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NEW OR INTERESTING RECORDS OF BRITISH HYMENOMYCETES VII

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ABSTRACT. Accounts are given of ten taxa of *Amanita* (Amanitaceae) based on British material. Of these *A. inopinata* Reid & Bas is described as new as are *A. submembranacea* var. *bispora* Reid and *A. umbrinolutea* var. *flaccida* Reid.

INTRODUCTION

During the past few years a number of interesting British collections of *Amanita* have been received at the Kew Herbarium, and the opportunity is taken to discuss them here.

The most striking species is *A. inopinata* sp. nov. which has been found in four scattered localities in S E England over the last five years, and which is thought to be an introduction to this country, since all the sites have been strongly influenced by man (parkland, plantations and cemeteries). However, it appears to be well established.

A. friabilis, although not previously known from this country, is no doubt a regular component of our mycological flora but is restricted to alder bogs and on that account possibly overlooked. Further exploration of this habitat will doubtless lead to additional reports.

A. mairei occurs very sporadically and must be regarded as very rare, although widely distributed in southern Britain, despite not having been previously recorded from this country. In much the same category are *A. vittadinii* and *A. pachyvolvata,* although the possibility cannot be ruled out that the very few finds of these species each represent a temporary casual colonization from mainland Europe.

A. ovoidea is a species which, although occasionally straying into northern France and Belgium, is essentially one with a central and southern distribution in Europe. Its occurrence in Britain is altogether unexpected and must be seen as a chance event.

A. umbrinolutea, if it is a regular component of our mycological flora, must be extremely rare, but as yet there are insufficient data available on which to base an opinion as to its true status in this country. It is, however, very widely distributed on the European mainland.

In contrast to the other species discussed above, *A. submembranacea* is probably not uncommon and has no doubt previously been confused with *A. vaginata.*

Amanita friabilis (Karsten) Bas in Bull. Mens. Soc. Linn. Lyon. (Numéro Spécial) 43:18 (1974), Fig. 1a–d.

Syn.: *Amanitopsis vaginata* var. *friabilis* Karsten in Bidr. Kannedom Finlands Natur Folk 32:547 (1879).

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Amanitopsis friabilis (Karsten) Sacc., Syll. Fung. 5:22 (1887).
Pseudofarinaceus friabilis (Karsten) O. Kuntze, Rev. Gen. Pl. 2:868 (1891).
Vaginata friabilis (Karsten) O. Kuntze, Op. cit. 3(2):539 (1898).
?Amanita sternbergii Velen., České Houby 1:192 (1920) [fide Bas loc. cit.].
Amanitopsis vaginata var. *sternbergii* (Velen.) J. Favre in Ergebn. Wiss. Untersuch. Schweiz Nationalparks 6 (Neue Folge), 566 (1960); (non rite publicatum).
Amanitopsis sternbergii (Velen.) J. Favre, Op. cit., fig. 100 (1960); (non rite publicatum).
Amanita sternbergii (Velen.) Vesely in Ann. Mycol. 31:296 (1933).
Amanita alnicola Rouzeau & Massart in Actes Soc. Linn. Bordeaux 103:5 (1966); (non rite publicatum).

Pileus 3·5–5cm diam., when mature applanate to shallowly convex with sulcate margin, very thin fleshed, fragile, at first pale grey or soft grey-brown and very densely covered almost to the edge with darker grey, conical or pyramidal floccose warts, which almost obscure the cap surface; with age the colour may become dark grey-brown. *Stipe* 4–6·5cm high, up to 0·7cm wide enlarging below to 0·7–1·3cm, at first densely covered with minute punctate granular scales, but in older fruit-bodies these scales may become far more conspicuous and dark brown in colour, sometimes forming snake-like markings, although paling toward the apex. *Annulus* lacking. *Volva*: despite careful observation in the field no volval remains were observed. *Lamellae* relatively broad, appearing almost free but with slight decurrent tooth, white. *Spores* 10–12 × (7–)8–10μm (from print, in KOH); (9–)10–11·75(–13) × (–7)8–10μm (from print, in Melzer's reagent), variable in shape, predominantly broadly-elliptic to ovate, varying subglobose, with a large oil drop, smooth, hyaline, thin-walled, non-amyloid, with small lateral apiculus. *Basidia* 45–60 × 9–12μm, more or less clavate, although narrowing slightly toward the apex from just above the mid-point, and lacking a basal clamp-connection. *Cheilocystidia*: gill edge imperfectly preserved, preventing description of the full range of sterile elements which may originally have been present; a few thin-walled, hyaline, sterile, club-shaped to almost sphaeropedunculate or basidiiform organs to 40μm long, and 15μm wide at the inflated apex. *Structure of velar remains on cap*: a mixture of both undifferentiated hyphae and sphaerocysts. Hyphae hyaline, 3–7μm wide, occasionally branched, septate, mostly thin-walled or very slightly thick-walled. The hyphal segments tending to become inflated and barrel-shaped and finally rounding up to form the thin-walled, hyaline, globose or ovate sphaerocysts, 12–30μm diam.

