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Studies on the agaric genera Singerocybe n. gen. and Squamanita

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Descriptions are given of the new genus *Singerocybe* Harmaja (*Singerella* Harmaja 1974, non *Singeriella* Petrak 1959) and of the type species, *S. viscida* Harmaja. The type of *S. viscida* is from Finland. Two new combinations are made: *Singerocybe hydrogramma* (Bull. & Vent.: Fr.) Harmaja and *Singerocybe phaeophthalma* (Pers.) Harmaja. Two new Finnish localities of *S. hydrogramma* are reported, one of them being the most northern known for the species. The new species *Squamanita basii* Harmaja (type from Switzerland) and *S. umbilicata* Harmaja (type from Finland) are described. *S. basii* has been misidentified as the North American *S. paradoxa* (A.H. Smith & Sing.) Bas in Europe; it is known from 11 localities in Europe.

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Singerocybe Harmaja, n. gen.

Singerella Harmaja, Karstenia 14: 114. 1974 (non *Singeriella* Petrak, Sydowia 12: 252. 1959).

Generis Clitocybe *valde similis. Ab ea praesertim differt hyphis epicutis pilei cum bullulis magnitudine ca. 12–30 x 10–20 µm. — Typus: Singerocybe viscida* Harmaja, n. sp.

My previous attempt to establish a separate genus for *Clitocybe hydrogramma* (Bull. & Vent.: Fr.) Kumm. (and possible relatives) was unfortunate, as the generic name proposed by me in honour of Prof. Rolf Singer must be interpreted as a later homonym of Petrak's genus. Since Kuyper (1981) has thrown doubt on the current interpretation of *Agaricus hydrogrammus* Bull. & Vent.: Fr., I prefer formally to describe a new genus for the species in question, with a new species (see below) as the type, instead of proposing a *nomen novum* for *Singerella* Harmaja (type *A. hydrogrammus*).

For more information on *Singerocybe* and its relation to *Clitocybe* (Fr.) Staude, and for the synonyms of *A. hydrogrammus*, the reader can consult Harmaja (1969, 1974). It can be added that Bresinsky and Schneider (1975) reported that *S. hydrogramma* (and species considered by me to belong to *Lepista* (Fr.) W.G. Smith) differ from the true Clitocybes in being capable of assimilating nitrate-nitrogen (see also Harmaja 1978).

Singerocybe hydrogramma (Bull. & Vent.: Fr.) Harmaja, n. comb. —Fig. 1

Agaricus hydrogrammus Bull. & Vent., Hist. champ. France, 515. 1809: Fr., Syst. mycol. 1: 169. 1821. — Type: None designated; see Harmaja (1974) and Kuyper (1981).

Kuyper (1981) tries to prove that Fries cannot have found the present species in Sweden before 1821: for example, in his descriptions of *A. hydrogrammus* Fries failed to mention the unpleasant odour and the somewhat bitter taste. Kuyper also writes of the species: "Its northernmost distribution seems to coincide with that of calcareous *Fagus* woods", and refers to the distribution map of the species presented by me (Harmaja 1969). According to Kuyper, it is highly improbable that the species occurs in Femsjö. As regards Kuyper's statements the following facts may be noted:

(1) There is evidence that Fries did not always differentiate sufficiently between various odours; moreover, I have found that the present species may sometimes be odourless and have a mild taste;

(2) in Fennoscandia the species extends far north of the distribution area of not only *Fagus sylvatica* but also *Quercus robur* (Harmaja 1969 and below);

(3) even if *S. hydrogramma* did not occur in the Femsjö area, Fries could well have seen it in southernmost Sweden (Scania), which he is known to have visited prior to 1821.

Anyway, related taxa may occur, especially farther south (cf. *Agaricus phaeophthalmus* Pers. below).

In my thesis (Harmaja 1969), only one Finnish locality was given for *S. hydrogramma*; here I report two new localities; the species is new to the biological province of Varsinais-Suomi. The Lohja locality is situated in the hemiboreal zone, at its northern border, while the Lammi locality is in the southern boreal zone. The latter is the most northern locality where *S. hydrogramma* is known to occur in its whole area.

