

THE AGARICALES OF ICELAND (ÍSLENZKIR HATTSVEPPIR) - VI

Icelandic species of Bolbitiaceae

OBSERVATIONS ON THE BOLBITIACEAE - 25

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ABSTRACT: Twenty two species referable to the Bolbitiaceae are recorded from Iceland, most of them for the first time. A total of one hundred and seven collections housed in the Natural History Museum in Akureyri have been examined.

Little work has been carried out on members of the Bolbitiaceae found in arctic communities although a few records exist for Greenland (LANGE, 1948; WATLING, 1977) and Svalbard (HUTHINEN & WATLING, unpubl. data). In general, members of the Bolbitiaceae prefer baserich soils with a relatively high nitrogen content (WATLING, 1964) and therefore characterize temperate to subtropical and mediterranean grasslands, woodlands on rendzina and mull soils (brown earth), and disturbed soils throughout the world; they are frequently associated with the activities of worms. The distribution of members of this family in northern climates is therefore rather restricted, as podsollic or immature mineral soils characterize these areas. However, even in these rather unfavourable sites they may be found as adventitious elements in the flora associated with dung of herbivores, around human habitation and in other rather ephemeral habitats.

Although the Icelandic members of some other groups of larger fungi have been dealt with previously e.g. Hygrophoraceae (HALLGRÍMSSON, 1974; Lepiotaceae, Gomphidiaceae, Paxillaceae and Crepidotaceae (HALLGRÍMSSON, 1973), the Bolbitiaceae is poorly known. This contribution therefore is an attempt to bring together the identities of the material housed in the Herbarium of the Natural History Museum at Akureyri (AMNH). The material was collected by Helgi Hallgrímsson and a few others during a period spanning 1960-

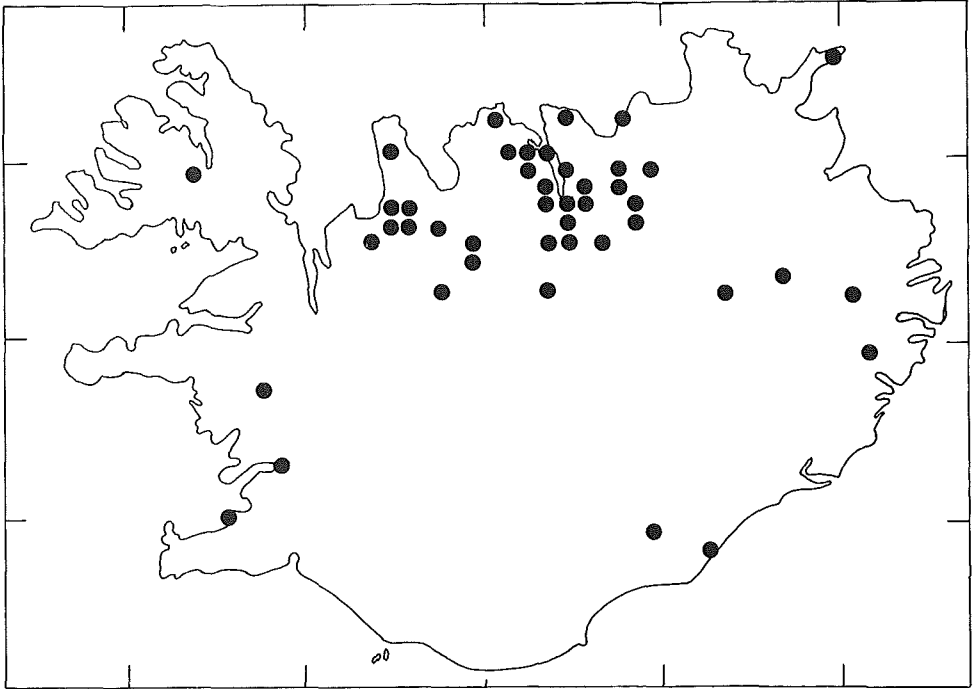


Fig. 1. Map of locations. Members of Bolbitiaceae have been found one or more times within grid points indicated.

1980. The map offered gives an idea as to the distribution pattern so far achieved. ISL in the text refers to the Icelandic grid system expressed in this map.

Nomenclature follows WATLING & GREGORY (1981) thus alleviating the necessity to give full citations. Abbreviations for districts are as follows: Eyf. = Eyjafjarðarsýsla; A.-Hún. = Austur-Húnavatnssýsla; Skag. = Skagafjarðarsýsla.

ENUMERATION OF SPECIES

AGROCYBE Fayod

AGROCYBE PALUDOSA (J.E. Lange) Kühner & Romagnesi. Fig.4, 7-9.

This species is apparently widespread in the northern half of Central Iceland during July and August in moderately wet land, marshland or mire with *Sphagnum*. It is found in similar localities in Shetland in the British Isles 61°N, and is not uncommon throughout mainland Europe. It is recognized by the medium sized basidiospores (generally 7-9.5 x 4.5-6µm), 4-spored basidia, presence of ampulliform pleurocystidia and, in the field, by its annulate stipe; from *A. praecox* (see below) it differs in its slender stature and habitat preferences; i.e. marshland.

A. paludosa grows in relatively base rich mires and should not be confused with members of the *Hypholoma ericaeoides* group which favour acid heath or bogland; the pileipellis of *Hypholoma* is not a palisadoderm but is composed of a filamentous suprapellis seated on a "cellular" subpellis; chrysosystidia, unknown in the Bolbitiaceae, are also present.

Material examined: AMNH 2854 (ISL 5342); 2859 (ISL 5342); 5770 (ISL 4442); 8545 (ISL 5442); 8583 (ISL 5644); 9218 (ISL 5442). AMNH 2859 is an interesting collection in that the cheilo- and pleurocystidia are covered in yellowish mucilaginous(?) material.

AGROCYBE PEDIADES (Fr.) Fayod. Fig. 6, 1-2.

This species is probably more widespread in grassland communities than the single record suggests. It is recognized by the large, slightly compressed basidiospores (12.2-13.8 x 7.8-8.3 x 8.8 μ m) with large central germ-pore, 4-spored basidia, subcapitate cheilocystidia and rare development of pleurocystidia. This fungus is widespread in temperate and mediterranean grasslands throughout the world.