Habitat. On mound of damp earth or humus under *Filipendula ulmaria* near base of *Salix* sp., with *Alnus glutinosa* and *Fraxinus excelsior* nearby, in Alder Carr area surrounding a deep pool known as Little Hawes Water, Gait Barrows National Nature Reserve, Silverdale, Lancs, 24 ix 1986, coll. A. Henrici and Mrs P. Livermore; same locality, 30 ix 1986, coll. Mrs P. Livermore; same locality, but 70–80 yards distant from previous two gatherings, 3 x 1986, coll. J. C. Leedal.

The collections each comprise a single sporophore and represent the first British material of *A. friabilis*; the description having been drawn from photographs of the fresh specimens and the collectors notes. Regarding the latter, it was categorically stated that the stipe was only shallowly inserted in the soil and that despite being very carefully excavated no trace of volval tissue was found. The collector also remarked on the delicate nature of the velar warts on the cap, observing that it was impossible to imagine such a tissue forming a very substantial volva.

Judged from the literature it would seem that *A. friabilis* is widespread but rare in Europe, although the few reports of its occurrence may, in part, reflect the unattractive swampy habitat in which it grows.

In the past *A. friabilis* has usually been placed either in the genus *Amanitopsis* Roze (typified by *A. vaginata*) or in *Amanita* sect. *Vaginatae* (likewise typified by *A. vaginata*) because of its close superficial resemblance to *A. vaginata* (Bull.: Fr) Vitt. Indeed it was originally described as a variety of this taxon. Even comparatively recently the eminent Swiss mycologist J. Favre (1960), adopting the epithet *sternbergii,* described it in varietal rank under *Amanitopsis vaginata.* Bas (1974) also acknowledged that in the field *A. friabilis* resembles a small grey *Amanita vaginata* that has lost its saccate volva, but he expressed disagreement with the traditional view whereby this species is classified in sect. *Vaginatae.* In his opinion it should be assigned to *Amanita* sect. *Amanita* (typified by *A. muscaria*), inclusion of a ringless species presenting no problem.

On the whole there is a remarkable degree of uniformity between the published accounts of *A. friabilis.* Nevertheless it does seem that the cap colour can be more brownish than that of the British material examined to date, varying from ochraceous-grey-beige to sepia or grey-brown to grey. Furthermore, while there is complete agreement that there is no cohesive volva at the base of the stipe, some authors (Bon, 1979b; Courtecuisse, 1982; Mesplède, 1980a & b; Merlo & Traverso, 1983) indicate that volval tissue may be present on the slightly swollen base of the stem or just above it in the form of a distinct ridge or bands of small scales. Bon even refers to it as being 'un peu plus consistante' on some material while other specimens he described as remarkable for several reasons including 'une volve encore plus membraneuse, bien que fragile et déchiquetée'.

A. friabilis appears to be rare but widespread in Europe; with the following reports. FRANCE: Gironde (Rouzeau & Massart, 1966; Rouzeau, 1967; Bas, 1974; Mesplède, 1980a & b); Haute Savoie (Rouzeau, 1981); Basin inferieur de la Somme and Pas de Calais (Bon, 1979b; Courtecuisse, 1982). NETHERLANDS: (Frencken, 1973; Bas, 1974; Arnolds, 1984). SWITZERLAND: (Favre, 1960; Bas, 1974). ITALY: (Merlo & Traverso, 1983). WEST GERMANY: Reinland (Bas, 1974; Krieglsteiner, 1984). EAST GERMANY: near Potsdam; Kyritz (Bas, 1974; Benkert, 1978; Krieglsteiner, 1984; Kreisel, 1987). CZECHOSLOVAKIA: (Velenovský, 1920; Bas, 1974; Šebek, 1980, 1981). POLAND: (Šebek, 1981). NORWAY: (Weholt, 1983; Brandrud, 1986). FINLAND: (Karsten, 1879, 1881a & b, 1889, 1898; Bas, 1974; Ulvinen, 1976).

