical reactions: all parts of the fresh basidiocarp turning immediately dark red-brown to violet-brown with KOH 5% and 10% ammonia (macroscopically); preparations of all tissues turning immediately violet in KOH 5% and reddish in 10% ammonia, also staining surrounding liquid; granules and clots becoming vinaceous red or dark violet. Granules staining dark purple in acetocarmine with iron (seemingly siderophilous).

Habitat and distribution: Saprotrophic, solitary or in small groups, on strongly decayed stumps or dead trunks of coniferous trees, mainly recorded from *Pinus sylvestris*, also on *Pinus pinea* and *Picea abies*, in coniferous and mixed stands, mainly on acidic, sandy and loamy soils. July–Nov. Apparently widespread but rare in Central-Europe; recorded from The Netherlands, southern and eastern Germany (Ludwig 2001; Wilhelm 2003), Switzerland (Kalamées 2004, as *C. cerina*), Austria (Kalamées 2004, as *C. cerina*), France (Wilhelm 2003; Bon 1995) and Italy.

Collections examined. AUSTRIA: Steiermark, Gleichenberg, Trautmannsdorf, 21 Aug. 2003, W. Wofar & A. Hausknecht (WU, as *Calocybe cerina*). – FRANCE: Elsass, Hardt, 16 Sept. 1998, M. Wilhelm 596 (herb. Wilhelm); Sondersdorf, 31 July 2000, M. Wilhelm 709 (herb. Wilhelm); Oltingue, 27 Aug. 2002, M. Wilhelm 793 (herb. Wilhelm). – ITALY: Tuscany, Orbetello, Bosco di Patanella, 27 Oct. 1987, Th. W. Kuyper 2804 (L, as *Calocybe cerina*). — THE NETHERLANDS: Dwingeloo, Lheederzand, 4 Oct. 1990, E. Arnolds 6100 (L, as *Calocybe cerina*); Smilde, Hardersbosch, 13 Nov. 1991, E. Arnolds 6232 (L, as *Calocybe cerina*); Diever, State Forest Smilde, 3 Nov. 1986, B. de Vries 5193 (L, as *Calocybe spec.*); Diever, State Forest Smilde, 31 Aug. 1992, J. Baar 92/11 (L, as *Calocybe chrysenteron*); Ede, estate Roekel, 21 Sept. 2002, P.J. Keizer s.n. (L, as *Calocybe cerina*); Bergen-Schoorl, State Forest, A.G. Becker, 6 Oct. 1990 (L, as *Calocybe cerina*).

Callistosporium pinicola does not belong to the genus *Calocybe* in view of the presence of small granules and larger clots of brown necropigment in the basidia, spores trama and pileipellis, as well as by the complete absence of clamp-connections. However, the necropigment can only be recognized as such in preparations in water (also of exsiccata), because it is immediately turning red to violet in ammonia and KOH. Since exsiccata are usually revived in these solutions the brown pigment is easily overlooked in dried specimens. Moreover the necropigment is strongly staining purple with acetocarmine, thus mimicking the siderophilous granules of *Calocybe* species. Therefore it is not surprising that the majority of herbarium collections, identified as *Calocybe cerina*, appears to belong to *Callistosporium pinicola*. In this context it is interesting to note that Maire (1937) described *Callistosporium luteolivaceum* under the name *Tricholoma chrysenteron* (*Calocybe chrysenteron*) var. *olivascens* Maire (Redhead 1982). Apparently confusion between the two genera has occurred before.

The presence of necropigment, the red staining of tissues in KOH and ammonia and the absence of clamp-connections are all characters of the genus *Callistosporium* Sing. The present species belongs to subgenus *Callistosporium* in view of the crowded lamellae, small, ellipsoid spores, short basidia and the pigment not turning blue

in ammonia (Bon, 1991). Taxonomy and nomenclature of this group are still rather controversial. Bon (1991) distinguished two species, *C. xanthophyllum* (Malenc. & Bert.) M. Bon and *C. elaeodes* (Romagn. ex) M. Bon, but Redhead (1982) and Noordeloos (1995) united these taxa in one species and synonymised it with the North-American *C. luteoolivaceum* (Berk. & Curtis) Sing, which name has priority in that case. Ludwig (2001) described *C. foetens* E. Ludwig as additional new species in this subgenus, characterized by a strong unpleasant smell.