Specimens examined
Finland. *Varsinais-Suomi:* Lohja rural commune, Torhola, by the cave, rich predominantly deciduous (e.g. *Corylus avellana, Tilia cordata, Ulmus glabra, U. laevis*) woods on calcareous soil, accompanied by several calciphilous species such as *Clitocybe gilvaoides*, Grid 27°E: 6686:325, 8.X.1972 Harmaja (H), 24.IX.1978 Harmaja (H). *Etelä-Häme*: Lammi, Halila, Revasvuori, rich predominantly deciduous (e.g. *Corylus avellana, Populus tremula*) woods on southern slope, somewhat calcareous soils, together with some calciphilous species, Grid 27°E: 6774:396, 9.IX.1985 Harmaja (H).

Singerocybe phaeophthalma (Pers.) Harmaja n. comb.

Agaricus phaeophthalmus Pers., Mycol. Eur. 3: 72. 1828. — *Clitocybe phaeophthalma* (Pers.) Kuyper, Persoonia 11: 386. 1981. — Type: in L (see Kuyper 1981).

Singerocybe viscida Harmaja, n. sp.

Singerocybis hydrogrammi *satis similis. Ab ea differt praesertim colore pilei aquoso-griseolo, superficie pilei viscidulo et sporis dissimilibus. Sporae 5–7.5 x 2.6–3.7 µm. — Typus:* Finland. *Etelä-Häme:* Lammi, Kaitala, Mataramäki, near Taka-Killo, *Picea abies* woods, in decaying spruce needles, Grid 27°E: 6773:389, 3.IX.1987 Leena Myllys (H).

Pileus reaching at least 2.5 cm in diam, shallowly infundibuliform, hygrophanous, non-pruinose, weakly translucent-striate near margin when moist, greyish hyaline when moist, pale grey-brown when dry; surface slightly viscid, slightly shining and concentrically wrinkled when dry. *Stipe* ca. 4 x 0.3 cm, equal, curved, white with buff tinge in lower part; surface dry, glabrous; with scanty white mycelial tomentum at base. *Lamellae* fairly long decurrent, white, in 3 verticils, moderately close, elastic, densely intervenose with low anastomoses. *Odour* slightly acidulous when fresh (reminiscent of that of *Clitocybe candicans*). *Taste* mild. *Spores* 5–7.5 x 2.6–3.7 µm, single in mounts of dried gills, mostly oblong–narrowly ellipsoid, remainder lacrymoid, obovoid, and subfusiform, often very slightly constricted; wall hyaline, thin, smooth, inamyloid; contents ± homogeneous. *Basidia* 4-spored. *Cystidia* not differentiated. *Cortex of pileus* a cutis with partly gelatinized clamped hyphae ca. 2–4 µm in diam, inflating in places to conspicuous vesicles ca. 15–30 µm long and ca. 10–20 µm in diam; encrusted and membranal pigments absent. *Cortex of stipe*: vesicles present in places. *Ecology*: found in fertilized mesic mesotrophic *Picea abies* woods (approximately of *Oxalis–Myrtillus* site type), in decaying spruce needles; in early September.

This fungus was brought to me in the woods by one of the students attending my mycology field course. Though the white and whitish clitocyboid species are extremely numerous, it was immediately clear that an unusual and interesting find had been made. The fresh fruit body somewhat resembles *Camarophyllus niveus*, and is not unlike *Clitocybe candicans*, though that species possesses a pruinose pileus.

S. viscida is chiefly distinguished from *S. hydrogramma* (which has been found only ca. 8 km away; see above) by the pale and more grey-tinged pileus, the slightly viscid surface of the pileus (dry in the latter species), and the spores, which are narrower and mostly oblong–narrowly ellipsoid (in *S. hydrogramma*, mostly lacrymoid, resembling those of *Clitocybe gibba*) (the microscopic characters have been examined in Melzer's reagent). Whether the odour and taste are generally different in these species, can only be decided when more collections of *S. viscida* are available. Likewise, it remains to be ascertained whether this new species has a different substrate preference (*S. hydrogramma* almost always grows in decaying angiosperm leaves) or a more northern distribution area (the present locality lies in the southern boreal zone).