Coloured illustrations of *A. friabilis* have been published as follows: Krieglsteiner (1984, p. 190); Merlo & Traverso (1983, pl. 51); Rouzeau (1981, p. 16). Black and white habit sketches can be found in Bas (1974, figs 1–2); Favre (1960, fig. 100); Šebek (1980, p. 93; 1981, p. 67); Weholt (1983, fig. 1a).

Amanita inopinata Reid & Bas, **sp. nov.** Figs 2a–b, 3a–c.

Pileus 2·5–8cm diam., convexus vel applanatus dein leviter concavus margine decurvato et non-striato, verrucis crassissimis floccosis pyramidalibus fusco-griseo-brunneis usque 0·5cm altis omnino vestitus. Stipes 4·5–7cm altus, 0·4–1·9cm latus, cylindricus vel basin versus leviter dilatatus sed basi radicatus; infra annulum primo floccis nigricantibus fugacibus ornatus dein sordido-salmoneus vel laete fulvus fibrillis nigro-brunneis delicatis recurvatis dense orantus. Annulus apicalis plus minus adpressus vaginatus apicem stipitis versus in squamas fractiflexus pallide griseas disruptus. Volva non visa. Lamellae usque 1cm latae, salmoneae, ad marginem rotundatae. Caro pilei alba sed subter cuticulam pallide grisea; caro stipitis supra alba sed infra cremea vel pallide salmonea. Sporae typice late ellipticae vel ovatae, hyalinae, valde amyloideae, laeves, muris tenuibus 8–9 × 6–7μm (nonnunquam 8–12 × 6–8μm). Basidia clavata vel lanceolata, 43–56 × 6–8μm, hyalina, bi vel quadrispora, muris tenuibus. Cheilocystidia non visa. Structura verrucarum pilei ex segmentis cylindricis vel doliiformibus hyalinis septatis fibulatis tenue tunicatis succo pallide brunneo plenis in catenis erectis constans.

Pileus 2·5–8cm diam., convex or applanate, finally shallowly concave with a downward curved margin, entirely covered by a thick cottony pale grey-brown felt which disrupts into very prominent darker pyramidal warts to 0·5cm high. *Stipe* 4·5–7cm tall, 0·4–1·9cm wide, cylindric to slightly enlarged below before tapering to a rooting base, apex seemingly sheathed by a closely adpressed, pale grey annulus which becomes darker downward to the narrow, black, free margin. With age the portion above this black band disrupts into pale grey zig-zag bands of scales on a pale pinkish salmon-coloured background. Below the black annulus the stem of young fruitbodies is at first densely spotted with very dark grey to almost black floccose scales, which soon disappear leaving the lower part of the stem densely flecked with delicate, dark blackish brown, hair-like fibrils with recurved tips on a dirty salmon to bright tawny background, finally passing into blackish grey-brown on the rooting base. *Volva* not visible. *Lamellae* to 1cm broad, rounded at the margin, salmon coloured. *Flesh* white in pileus with a slight to prominent pale grey region beneath cuticle; white in upper part of stipe passing into cream or pale salmon below. *Spores* very variable in shape and size, typically broadly elliptic to ovate, thin-walled, hyaline, strongly amyloid, 8–9 × 6–7μm (in fruitbodies with 4-spored basidia) on some specimens varying from subglobose to ovate, broadly elliptic, elliptic or pip-shaped, and when there is a mixture of 2- and 4-spored basidia on the same gill the range is 8–12 × 6–8μm. *Basidia* clavate or lanceolate, 43–56 × 6–8μm, thin-walled, hyaline, either 2- or 4-spored, often on the same gill, and with a basal clamp-connection. *Cheilocystidia* not recovered. *Structure of warts on pileus* comprising chains of basically erect, thin-walled, hyaline, cyclindric or barrel-shaped elements with pale brown sap and clamp-connections at the septa, reaching to 255μm in length, and to 43μm in width, in the lower portion of the warts the elements are often more fusiform, in the apical portion they are shorter and less regularly arranged. In some fruit-bodies the structure of the warts is modified by presence of numerous branched, highly refractive oleiferous elements. *Structure of annulus* similar to warts on pileus, consisting of chains of barrel-shaped, thin-walled, hyaline, clamp-bearing segments to 120μm long and to 23μm wide.