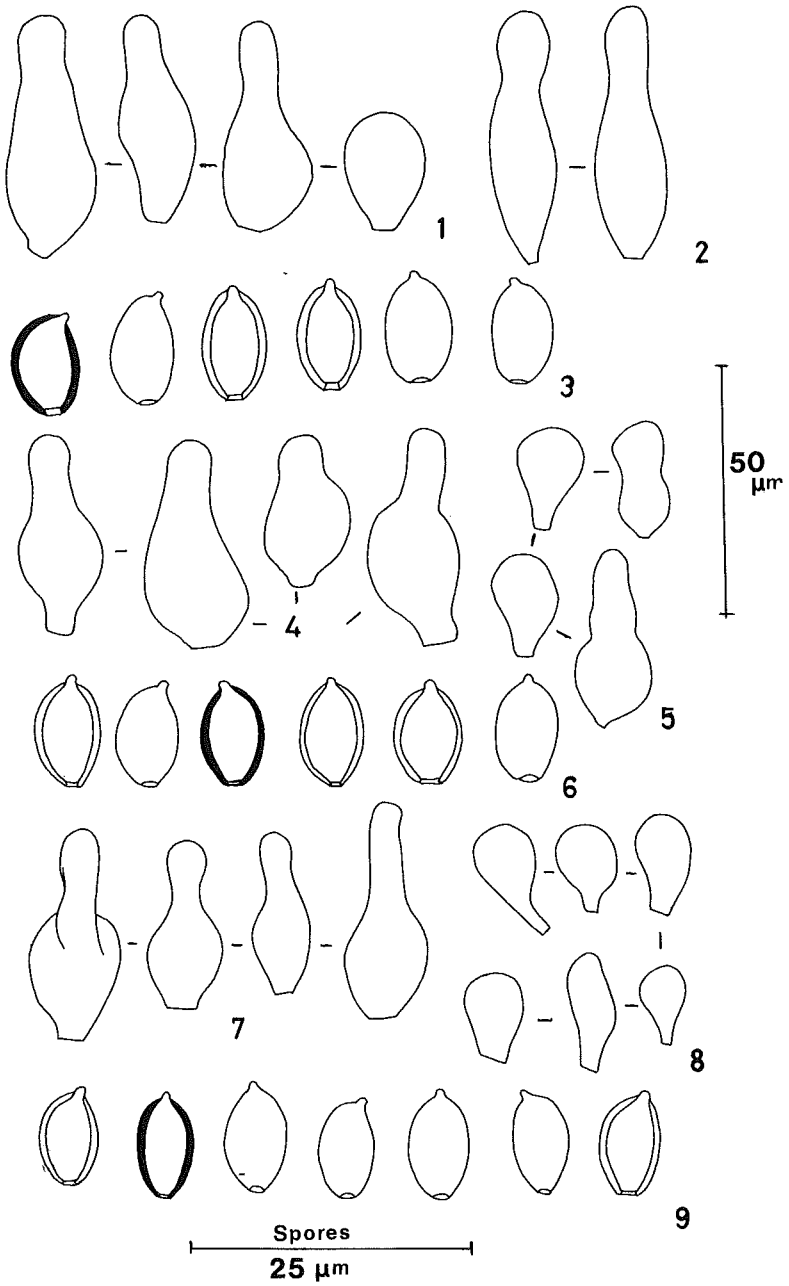
Material examined: Laugar, Reykjadal S.-Þing. (ISL 5741), mown grass on terrace by school house, 12 VIII 1969.

AGROCYBE PRAECOX (Pers.: Fr.) Fayod. Fig. 2; 3; 4, 1-6.

This is the most widespread annulate species of the genus *Agrocybe*, and perhaps, in parallel to other areas of natural history, because it is so common, everyone felt they knew the delimitation of the species. This unfortunately is not true, as hinted at by SINGER (1950) when he recognized several infraspecific taxa. Singer's taxa were based on the earlier names available in the literature, for authors such as BRITZELMAYR (1883) had already realized that several closely related fungi were involved. How to distinguish them, is a very different matter, and examination of the original descriptions is of limited value. WATLING & GREGORY (1981) list seven infraspecific taxa within *A. praecox* which have been recognized.

It is only when a collection of specimens from a comparatively small or restricted area, such as the present one, has been massed together that some attempt can be made, if not to unravel the problem, to group the material into meaningful units; in addition it is possible to indicate the areas requiring further, more critical study. Unfortunately a definitive approach cannot be made herein as the collections lack adequate field data, and no spore-prints or cultures support the herbarium material. Undoubtedly an experimental approach would yield interesting and worthwhile results, especially as the basidiospores of *A. praecox* germinate with ease. Certainly some members of this complex show a bipolar, heterothallic pattern and fructification in pure-culture can be achieved.

Members of the *A. praecox* complex grow in ruderal communities, i.e. pathsides, newly seeded lawns, gardens, ploughed fields, margins of pastures, areas near habitation and tracks in woods. Jud-



ging from illustrations, a member of this same group was one of the first agarics to fructify on Surtsey after the volcanic island was formed; at least some of the collections noted below are also from lava fields. *A. praecox* and its allies might be considered pioneers or adventitious and are some of the earliest autumnal agarics to appear.

WATLING (1982) has recognized four species in the *A. praecox* group in the British Isles, two of which are recognized below as separate taxa (*A. paludosa* and *A. sphaeromorpha*), *A. gibberosa* (Fries) Fayod not yet recognized for Iceland, and *A. praecox* which is obviously still an aggregate species. The above approach is adopted herein although further subdivision of *A. praecox* is attempted. The type-variety of *A. praecox* is taken as that documented by HORAK (1968).

Var. *praecox* (Persoon: Fries) Fayod. Fig. 2, 1-6.

This species is apparently widespread and common in Iceland in keeping with its occurrence in Europe. Seventeen collections were recognized from sites throughout Iceland. The majority (10) were collected in July; although it can be found earlier, its fruiting period rarely extends into late August (e.g. AMNH 6600).

The type variety is recognized by its moderately sized basidiospores ($10 \times 6 \mu\text{m}$), numerous ampulliform pleurocystidia with short to medium neck, and relatively slender stature. It may be found along forest paths or near human habitation.

Material examined: AMNH 136 (ISL 5442); 1087 (ISL 3559); 2128 (ISL 5541); 2198 (ISL 5239); 2848 (ISL 5541); 4988 (ISL 6748); 5809 (ISL 5437); 5833 (ISL 5339) 6600 (ISL 5541); 7112 (ISL 5541); 7765 (ISL 6261); 7772 (ISL 6261); 8490 (ISL 6261); 7913 (ISL 5541); 9219 (ISL 6347); 9228 (ISL 5737); 9305 (ISL 5541).

Var. *britzelmayri* (Schultz.) Singer. Fig. 1, 7-9; Fig 2, 1-3.