Callistosporium pinicola differs from all species mentioned above in the first place by the very small spores. Ludwig (2001) described the spores of *C. luteoolivaceum* as 5-5.5(-6.5) x 3.5-4 μm and Bon (1991, as *C. xanthophyllum*) as (5.0-)5.5-6.5(-7) x (3-)4-4.5(-5) μm . Spores in the type collection of *C. elaeodes* measured 6.5-7.5 x 3.5-4.4(-5.0) μm (Bon 1976). In addition it is striking that the basidiocarps of *C. pinicola* are generally lacking green colours, so characteristic for other species of *Callistosporium*. Only in one of the studied collections a weak olivaceous tone was observed in the centre of the pileus. The habitat on stumps and trunks of coniferous trees is also characteristic for *C. pinicola*. Other species are usually growing on deciduous wood or litter. In view of these characteristics the identity of the collection, depicted by Ludwig (2000) in Pl. 6.2 B as *C. luteoolivaceum* var. *minor*, is in my opinion doubtful since the pileus is distinctly green and the spores are described as larger: 4-5 x 3-4 μm .

In the field *Callistosporium pinicola* may also be mistaken for a species of *Simocybe* or *Gymnopilus*.

THE TAXONOMIC POSITION OF *CALOCYBE JUNCICOLA*

Next to *Calocybe cerina* sensu Arnolds & Becker, there is a second European species of *Calocybe* in which red staining of tissues in alkaline solutions has been reported, viz. *Calocybe juncicola* (R. Heim) Sing. (Moreno 1995). Since this reaction is considered a characteristic feature of the genus *Callistosporium*, I have examined two collections of that species in order to re-evaluate its taxonomic position.

Calocybe juncicola (R. Heim) Sing. in Sydowia 15: 47. ('1961') 1962. – Fig. 3.

Tricholoma chrysenteron var. *juncicola* R. Heim in Treb. Mus. Cienc. nat. Barcelona 15: 101. 1934; *Calocybe chrysenteron* var. *juncicola* (R. Heim) G. Moreno in Cryptog. Mycol. 15: 240. 1995; *Rugosomyces chrysenteron* var. *juncicolus* (R. Heim) M. Bon in Doc. Mycol. 21 (82): 65. 1991.

Sel. icon. – Cetto, Funghi Vero 6: pl. 2414. 1989; Ludwig, Pilzkompedium 1: pl. 19, fig. 7.9. 2000.

Sel. descr. & figs. – Hauskn. & Zuccherelli in Boll. Gruppo micol. G. Bres. 1994: 68-69, fig. 1 a-c. 1994; Ludwig, Pilzkompedium 1: 48. 2000; G. Moreno in Cryptog. Mycol. 15: 240-241, Fig. 1. 1995.

Pileus 10-30 mm, truncate campanulate to hemispherical at first, then convex to flattened, with or without umbo, often irregular, not hygrophanous, not striate, bright orange to golden yellow or brownish orange (e.g. K. & W. 4A8, 6A6, 6A7, 6B8), uniformly coloured or with slightly paler margin, slightly aerenchymatic in places when young, glabrous and dry. Lamellae, L 30-40, l 3-7, emarginate to adnexed, moderately crowded to crowded, segmentiform, up to 4 mm broad, thin, vividly yellow, butter-yellow or ochre-yellow (K. & W. 4A5/6, 4B6), with concolor-

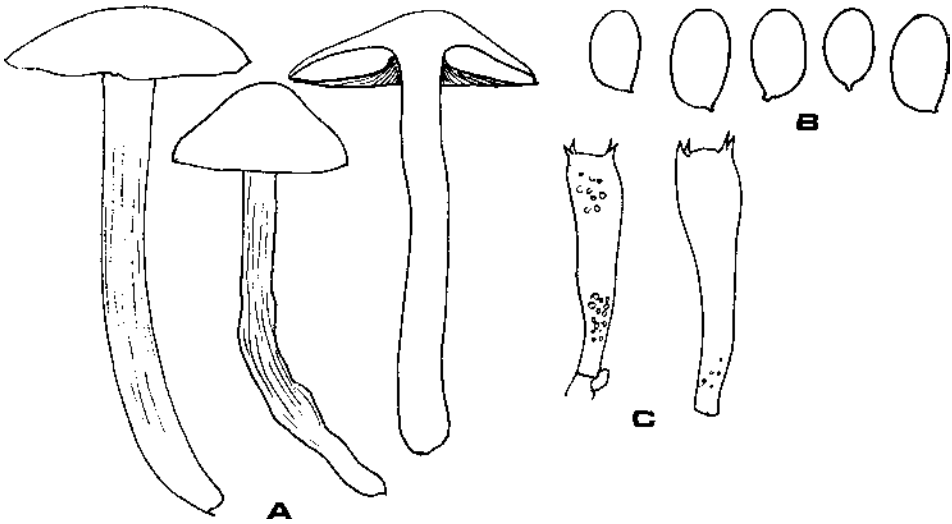


Fig. 3. *Calocybe juncicola*. A. Basidiocarps x 1; B. Spores x 2000; C. Basidia x 1000 (all from Noordeloos 20266).