Habitat: under Sitka Spruce (*Picea sitchensis*) at edge of a plantation but also close to dead Elms (*Ulmus* sp.), Lullingstone Park, Kent, 8 x 1981, coll. Mrs Irene Palmer; under old Horse Chestnut (*Aesculus*

hippocastanus), but also Sycamore (*Acer pseudoplatanus*) and Holly (*Ilex aquifolium*) nearby, in very dry barren area, Tandridge Hall, Surrey, 2 x 1983, coll. Mrs Irene Palmer (**holo.** K); under *Chamaecyparis lawsoniana,* Broad Oaks, Chigwell, Essex, from October until end of November 1984, coll. S. Taylor; under *Taxus,* Kingston Cemetery, Surrey, 23 x 1986, coll. E. Brown.

A. inopinata is easily recognized by its grey-brown, prominently warted cap, which resembles that of *Strobilomyces floccopus* (Vahl: Fr.) Karsten from above, its salmon-coloured gills, its grey annulus with narrow black edge, by the lower portion of the stem which is covered by fine black recurved hair-like fibrils on a dirty salmon-coloured or bright tawny background and finally by the lack of an obvious volva.

It is inconceivable that such a relatively large and very strikingly coloured agaric should have escaped notice in S E England, where fungi have been so intensively studied for many years. All four localities in which it has been found to date have been highly unnatural i.e. parkland, plantations and cemeteries. This suggests that the species could be a recent introduction, but if so it is remarkable that it should have become so widespread in such a short time.

A portion of the original gathering was sent to Dr C. Bas (Leiden) for comment. He remarked on its isolated position in the genus *Amanita,* with seemingly no close relatives. He also made the following observations: '*Spores* (8·7–) 9·2–10·2 (–10·8) × 6–8·8 (–9.2)μm. *Basidia* 46–56 (–64) × 11–13μm, mostly 2-spored but also some 1-, 3- or 4-spored. *Subhymenium* irregularly cellular. *Elements of volva on pileus*: Chains of subcylindrical-subfusiform elongated cells (70–280 × 8–56μm) ascending interweaving, but near the surface of pileus periclinal, in apical part of warts cells more interwoven and broader and shorter (60–140 × 35–60μm). *Stipitetrama* studied about the half-way level with acrophysalides up to 280μm long and to 41μm wide but also with many narrow to fairly broad branching 3–15μm wide longitudinal hyphae (with no or only inconspicuous oleiferous hyphae). *Trama of gills* distinctly divergent (bilateral) a rather dense central plate (frequently with relatively narrow undulating oleiferous hyphae) and two zones of up to 18μm wide divergent hyphae which all seem to be connected with the subhymenium, so acrophysalides here apparently absent'.

Amanita mairei Foley in Mém. Soc. Hist. Nat. Afrique N. 11:117–120 (1949). Figs 4a–d, 5a.

Syn.: *Amanita argentea* Huijs. in Bull. Soc. Mycol. France 75:14–24 (1959).
Amanita mairei var. *argentea* (Huijs.) Bon & Contu in Documents Mycol. 15 (59):53 (1985).
Amanita supravolvata Lanne in Documents Mycol. 9 (34):24 (1979).
Amanita argentea var. *supravolvata* (Lanne) Contu in Documents Mycol. 14 (56):26 (1984).
Amanita bertaultii Contu, loc. cit. (1984).