This variety differs in its more luxuriant form and more particularly in the numerous, long necked pleurocystidia; the basidiospores are slightly larger than those of var. *praecox*.

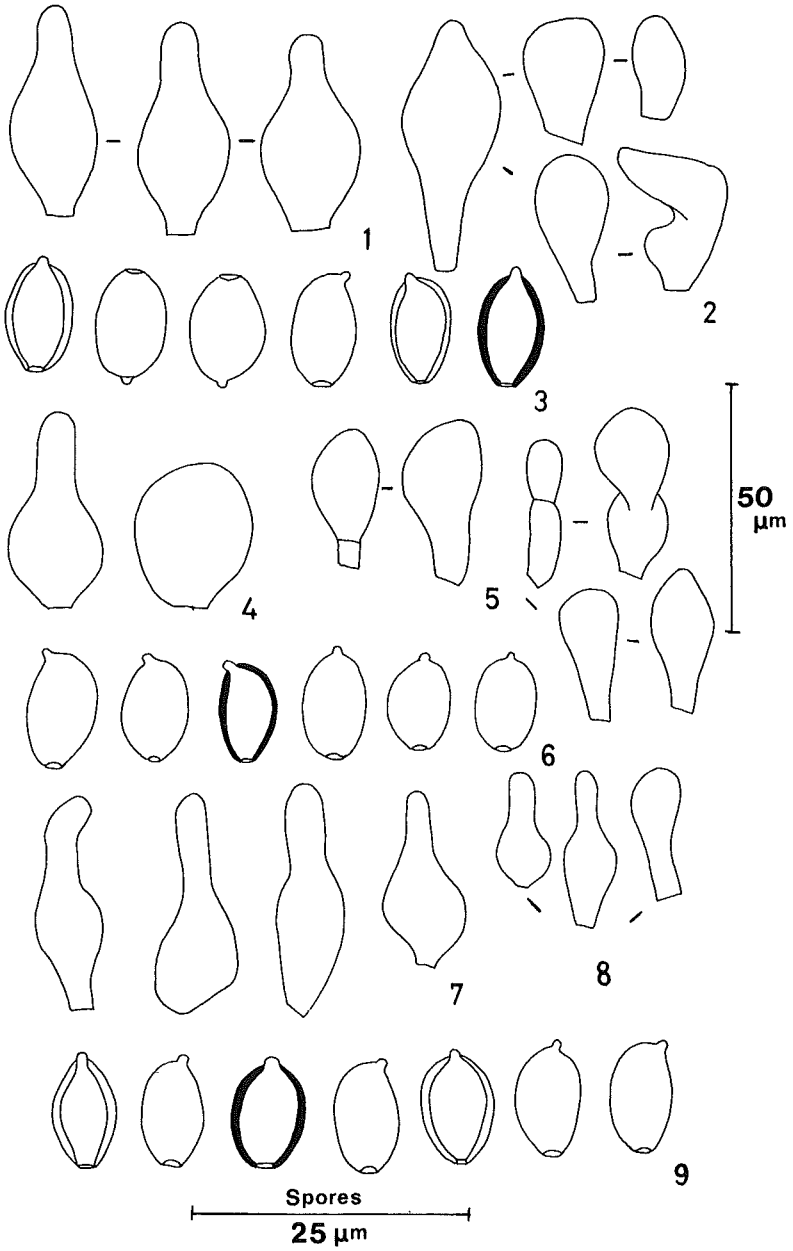
Material examined: AMNH 1586, Vaglaskógur, in wood, 23 VIII 1962 (ISL 5541); AMNH 7880, Kotahólar, Þorvaldsdal, Eyf., roadside, 12 VII 1972 (ISL 5339); AMNH 9217, Vaglaskógur S.-Þing., in wood, 30 VI 1969 (ISL 5541).

AMNH 1586 is placed here but the pleurocystidia are less abundant. The combination as a variety was made by SINGER (1950) but it would appear to warrant specific rank. No field notes, however, are available and a formal diagnosis at this rank is therefore not offered.

Var. *cutefracta* (J.Lange) Singer *nomen nudum*. Fig. 2, 4-6.

This variety differs in its much more stocky build, relatively short stipe, pileus-margin slightly incurved even into maturity, and the pileipellis cracking into areolate plaques to show the

Fig. 2. 1-3, *Agrocybe praecox* 136. 4-6, *A. praecox* 2848. 7-9, *A. praecox* var. *britzelmayri* 9217. 1, 5, 8 cheilocystidia; 2, 4, 7 pleurocystidia; 3, 6, 9 basidiospores.



white flesh below. The basidiospores of this collection are slightly narrower than the type variety. This variety differs from *A. molesta* (Syn.: *A. dura*) in the larger spores of the latter (11-14 x 7-8 μm).

Material examined: AMNH 9214, Reykjavik, on refuse heap, 7 VII 1962 (ISL 3559) (HALLGRIMSSON, 1979, as *A. dura*).

This leaves two other groups in the *A. praecox* complex to which names cannot be assigned:

A. Populations of medium-sized basidiomes with relatively large basidiospores ($\rightarrow 11 \times 6.7 \mu\text{m}$) and numerous long necked, ampulliform pleurocystidia (Fig. 4, 1-3).

Material examined: AMNH 1593, in woodland (ISL 5541); 2158, in grass, (ISL 5541); 5758, edge of hayfield (ISL 4442); 6513, roadside (ISL 5842); 9212, in hayfield (ISL 5843).

The first collection differs in its habitat preference and the last in the larger range for the spores, $\rightarrow 13.2 \times 7.7 \mu\text{m}$, probably due to the presence of some 2-spored basidia, although these were not located.

B. Populations of medium-sized basidiomes with medium-sized spores and only a few pleurocystidia (Fig. 4, 4-6).

Material examined: AMNH 1095, woodland on lava (ISL 3752); 1246, edge of ditch (ISL 6934); 2866, turf-wall (ISL 5437); 5778, stony earth with moss and heather (*Calluna*) (ISL 4542).

AMNH 5778 is interesting in its habitat which parallels in some ways AMNH 48 found on a heath moor at Möðruvellir, Hörg. Eyf. N. Icel. (Fig. 5, 4-6).