Squamanita Imbach

Squamanita paradoxa (A.H. Smith & Sing.) Bas, described from Oregon, North America, has been reported from ca. 11 localities in Europe (Herink 1954, Horak 1962, Ruotsalainen 1985, Krieglsteiner & Enderle 1987). I, too, believed that I had found this species in Lammi, South Finland, during my mycology field course in September 1981. However,

careful comparison between my fungus and *S. paradoxa* as described and illustrated in the protologue (Smith & Singer 1948, as *Cystoderma paradoxum* A.H. Smith & Sing.) revealed that my find cannot be conspecific with the North American one. The fungus from Lammi clearly represents a new species and is described as *S. umbilicata* Harmaja below. While choosing the name for my fungus, I became thoroughly acquainted with the reports of *S. paradoxa* from Europe. To my mind, all reports concern one species, which, however, is neither identical with the true *S. paradoxa* nor with my Lammi fungus. This *S. "paradoxa"* in the sense of the European reports proved likewise to be an undescribed species, and is described as *S. basii* Harmaja below. It is named in honour of Prof. C. Bas, Leiden; in his valuable study on *Squamanita*, he examined the material of Herink and Horak and included it in *S. paradoxa*, though he drew attention to a difference in odour between the North American and the European fungi and discovered some microscopic differences between them.

S. paradoxa coll. differs from the other species of the genus in possessing a well-developed universal veil composed of spherocysts (cf. Bas 1965). For this reason, the species was assigned to a genus of its own, *Dissoderma* (A.H. Smith & Sing.) Sing., as *D. paradoxum* (A.H. Smith & Sing.) Sing. However, the other species of *Squamanita* also appear to possess at least a reduced universal veil, and as they also otherwise show distinct affinity to *S. paradoxa* (cf. Bas 1965), I concur with Bas and do not consider that *S. paradoxa* coll. deserves a separate genus. It must be admitted, however, that *Squamanita* as treated by Bas (1965) appears somewhat heterogeneous.

The most curious feature relating to *Squamanita* is the presence of a basal ± bulbous part in the fruit body, which often appears as a deviating lower part of the stipe. The kind of nutrition of the species of the genus is unknown; one possibility to be considered is that they may be parasitic on the mycelia of other agarics. The basal bulbs in the different species could perhaps be explained as mixtures of mycelial and/or basidiocarp tissues and structures of the parasite and its host (often severely deformed as concerns the host). The upper stipe and the pileus in adult fruit bodies would chiefly represent the parasite species (cf. Reid 1983). The habit of the Squamanitas should be compared with that of e.g. *Psatyrella epimyces* (Peck) A.H. Smith (see Babos 1984). *S. schreieri* Imbach is often found together with *Amanita strobiliformis* and *A. echinocephala* (Bas 1965), *S. fimbriata* Gulden, Bend. & Brandr. was found among *Kuehneromyces mutabilis* (Gulden, Bendiksen & Brandrud 1977), and when young *S. paradoxa* coll. has structures surprisingly similar to those of *Cystoderma amianthinum* coll., among which it is commonly found.

The genus *Squamanita* was reported as new to Finland by Ruotsalainen (1985), who made finds of two species in 1980 and 1981, one of which was unknown. Considering that report and the present paper, three species of the genus are now known from Finland: *S. basii* Harmaja, *S. umbilicata* Harmaja, and *Squamanita* sp.

Squamanita basii Harmaja, n. sp.

Illustrations: Anon. 1981: Boll. Gr. Micol. G. Bresadola Trento 24: 127 (coloured); Bas 1965: Figs. 27–33; Horak 1962: Fig. 2a–b; Ruotsalainen 1985: 41.