ous, entire or eroded edge. Stipe 30-60 x 2-10 mm, subcylindrical or tapering towards base, often compressed or twisted, often slightly broader towards apex or base, solid, paler than the pileus, pale yellow, butter-yellow to brownish yellow (e.g. K. & W. 4A4, 5, 6, 4B6), fibrillose striate lengthwise, appearing pruinose by aerenchymatic tissue. Context in pileus up to 4 mm thick, pale yellow. Smell and taste strongly farinaceous, taste slightly adstringent. Spore print unknown.

Spores (3.5-)4.5-6.5 x (2.5-)3.0-3.7(-4.0) μm , av. 5.0-5.4 x 3.2-3.3 μm , Q 1.3-1.9, Qav. 1.5-1.65, ellipsoid or ellipsoid-oblong, smooth, not amyloid, in water and ammonia colourless. Basidia 25-36 x 5.0-8.0 μm , clavate, 4-spored or a few 2-spored, in part with few to fairly numerous small granules. Lamella edge fertile, but sometimes with scattered cylindrical basidiola, 18-23 x 4.0-5.0 μm . Pleurocystidia absent. Hymenophoral trama subregular, made up of rather narrow hyphae with cylindrical or slightly inflated elements, 2.0-14 μm broad. Pileipellis a poorly differentiated cutis, made up of repent, interwoven hyphae, 1.5-5.0 μm broad, in places with ascending to erect hyphae, with pale yellow intracellular pigment. Stipitipellis a cutis, made up of repent hyphae, 2.0-4.0 μm wide. Clamp-connections abundant in hymenium and trama.

Chemical reactions: Preparations of all tissues turning immediately reddish to violet in KOH 5% and ammonia 10%; macroscopic reactions on fresh basidiocarps unknown. Granules in basidia staining dark purple in acetocarmine with iron (siderophilous).

Habitat and distribution: Saprotrophic, usually fasciculate, on roots and litter in dense tussocks of *Juncus* spp. (e.g. *Juncus maritimus*, *Juncus acutus*) in open forests and dune slacks. Nov. Apparently very rare in southern Europe, known from Italy and Spain.

Collections examined. – ITALY: Ravenna, Pineta San Vitale, Bardello, 6 Nov. 2000, A. Hausknecht et al. (WU no. 20752); same dat. and loc., M.E. Noordeloos 20266 (L).

The reddish staining of tissues in alkaline solutions was only reported by Moreno et al. (1995), who mentioned a violet discoloration of the solution when making a preparation of the lamellae in KOH. The reaction was not mentioned in other descriptions (Hausknecht, Zuccherelli 1994; Cetto 1989; Ludwig 2001) or in the descriptive notes accompanying the collections. The reddening in ammonia and KOH is very similar to that of *Callistosporium pinicola*, although slightly weaker. Nevertheless, *Calocybe juncicola* seems not to be related to the latter species in view of the absence of brown necropigment, the abundance of clamp-connections and the presence of truly siderophilous granules in the basidia, although these granules seem to be less numerous and striking than in other *Calocybe* species. Otherwise, *C. juncicola* differs from *C. chrysenteron* (incl. var. *cerina*) mainly in duller colours, striate stipe, larger and more elongate spores and specific habitat.

A second European species of *Calocybe* with violaceous red discoloration of tissues in KOH is *Rugosomyces pudicus* M. Bon & Contu, collected in moist forest of *Populus* on Sardegna (Contu, Bon 2000). It has small basidiocarps with a pinkish brown to yellow-brown pileus up to 20 mm, differing mainly from *C. juncicola* in immediate reddening of the context on exposure to the air and broader spores (5.0-6.0 x 3.5-4.5 μm) that are slightly rugulose, as was also demonstrated with SEM microscopy (Contu, Ortega 2001).

CALOCYBE OR RUGOSOMYCES?