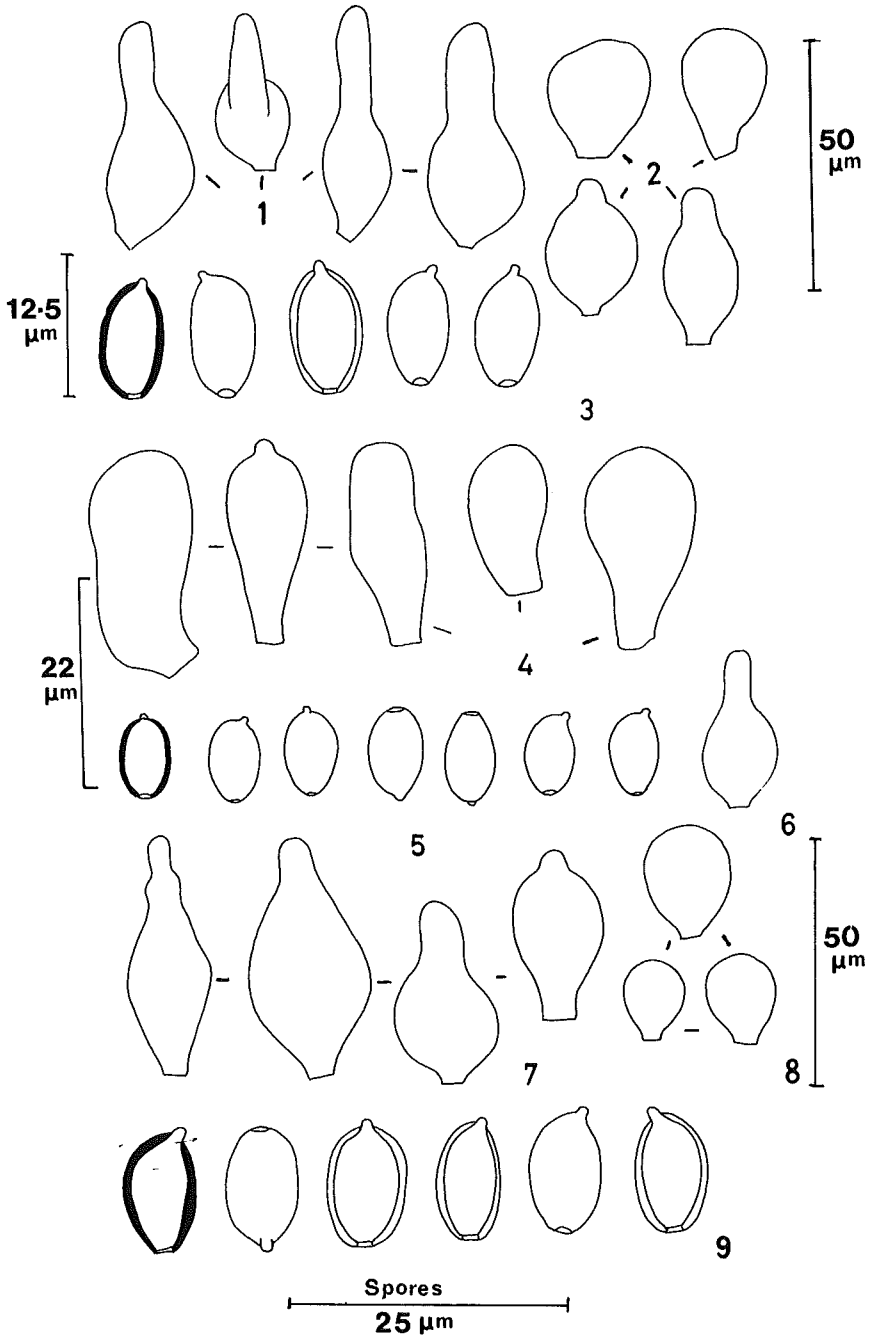
Although the author has found *A. praecox* on a track-side close to heather in a Finnmark palsa bog, fruiting under rather acidic soil conditions is unusual. See under *A. sphaeromorpha* below.

AGROCYBE SPHALEROMORPHA (Bull.: Fr.) Fayod. Fig. 5.

A single collection from the Akureyri Botanical Gardens (AMNH 610; ISL 5442) resembling a "*Lepiota*" more than a "*Pholiota*" possibly represents this species. It was collected from amongst grass close to a hut and therefore may be adventitious. A description of this material is given, as much confusion surrounds the epithet and only by documenting each collection carefully can a final assessment be made.

Pileus grey brownish, with a bluish tinge towards margin, fine-mealy; margin enrolled. *Stipe* pale, greying downwards, base with white felt, grooved striate at apex; ring white, membranous, conspicuous, adnate to stipe upwards.

Fig. 3. 1-3, *Agrocybe praecox* var. *britzelmayri* 7880. 4-6, *A. praecox* var. *cutefracta* 9214. 7-9, *A. praecox* group A 6513 (see text). 1, 4, 7 pleurocystidia; 2, 5, 8, cheilocystidia; 3, 6, 9 basidiospores.



Gills adnate with a decurrent tooth running down the stipe-apex into the ring, crowded, light citron yellow. *Flesh* dense and thick in pileus; odour of raw potatoes.

Basidia 4-spored, 25-27.5 x 6-7 μm , cylindric to elongate clavate, hyaline. *Basidiospores* 8.3-10 (-11.5) x 4.5-5.5 (-6) μm , broadly ellipsoid to very slightly, although distinctly, mitriform, flattened on one side in profile, fulvous in water, darker in alkali, thick-walled with distinct apiculus and broad germ-pore. *Cheilocystidia* vesiculose, 22-33 x 13-19.5 μm , less frequently utriform (\rightarrow 33 x 16.5 μm) or lageniform (\rightarrow 44 x 20 μm) with head 7.5 μm long; *pleurocystidia* numerous, flask-shaped to spindle-shaped or ampulliform, inflated below, 44-27.5 x 15-19 μm , head 6.5-8.5 μm with neck 2.5-14 μm long. *Pileipellis* an irregular hymeniform layer of ellipsoid to pyriform cells 19-30.5 μm broad in 4-5 tiers, seated on a radially arranged filamentous subpellis of shiny, yellow hyphae. *Stipitipellis* of parallel hyphae supporting at stipe-apex caulo-cystidia similar to cheilocystidia, 13.5-16 μm broad. *Veil* of filamentous cylindric, hyaline hyphae. *Clamp-connections* present.

There is some doubt as to whether the epithet used above is correct. Originally FRIES (1821) described this agaric from woodland a relatively uncommon habitat for *Agrocybe* spp. of this group, although a fungus agreeing with the early concept has been found in Europe. In fact a collection made by Björnsson from Skaftafells-skógur, Örafum (AMNH 9213, ISL 5960) may represent the silvicolous "form". It has been synonymized with *A. howeana* (Peck) Singer (= *Stropharia howeanus* (Peck) Peck) by BON (1974) but from my own N American finds of this species, and redescriptions by SINGER Peck's fungus is much larger. As the circumscription of *A. howeana* is itself unfixed (See SINGER, 1978) I refrain from synonymizing the N American and European taxa.