Pileus 10cm diam., more or less flattened to shallowly convex with a prominently sulcate-striate margin, the striae extending inward for 1–1·5cm,

surface moist, silvery-grey ornamented with large pallid patches of volval tissue. *Stipe* 7cm high, 1·5cm wide, covered with a woolly coating which disrupts into a zig-zag pattern. *Annulus* lacking. *Volva* saccate, buried deep in earth and mostly lost during collection. *Lamellae* whitish with a remarkably grey woolly edge, but becoming pinkish on drying. *Flesh* white. *Smell* slight. *Spores* non-amyloid, very variable in shape from narrowly elliptic to subcylindric, 11–14·5 × 6·2–8(–9)μm, from elliptic to broadly elliptic 10–15 × 7–9·5μm and to subglobose 9·5–12·2 × 8·5–10μm. *Basidia* 4-spored, clavate, up to 80 × 16·5μm, lacking a basal clamp-connection. *Cheilocystidia* thin-walled, clavate to obpyriform, up to 50 × 30μm, arising from small barrel-shaped segments. *Structure of volval remains on cap* entirely hyphal, consisting of interwoven, thin-walled, branched, septate hyphae, 4–6·6(–10)μm wide, some of which become converted into glassy, highly refractive oleiferous hyphae. In most of the volval patches clamps are very few or lacking, but in others, which appear to form part of the fungus and not merely extraneous tissue, clamps are not uncommon.

Habitat: deeply rooted in grass near *Quercus* sp., North Downs, 5km north-west of Sevenoaks, Kent (G.R. 500590), 28 x 1976, coll. Maj. R. Brown.

A further British collection (in K) was made during a British Mycological Society foray to South Wales and determined by C. Bas (Leiden) (under *Quercus,* St Gwynnos Forest, Glamorgan, 17 ix 1973, coll. R. Jennings.). According to a note by Bas accompanying the material the specimen was in very poor condition when found. The cap, now 4cm diam., dark mouse-grey and naked, was said to match Munsell 107R between 5/2 and 5/3 when fresh, while the striations 1·6–2·7R. The spores of this collection are smaller and tend to be more broadly elliptic to subglobose, without any which are narrowly elliptic. The broadly elliptic spores measure 8–11 × 6–9μm and the subglobose 9–11 × 8–10·2μm.

A more recent collection has been received from: a pasture, but on very edge of a plantation of Western Hemlock (*Tsuga heterophylla*) with a narrow belt of Birch (*Betula* sp.), Willow (*Salix* sp.) and Hazel (*Corylus avellana*) between fence and plantation, on limestone, south-west of Kington, Radnorshire, 24 x 1985, coll. Mrs J. Pitt & Mrs J. Weightman. The single sporophore had: pileus 14cm diam., 'light-grey becoming pale tan to margin'. The centre had a whitish pruina resembling that of certain *Clitocybe* spp. and on handling slight 'bruising' occurred to reveal a brown tone. The cap surface was streaky toward the sulcate margin. Stipe 20cm high, narrowed upward with surface disrupted into zig-zag belts of white and pale grey or tan 'scales'. Volva large, outside white, inside dove grey. A few thick velar remains on cap. Spores varying from globose to subglobose 10–11μm, to ovate or broadly elliptic 10·5–15 × 8·5–10·5μm.

The most recent gathering is a sporophore in grass under Oak (*Quercus* sp.) on neutral clay soil, near Bridport, Dorset, 9 ix 1986, coll. R. Jennings.

There is also at K, amongst the Rea drawings a coloured illustration of a specimen from Wyre Forest, Salop, 11 viii 1915, referred to *Amanita nivalis,* showing a young, as yet not fully expanded, rather robust

sporophore which lacks a ring and has a naked, whitish hemispherical-truncate cap, perhaps flushed with grey, and a sulcate-striate margin. The spores of this specimen are shown as elliptic and were said to measure 11–12 × 9μm. These spore data are strongly suggestive of *A. mairei.*

The epithet *A. mairei,* based on N African material, had been largely overlooked with regard to Europe and indeed this fungus was described from eastern France by Huijsman in 1959 under the name *A. argentea.* It was not until Malençon & Bertault (1970, 1972) drew attention to the fact that *A. mairei* was an older name for the same species, that the name became familiar to most mycologists. More recently Lanne (1979) described *A. supravolvata* from the Atlantic coast of S W France near Bordeaux, which seems to be no more than an ecological variant of *A. mairei.* Then Contu (1984) described the new species *A. bertaultii* which was said to differ from *A. mairei* in being more gracile, in having a more sheathing volva, a darker grey (not silvery) cap, and by growing in association with *Quercus.* This too seems best regarded as falling within the range of variation of *A. mairei* as indicated by Luciani (1985) and Bellù (Anon, 1985).