The genus *Calocybe* was erected (but invalidly published) by Kühner (1938) in order to accommodate tricholomoid, white-spored agarics with basidia containing siderophilous granules in combination with vividly coloured basidiocarps. Donk (1962) validated this name and selected *Calocybe georgii* (L.) Kühner (= *C. gambosa* (Fr.: Fr.) Donk) as type species. Several authors have discussed the possible heterogeneity of this genus since. Kalamées (1992) has proposed the genus *Tricholomella* for *Calocybe constricta* (Fr.: Fr.) Sing., deviating from other species in presence of a partial veil, verrucose spores, large basidia and ecological preference for substrates with high ammonia content. This distinction was later confirmed by phylogenetic studies using molecular characters (Hoffstetter et al. 2002; Moncalvo et al. 2002).

The genus *Gerhardtia* was created by Bon (1994) for *Calocybe borealis* A. Riva (= *Lyophyllum incarnatobrunneum* Ew. Gerhardt), a species deviating in minutely verrucose spores and absence of clamp-connections. Since verrucose spores have also been observed in *Rugosomyces (Calocybe) pudicus* (Contu and Ortega 2001), the status of this genus seems questionable. The phylogenetic relationships with the rest of *Calocybe* (and *Lyophyllum*) has not yet been studied.

Earlier Raithelhuber (1979) erected the genus *Rugosomyces* for the two species of *Calocybe* with a cellular pileipellis (hymeniderm) instead of a pileipellis of slender hyphae (cutis): the type species *Rugosomyces onychinus* (Fr.) Raithelh. and *R. fallax* (Sacc.) M. Bon. This concept was adopted by e.g. Horak (2005), but Bon (1991) extended *Rugosomyces* to all small species with collybioid habit, a pileipellis

with more or less free ending hyphal tips, often with inflated cells, and mixed parietal and intracellular pigments. *Calocybe* was restricted by Bon (l.c.) to a few large, tricholomoid species with intracellular pigments. This concept was accepted by e.g. Kalamees (2004). However, molecular studies of the *Lyophylleae* have demonstrated that *Calocybe* (with the exception of *C. constricta*, possibly also *C. borealis*; see above) forms a single clade and is probably of monophyletic origin (Hoffstetter et al. 2002; Moncalvo et al. 2002). Therefore there seems to be no good reason to recognise *Rugosomyces* as a separate genus.

In this connection I propose two new combinations:

Calocybe pudica (M. Bon & Contu) Arnolds **comb. nov.**

Basionym: *Rugosomyces pudicus* M. Bon & Contu in Doc. Mycol. 29 (116): 35. 2000.

Calocybe obscurata (P. Karst.) Arnolds **comb. nov.**

Basionym: *Tricholoma cerinum* Pers. ssp. *obscuratus* P. Karst. in Meddeland. Soc. Fauna Fl. Fenn. 5: 43. 1879.

CALLISTOSPORIUM AND CALOCYBE

The genus *Callistosporium* is assigned to the *Tricholomatoideae* and not to the *Lyophylloideae* in view of the absence of siderophilous granules in the basidia. Also in phylogenetic analysis the genera seem not to be closely related to each other (Moncalvo et al. 2002). However, it might be interesting to study the relationships between these groups more closely in view of the remarkable convergence between some species. Also the chemical composition of the necropigment in *Callistosporium* deserves attention.

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Podwójna niejasność: *Calocybe cerina* i *Callistosporium pinicola* (Agaricales)

Streszczenie

Nazwa *Calocybe cerina* była ostatnio stosowana dla dwóch różnych gatunków grzybów agarikoidalnych. Na podstawie analizy materiałów z różnych krajów europejskich autor dochodzi do wniosku, że prawdziwie gatunek *Calocybe cerina* jest bardzo bliski *C. chrysenteron* i proponuje nową kombinację *Calocybe chrysenteron* var. *cerina* podając opis nowego taksonu. Większość badanych kolekcji określonych jako *C. cerina*, okazała się taksonem, który Bon opisał prowizorycznie jako *Callistosporium luteoolivaceum* fo. *minor*. W nieniejszym artykule został on opisany jako nowy gatunek: *Callistosporium pinicola*. Opis pozwala wyraźnie odróżnić inny gatunek *Calocybe juncicola*. Równocześnie dyskutowany jest status rodzajów *Rugosomyces* i *Calocybe*. Podane są też nowe kombinacje *Calocybe obscurata* i *Calocybe pudica*.