At one time *A. sphaaleromorpha* was also considered the same as *A. paludosa* (see above), and if this is the case Bulliard's epithet takes precedence, but with present knowledge both are best considered autonomous. *A. sphaaleromorpha* differs from *A. paludosa* in its umbonate pileus and rather sturdier stature, and habitat preferences, and from both *A. praecox* of disturbed soils and *A. paludosa* by the slightly mitriform basidiospores.

Collection AMNH 48 (ISL 5341, Möðruvellir, Hörg., Eyf. N. Icel. amongst heather on moor, 9 VIII 1961) differs in its habitat, although the basidiospores agree in size and shape (9.5-11 x 5.5-6.7 μm), and the pleurocystidia are numerous and rather broad. This could be *A. muscigena* (Quél.) Remy but field notes are lacking. Material agreeing microscopically with AMNH 610 has been found in S England and in Shetland (61°N) in dune slacks amongst *Salix repens*.

General notes on *Agrocybe* spp.:

The *A. semiorbicularis* - *A. pediades* group appears to be uncommon in Iceland although it might be expected; two sterile collections in AMNH both from Vaglaskógur (ISL 5542), one from a wood pile (AMNH

Fig. 4. 1-3, *Agrocybe praecox* group A 5758. 4-6, *A. praecox* group B 1095 (see text). 7-9, *A. paludosa* 2854. 1, 6, 7 pleurocystidia; 2, 4, 8 cheilocystidia; 3, 5, 9 basidiospores.

5541) and another from a wood-path (AMNH 7918), which cannot be placed and probably belong here. *Agrocybe* spp. often produce sterile to semisterile basidiomes e.g. *A. pediades* as *Cantharellus brownii* Berk. & Br. (REID & AUSTWICK, 1963) and *A. dura* var. *wanthophylla* (Bres.) P.D. Orton. *Stropharia coronilla* (Bull.: Fr.) Quél. in common with many Strophariaceae may also be sterile; superficially it can easily be mistaken for *Agrocybe vervaeti* as has been done in Iceland, but differs in its filamentous pileipellis and presence of chrysocystidia. *A. vervaeti* (Fr.) Singer differs in its small basidiospores (6-)7.5-8.5(-9) x 4.5-6 μm which possess a very small germ-pore.

BOLBITIUS Fr.

BOLBITIUS TITUBANS (Bull.: Fr.) Fries

Material examined: AMNH 1402, Geldingsá, Vaðlaheiði, N. Icel. (ISL 5442), on dung growing with *Paneolus* sp.

This species differs from *B. vitellinus* (Pers.: Fr.) Fr. in its more delicate nature and often smaller, but always broader, basidiospores. It is widespread in Europe.

General notes on *BOLBITIUS*:

CHRISTIANSEN (1941) recorded *B. vitellinus* from home-fields at Skógar in Fnjóskadalur (23 VII 1937) and Lindabrekka (26 VII 1935). It has not been possible to examine this material but judging from the concepts adopted in 1940 and the spore-dimensions quoted it is in agreement with *B. vitellinus*. This species was also recorded by HALLGRÍMSSON (1979) based on the above-mentioned material.

CONOCYBE Fayod

CONOCYBE BLATTARIA (Fr.) Kühner - see general notes below.

CONOCYBE COPROPHILA (Kühn.) Kühner

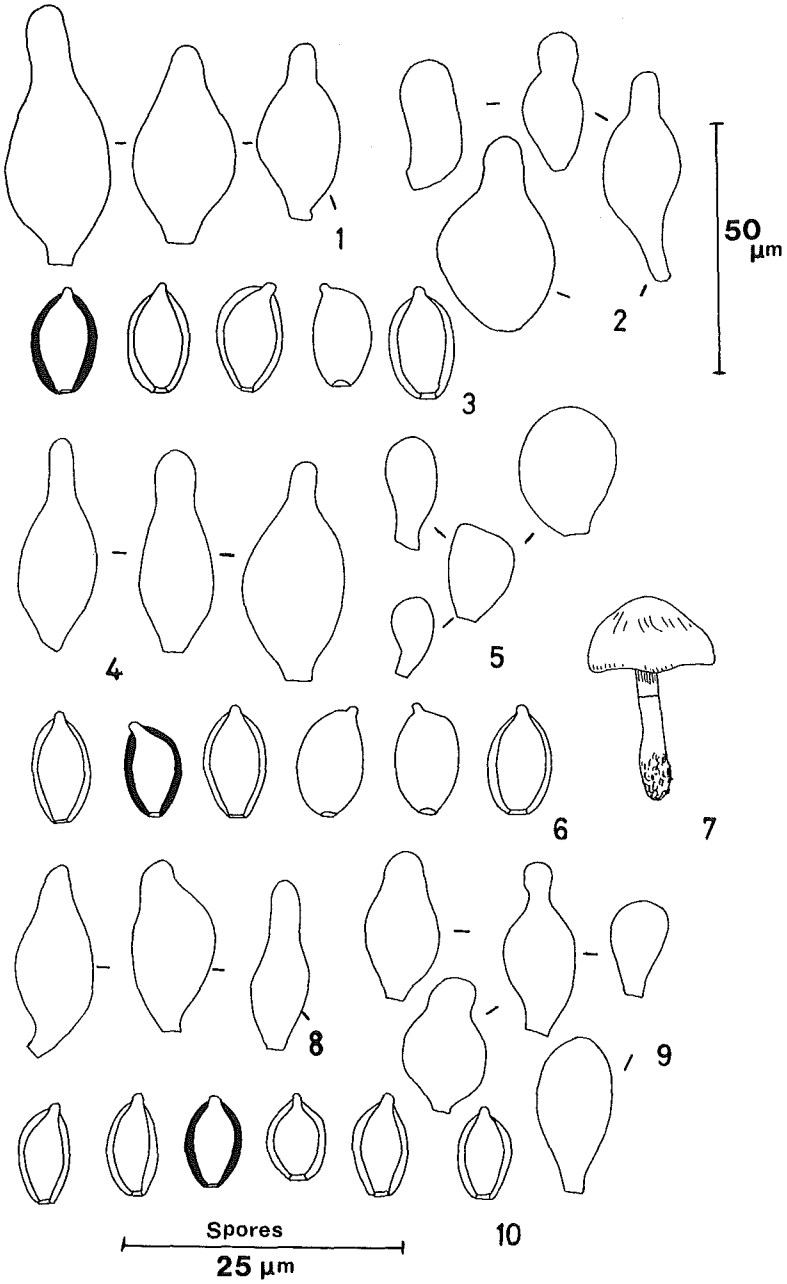
This is a widespread fungus on dung of domestic animals and probably recorded by LARSEN as *Galera* sp. page 544 (Hallormsstaðir, Akureyri). It is known from localities in east and north central Iceland from July to October. This species is readily recognizable by the large, richly-coloured basidiospores (12.2-14 x 6.5-8 μm) with broad, central germ-pore and lageniform pileo-, caulo-, and cheilocystidia. In the field it is recognized by the viscid pileus, white stipe and coprophilous habit. This species is also known as *Pholiotina coprophila* (Kühner) Singer.