The Sevenoaks specimen, described in detail above agrees very closely with Foley's account of *A. mairei.* The only real difference being that the gill-edge was grey whereas that of the Algerian material was white. There is also close agreement in both spore size and shape. However, while *A. argentea* is correctly assigned to synonymy under *A. mairei* by Malençon & Bertault (loc. cit.), most accounts of the former describe the cap as naked and the spores as being rather more broadly elliptic to ovate. Nevertheless, Malençon & Bertault (loc. cit.) and Bertault (1980) have commented on the variability of the spores of *A. mairei* and while the former authors figure spores from six different collections as virtually subglobose they note that elongate spores up to 14 × 8μm occur.

A. mairei is known from North Africa: MOROCCO, ALGERIA (Malençon & Bertault, 1970) and Europe: SPAIN: (Malençon & Bertault, 1971a, b; Malençon & Llimona, 1980; Moreno, 1980; Bertault, 1983). MINORCA: (Malençon & Bertault, 1972). ITALY: (Pacioni, 1976, 1980; Cetto, 1979; Merlo & Traverso, 1982, 1983; Galli, 1983). SARDINIA: (Contu, 1984). SW, SE and eastern FRANCE: (Huijsman, 1959; Parrot, 1960, 1965; Lanne, 1979; Mesplède, 1980a, b; Chevassut, 1985). CORSICA: (Anon, 1973). SWITZERLAND: (Hotz, 1973). WEST GERMANY: near Bad Meinberg, Tubigen (Bresinsky & Haas, 1976; Bas, 1967; Krieglsteiner, 1978; Winterhoff, 1978); Saarland (Derbsch & Schmitt, 1984). EAST GERMANY: 5km NE Reichenbach, bei Bad Langensalza im Bezirk Erfurt (Gröger, 1980, 1985; Kreisel, 1987). CZECHOSLOVAKIA: (Šebek, 1978; Kotlaba, 1981). POLAND: (Wojewoda *et al.,* 1986). BULGARIA: (Kuthan & Kotlaba, 1981).

Illustrations of *A. mairei* may be found as follows:
Barla (1888, pl. 7, 1–3 as *A. strangulata*); Bas (1967, fig. 1); Cetto (1979, pl. 18); Foley (1949, pl. IV); Galli (1983, p. 87); Huijsman (1959, fig. 1); Lanne (1979, pls I–VI); Malençon & Bertault (1972, figs 11–12); Merlo & Traverso (1982, 1983, p. 47); Moreno (1980, fig. 3); Pacioni (1980, fig. 13).

Amanita ovoidea (Bull.: Fr.) Quélet in Mém. Soc. Émul. Montbéliard 209 (1872). Figs 5b–c, 6a–b, 7d.

Syn.: *Agaricus ovoideus* Bull.: Fr., Syst. Mycol. 1:15 (1821).
Amidella ovoidea (Bull.: Fr.) Gilb. in Bresadola, Iconog. Mycol. 27(1):77 (1940).

Pileus 6cm diam., shallowly convex becoming flattened toward centre,

white with rather indistinct, small, flat, brownish-grey scales at disc; margin minutely incised. *Stipe* 7·5cm high, 1·2cm wide above, expanding slightly at the rooting fusoid base to 1·8cm, white with shaggy surface below the poorly formed ring-zone, but with hint of orange-buff near base. *Annulus* represented by a vague ring-zone near apex of stipe. *Volva* saccate, with free limb about 1·2cm high, irregularly torn, white, becoming orange buff. *Lamellae* white, up to 6·5mm deep, adnate, rounded at cap margin. *Spores* 9–12·5 × 6·5–8·2μm, thin-walled, hyaline, amyloid, varying from broadly elliptic to elliptic. *Basidia* 49–62(–73) × 10–13·2μm, 4-spored, lacking a basal clamp-connection. *Structure of scales on cap*: basal tissue largely of densely entwined, branched hyphae, 3–4μm wide, with hyaline or yellowish, often slightly thickened and refractive walls. These hyphae, which lack clamps at the frequent septa, are formed of rather short to very short segments. Also present are scattered, thin-walled, hyaline, elliptic, ovate or globose elements 14–50 × 12–25, and 20–40μm respectively. However, the bulk of the tissue is formed of similar elliptic, ovate and globular elements up to 80 × 28μm and 23–56 × 20–40μm respectively, together with some thin-walled, septate, hyaline hyphae, 3–10μm wide. For the most part these elements appear to lack any defined orientation, although there is some evidence that, at the centre of the warts there may be an initial vertical arrangement which is quickly lost. In this region there are more or less erect elliptic or clavate elements 35–55 × 10–20(–28)μm and above them disorganized, predominantly ovate to globular elements with a few elliptic elements and thin-walled hyphae intermixed. No clamps were seen. *Structure of annular remains* predominantly of dissociated, elongated fusoid or clavate, thin-walled elements up to 100μm in length and 10–20μm wide, formed in branching chains, intermixed with a few oval elements and some thin-walled hyphae. *Structure of volval limb* very like that of warts on cap with a higher percentage of elongate clavate or elliptic elements.
Habitat: on grassy mown bank in garden, Marlborough, Wilts (GR: SU182688), 11 vii 1973, coll. B. Bowen. The collector noted that the bank on which it occurred is obviously a deforested area of ancient woodland and heathland adjacent to Savenake Forest.