A Squamanita paradoxa *praesertim differt stipitibus normaliter basiis confluentibus, velo universale crassiore cum fragmentis ad pileum longe persistentibus, granulis veli universale ad partem inferiorem stipitis diffusis, et odore conspicuo grato. Sporae ca. 8–11 x 4.5–5.5 µm. Chlamydosporae ellipsoideae-fusiformes. — Typus:* Switzerland. *Graubünden:* Dischmatal, Bündenwald, alt. 1600 m, coniferous woods, 27.IX.1961 E. Horak 61/152 (Herb. E. Horak).

S. basii differs from *S. paradoxa* in the usually confluent stipe bases, the thicker universal veil, remnants of which usually persist on the cap surface for a long time as patches, the diffuse granules of the velar coating of the lower part of the stipe (not tending to form horizontal rows), the strong sweet odour (weak in *S. paradoxa*), and in some microscopic features (see Bas 1965). A full description is in Horak (1962). Not much can yet be told about the ecology or distribution of *S. basii*, except that it seems always to grow in the company of coniferous trees.

Squamanita umbilicata Harmaja, n. sp.

— Fig. 2

Sicut Squamanita paradoxa *sed differt praecipue pileo umbilicato, granulis stipitis minoribus diffusis, lamellis angustis breviter decurrentibus, et sporis parce brevioribus. — Typus:* Finland. *Etelä-Häme:* Lammi, Hauhiala, hill SSE of Lamminjärvi, one dense group in *Picea abies* woods among decaying spruce needles, Grid 27°E: 6774:395, 8.IX.1981 Harri Harmaja (H).

Pileus reaching at least 1.5 cm in diam, umbilicate, non-hygrophanous, fairly dark violet; surface dry, appressedly fibrillose; very young caps covered by the soon vanishing universal veil. *Stipe* 3–4 x 0.3–0.8 cm; upper quarter thinner than the lower

Figs. 1–2. — 1: *Singerocybe hydrogramma*, natural size (9.IX.1985 Harmaja). — 2: *Squamanita umbilicata*, x 1.3 (type). Photo: Tuomo Niemelä.

part, blue-violet, distinctly fibrillose; lower part cylindrical or slightly clavate, covered by the persisting universal veil, ochre, or yellow-brown, finely granulose with diffuse particles; bases intimately cespitose but apparently not arising from a common bulbous body; pale brown mycelial tomentum present at bases. *Lamellae* shortly decurrent, fairly pale greyish violet, narrow; edges concolorous, entire. *Odour* indistinct (faintly reminiscent of *Cystoderma carcharias*?). *Taste* mild. *Spores* 7–9 x 4.5–5.5 µm, ellipsoid; wall hyaline, smooth, somewhat thickened, moderately dextrinoid. *Basidia* 4-spored. *Cystidia* absent. *Anatomy of basal part of stipe:* the covering layer composed of spherocysts and ellipsoid cells with brownish walls; chlamydospores arising immediately below the covering layer, 11–13 x 7.5–10 µm, ellipsoid to fusiform, with thickened dextrinoid walls; the trama composed of filamentous clamped hyphae (the microscopic characters were examined in Melzer's reagent). *Ecology:* found in mesic mesotrophic woods where *Picea abies* is dominant (approximately of *Oxalis–Myrtillus* site type) among decaying litter composed of spruce needles; in early September.

S. umbilicata differs clearly from *S. paradoxa* in some macroscopic features: the pileus is pronouncedly umbilicate (vs. convex-plane), the granules of the basal part of the stipe are smaller and ± diffuse (vs. larger and tending to be arranged in distinct horizontal rows), and the gills are narrower and short-decurrent. Minor differences between the species evidently exist in the spores, the chlamydospores, and the spherocysts of the universal veil, but to confirm these, larger material of both exceedingly rare species is needed.

The locality of *S. umbilicata* lies in the southern boreal zone, and is inhabited by several additional rare and interesting fungal species (cf. Harmaja 1984, 1985): *Mycena cyanorrhiza* Quél., *M. lammiensis* Harmaja, *M. picta* (Fr.) Harmaja, *Otidea formicarum* Harmaja, *O. tuomikoskii* Harmaja, *Psatyrella caput-medusae* (Fr.) Konr. & Maubl., and *Sowerbyella brevispora* Harmaja.

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