Material examined: AMNH 161 (ISL 5542), 167 (ISL 5740), 1716 (ISL 5542), 3009 (ISL 5339), 5322 (ISL 5342), 8600 (ISL 7047).

CONOCYBE FARINACEA Watling

Recognized by the large basidiospores (11-14 x 7-19 μm), and lack of strong development of lecythiform caulocystidia. It is closely related to *C. pubescens* (Gillet) Kühn.; in the field it is dis-

Fig. 5. *Agrocybe sphaeromorpha*. 1-3, 9213. 4-6, 48. 7-10, 610. 1, 4, 8 pleurocystidia; 2, 5, 9 cheilocystidia; 3, 6, 10 basidiospores; 7 habit-sketch.



tinguished by its strong farinaceous taste and smell. Its distribution is unknown as it has in the past been confused with *C. pubescens*.

Material examined: AMNH 73, Arnarhóll, near Akureyri, N. Icel., on horse dung, 8 VIII 1961 (ISL 5442). Geldingaey, Mývatnssveit, N. Icel., in grassland, 5 VIII 1977, leg. Hallgrímsson (ISL 5943).

CONOCYBE FUSCIMARGINATA (Murr.) Singer

This species in dried material is recognized by the 4-spored basidia, basidiospores 10-12 x 6-7 μm , lageniform caulocystidia and contrasting lecythiform cheilocystidia with head 4.4-5.5 μm .

Material examined: AMNH 11, Akureyri, N. Icel., on droppings of domestic animals, 1 VIII 1960 (ISL 5442).

A collection from Kleyf in Eyjafjörður (AMNH 4978, ISL 5239), might be referred here but it is in bad condition. This species is recorded from Greenland (WATLING 1977).

CONOCYBE HUIJSMANII Watling

A widespread agaric in grassland areas; thirteen collections are known from north central Iceland. This species differs from *C. lactea* in the ellipsoid basidiospores and expanding pileus; it possesses a mixture of lageniform cystidia and long hairs on the stipe as does *C. lactea*.

Material examined: AMNH 149, 1491 (ISL 5442); 1801 (ISL 5843); 5364 (ISL 4945); 6438 (ISL 4344); 7937 (ISL 4944); 8752 (ISL 5940); 9210 (ISL 5442).

A collection from a home terrace (AMNH 8637, ISL 5740) differed in its slightly larger basidiospores (12.2-14.4 x 6.7-7.8 μm) and larger headed lecythiform cheilocystidia.

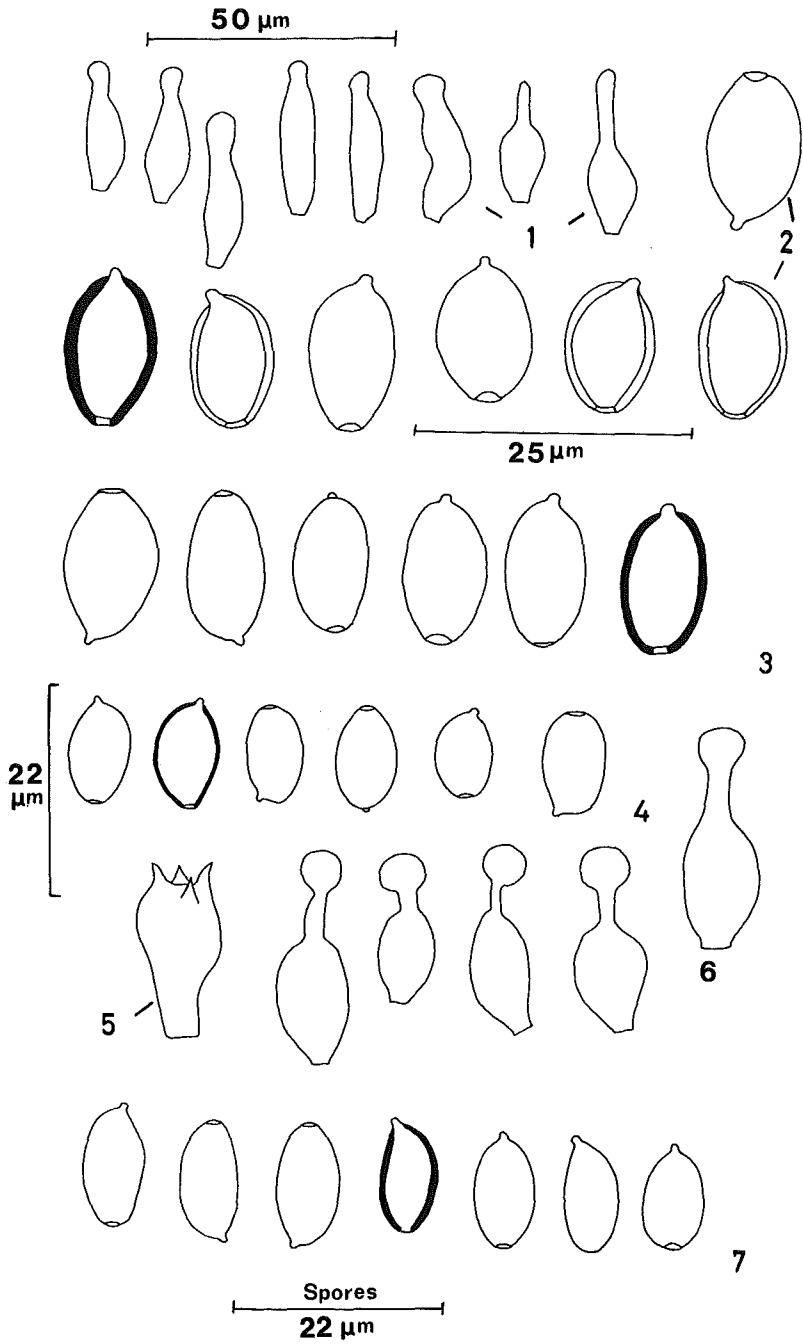
This fungus is usually confined to grassland areas so that collections from a heather moor (AMNH 1626, ISL 5442), *Equisetum palustre* mire (AMNH 755, ISL 4743) and wet land (AMNH 9211, ISL 5443) are interesting. The last two agreed with material in Dr. H.S.C. Huijsman's herbarium, now in L from boggy areas in mainland Europe, and to which he gave a herbarium name.

CONOCYBE KUEHNERIANA Singer

Apparently not uncommon in Iceland, records being available from all but the southern part. This is Kühner's "*Conocybe siliginea* var. *ocracea* récoltes macrospores" (1935). It is widespread in Europe in grasslands and near habitation from July to September. It is characterized by broadly ellipsoid, almost ovoid, basidiospores (10.5-12.2 x 6.7-7.2 μm), lecythiform cheilocystidia with head 4.5 μm broad and lageniform, sometimes flexuous caulocystidia.

Material examined: AMNH 1029 (ISL 3856); 1296 (ISL 5444); 1977 (ISL 5442); 5306 (ISL 5342); 9057 (ISL 7047).

Fig. 6. 1-2, *Agrocybe pedtades*. 3, *Conocybe* aff. *moseri* 1047. 4, *Conocybe* sp. 1080. 5-7, *C.* aff. *siliginea* 9221. 1, 6 cheilocystidia; 2, 3, 4, 7 basidiospores; 5 basidium.



AMNH 5306 was in a wet depression with *Alchemilla vulgaris* and *Equisetum palustre*. AMNH 9220 (in grass, 12 IX 1981, ISL 5442) differed in the narrower basidiospores.

CONOCYBE LACTEA (Lange) Métrod

Not as common as *C. huijsmanii* and differs in the non-expanding pileus and basidiospores in face-view being more ovoid in outline (spores 11.7-14.5 x 6.7-8 μ m).

Material examined: AMNH 9201 and 9209, both in Droplaugarstaðir, Fljótsdal, N. Múl., in wet land, leg. Hallgrímsson 2 IX 1960 (ISL 7047).

CONOCYBE MAGNICAPITATA P. D. Orton

Apparently widespread and common in North central Iceland in a range of habitats; also known from eastern Iceland. It is recorded from Svalbard (material communicated by S. Huthinen), Scandinavia etc., and Shetland 61°N. Eleven collections in all have been examined.

This agaric is recognized by the enormous head to the lecythiiform cheilo- and caulocystidia (+8 μ m diam.), the medium sized basidiospores (9-11(-12) x 5-6(-7) μ m) and lack of crystal production in ammoniacal solutions.

Material examined: AMNH 1055 (ISL 3559); 1256 (ISL 5341); 5120 (ISL 5339); 5793 (ISL 5437); 5829 (ISL 5339); 6638 (ISL 7150); 7853 (ISL 5339); 8829 (ISL 5339); 9102 (ISL 4747); and two collections AMNH 9207 and 9208 from ISL 5339.

CONOCYBE MESOSPORA (Kühn.) Kühner & Watling

This species is characterized by the relatively small basidiospores (7.5-10 x 4.5-5 μ m), lecythiiform caulo- and cheilocystidia and small stature. It has probably been overlooked in the past.

Material examined: AMNH 8061, Hof á Skaga, A. Hún., N. Icel., 19 VII 1972 (ISL 4439); AMNH 9033, Torfnahnjúkur, Eyf., N. Icel., with *Salix herbacea*, 2 VIII 1976 (ISL 5347).

CONOCYBE aff. *MOSERI* Watling Fig. 6, 3.

KÜHNER (1935) described a 2-spored collection of *C. siliginea* "forma typica". This is probably distinct from the 4-spored collection which has been described as *C. moseri*. AMNH 1047 from amongst grass at Reykjavík airport (7 VII 1962, ISL 3559) may represent this 2-spored population but without field data it is impossible to be definite. However, LARSEN (1932) records as *Galera siliginea* a gray-capped form from peaty soil at Isafjord (Ísafjörður: Gandrup) which may be *C. moseri*.

CONOCYBE PUBESCENS (Gillet) Kühn.

This species is characterized by its enormous basidiospores +17 x 9.5 μ m, 4-spored basidia and mixture of hairs and lecythiiform cystidia on the stipe. It is widespread in Europe usually growing attached to dung.

Material examined: AMNH 660, Mýlaugsstaðir, Aðaldal, N. Icel., 11 IX 1961 (ISL 5740); AMNH 8060, Hof á Skaga, A. Hún., N. Icel., on moor, 19 VII 1972.

CONOCYBE RICKENII (J.Schaeff.) Kühner

This species is characterized by the 2-spored basidia with horn-like sterigmata and long basidiospores (15.4-17.2 x 8.2-9.5 μ m) with large central germ-pore. It usually grows directly on dung or dung/straw mixtures.

Material examined: Akureyri, on dung heap, leg. Hallgrímsson 1 IX 1960 (ISL 5442).

Probably both AMNH 1230 (Fljótsdalur, ISL 7047, 3 VIII 1962) and AMNH 9203 (Akureyri, ISL 5442) should also be referred here but without field data it is difficult to distinguish between *C. siliginea*, a grassland species, and *C. rickenii*.

CONOCYBE SEMIGLOBATA (Kühn.) Kühner & Watling

This is a member of the "*Galera tenera*" complex characterized by its relatively large headed lecythiform cheilo- and caulocystidia, relatively large basidiospores (11.5-14.5 x 6-8 μ m) and fairly fleshy, semiglobate to convex pileus. It is quite variable in its characters in minutiae (see WATLING, 1980).

Material examined: AMNH 5508, in grassland (ISL 5440); 8031, in a mire, (ISL 4443) and AMNH 9205, from an old hayfield (ISL 5339).

CONOCYBE SIENNOPHYLLA (Berk. & Br.) Singer

This is Kühner's "*C. siliginea* var. *ocracea* récoltes microspores" (1935). It is generally considered more of a thermophile (SINGER 1969) than "récoltes macrospores" (= *C. kuehneriana*, see above). The basidiospores measure 8-11(-12) x (4.5-)5-6.5(-7) μ m; it possesses lecythiform cheilocystidia but lageniform caulocystidia.

Material examined: AMNH 141, Akureyri (ISL 5442) and AMNH 1302, Tungnafjall, Eyf., 700 m alt. (ISL 5444), both on mossy ground.

CONOCYBE aff. *SILIGINEA* (Fr.: Fr.) Kühner Fig. 6, 5-7.

Without field data it is impossible to determine the identity of a collection (AMNH 9221) from a grassy area in a plantation with introduced trees at Grund, Eyjafirði, N. Icel. (12 VIII 1961, ISL 5344). In many ways it approaches *C. murinacea* Watling; but see under *C. rickenii* above.

CONOCYBE SUBPUBESCENS P. D. Orton

A member of the *C. pubescens* group with smaller, less broad basidiospores ((10-)11-13(-14) x 6-8 μ m); generally seen in woodland communities but has recently been collected in base rich montane areas in Scotland.

Material examined: AMNH 9200, Geldingsá, Svalbarðsströnd, Eyf., N. Icel., 22 IV 1963 (ISL 5442).

CONOCYBE TENERA (Schaeff.: Fr.) Fayod

This species is characterized by medium sized basidiospores (10.5-13.3 x 5.5-6.7 μ m), copious production of needle-shaped crystals in amoniacal solutions and lecythiform cheilo- and caulocystidia with head 4.5-7.8 μ m broad. LARSEN (1932) records this species

from Seyðisfjörður and Akureyri but the records probably could be assigned to any one of the *C. tenera* group.

Material examined: AMNH 5713, Gautsdalur, A. Hún., N. Icel., in grassland with moss (500 m), 21 VII 1969 (ISL 4543).

CONOCYBE VEXANS P. D. Orton

This species is apparently common and widespread in northern Iceland; six collections are noted from grassy or mossy areas, or amongst leaves usually under trees. In Iceland it occurs from July to late September a similar pattern to that in the British Isles. It is common on mainland Europe where it may be sought under the synonym *C. togularis* f. *tetraspora*. This is the *C. blattaria* of KITS VAN WAVEREN (1970).

Material examined: AMNH 1573 (ISL 5541); 3016 (ISL 5240); 5509 (ISL 5540); 7890 (ISL 5240); 7908 (ISL 5541) and 9206 (ISL 5741).

General notes on *Conocybe* spp.:

A single collection from dry ground with grasses and moss (*Funaria*) at a roadside (AMNH 1080, 17 VII 1962) near Reykjavík (ISL 3559) Fig. 6,4, is referred to the *C. lactea* group, i.e. *Candidae* but differs from all other members in that the germ-pore is reduced to an apical spot. In this way, but this way alone, it resembles *C. spiculoides* (Kühn.) Kühner & Watling.

LARSEN (1932 p. 542) records *Pholiota togularis* from Hallormsstaður, E. Iceland. From the spore measurements given this will be *Conocybe blattaria* (Fries) Kühner, and therefore presumably had 2-spored basidia. *Pholiota togularis* is now considered a synonym of *Conocybe arrhenii* (Fries) Kits van Waveren characterized by smaller basidiospores (7-8(-9) x 4-4.5(-5) µm with central, small although distinct, germ-pore and filiform to lageniform cheilocystidia.

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REFERENCES

- BON, M. 1974. *Agrocybe sphaeromorpha* (Bull. ex Fr.) Fayod, 1889. Doc. Mycol. 15: 51-52.
- BRITZELMAYR, M. 1879-1894. Hymenomycetes aus Südbayern, Berlin.
- CHRISTIANSEN, M.P. 1941. Studies in the Larger Fungi of Iceland. Botany of Iceland, Vol. III, 2: 191-226.
- FAYOD, V. 1889. Prodrôme d'une Histoire naturelle des Agaricinées. Ann. Sci. Nat. (Bot.) Ser. 7, 9: 181-411.
- FRIES, E.M. 1821. Systema mycologicum I. Gryphiswaldiae.
- HALLGRÍMSSON, H. 1973. Íslenzkir hattveppir III (Lepiotaceae et al.) Acta Bot. Isl. 2: 29-55.
- HALLGRÍMSSON, H. 1974. Íslenzkir hattveppir IV (Hygrophoraceae). Acta Bot. Isl. 3: 36-81.

- HALLGRÍMSSON, H. 1979. Sveppakverið. Reykjavík 158 pp.
- HALLGRÍMSSON, H. 1981. Íslenzkir hatt sveppir V (Preliminary account of the Icelandic species of Tricholomataceae) Acta Bot. Isl. 6: 29-41.
- HORAK, E. 1968. Synopsis generum Agaricalium. Beiträge Kryptogamenflora Schweiz 13: 1-741.
- KEMP, R. 1983. Incompatibility and speciation in the genus *Coprinus*. Revista Biol. 12: 179-186.
- KÜHNER, R. 1935. Le Genre *Galera*, Paris.
- LANGE, M. 1957. Den Botaniske Ekspedition til Westgrönland, 1946, part 3. Medd. Grönl. 148: 1-125.
- LARSEN, P. 1932. Fungi of Iceland. Botany of Iceland, Vol. II, 3: 451-607.
- REID, D.A. & P. AUSTWICK. 1963. An annotated list of the less common Scottish Basidiomycetes (exclusive of rusts and smuts). The Glasgow Naturalist 18: 255-336.
- SCHAEFFER, J.C. 1762-1770. Fungorum qui in Bavaria et Palatinali circa Ratisbonam nascuntur icones nativis coloribus expressae. Ratisbonam.
- SINGER, R. 1950. *Naucoria* Fries and affinitive genera in the USSR. Acta Inst. Bot. Komarov. Acad. Sci. USSR. Series 2, 6: 402-498.
- SINGER, R. 1978. Keys to Agarics. A-Boletus. Sydowia 30: 192-279.
- WATLING, R. 1964. The taxonomic characters of the Bolbitiaceae with particular reference to the genus *Conocybe*, PhD. thesis, Edinburgh.
- WATLING, R. 1976. An analysis of the taxonomic characters used in defining the species of Bolbitiaceae in H. Cléménçon (ed.). Species concept in Hymenomyces. Bibl. Mycol. 61: 1-244.
- WATLING, R. 1977. Larger fungi of Greenland. Astarte 10: 61-71.
- WATLING, R. 1980. Observations on the Bolbitiaceae - 19. Notes Roy. Bot. Gdn. Edinb. 38: 331-344.
- WATLING, R. 1982. British fungus flora: Agarics & Boleti, Bolbitiaceae. Edinburgh.
- WATLING, R. & N.M. GREGORY. 1981. Census catalogue of World Members of the Bolbitiaceae. Bibl. Mycol. 82: 1-224.