A previous specimen from the same site was sent a few days earlier but arrived in bad condition. However the collector noted that the cap, 8cm diam., was cream, brown toward the centre, breaking up into a few large adpressed brown scales (even less pronounced than in the specimen described above), with a white appendiculate margin. The stipe was whitish, bruising brown, shaggy with a membranous ring and volva rooted in the ground. Volva free and membranous. Gills whitish-cream, free.

A. ovoidea was excluded from the British list by Dennis, Orton & Hora (1960), although there were two records from this country. However, neither is supported by material. The first report was by Bucknall (1882, p. 131) who, noting that it was new to Britain, recorded it from Abbots Leigh, Somerset, in October 1880. Unfortunately he gave very little data but wrote 'This fine species occurred on bare ground under trees in a field near Sandy Lane. One young specimen only was found, the top of the

pileus just appearing above the surface of the earth. It agrees well with Bulliard's figure, except that fragments of the volva remained attached to the pileus, forming large, flat, white warts. Unexpanded pileus $3\frac{1}{2}$ inches across, stem $5\frac{1}{2}$ inches high, 2 inches thick.' A group of three specimens was subsequently reported by G. J. Cooke (1939) from open tracks at Taverham, Norfolk, 9–13 vii 1920, on the site of a military camp. Cooke suggests it might have been introduced by troops returning from France after the 1914–1918 war ended.

The occurrence of *A. ovoidea* in Britain is surprising since it has a predominantly southern distribution in Europe occurring chiefly in Mediterranean countries. It is widespread in the Iberian Peninsula having been reported from PORTUGAL (Pinto-Lopes, 1944; Pearson, 1950; Camara, 1956) and SPAIN, where it is said to be widely distributed especially in Catalonia and Valencia: (Codina, 1926; Codina & Font-Quer, 1931; Heim, 1934; Maire, 1937; Espanã, 1943; Singer, 1947; Malençon & Bertault, 1971; Honrubia & Llimona, 1979; Moreno, Calonge & Torre, 1975; Calonge, 1979; Malençon & Llimona, 1980; Mozos & Calonge, 1982; Bertault, 1983; Rocabruna, 1984). It is also frequent on calcareous soil in MINORCA and MAJORCA (Malençon & Bertault, 1972; Knudsen & Sørensen, 1981). In North Africa it is known from MOROCCO, where it occurs but rarely, and from ALGERIA (Malençon & Bertault, 1970; Marchand, 1973). It also grows in EGYPT (Michael *et al.*, 1977) in ISRAEL (Binyamini, 1975) and CYPRUS (Nattrass, 1937), while in GREECE it is sufficiently abundant to be sold as food in Athens (Maire & Politis, 1940), while Pantidou (1980) notes that it is common in low lying pine forests in the south of the country, often forming huge fruit-bodies. There are reports from JUGOSLAVIA (Ehrne, 1967; Šebek, 1978) and ITALY, where it is said to be rarer in the north of that country (Anon, 1970; Cetto, 1979; Bernicchia & Furia, 1980; Laviano, 1980; Pacioni, 1980; Nonis, 1982; Merlo & Traverso, 1983; Galli, 1983; Violante *et al.*, 1986). It occurs in SARDINIA (Luciani, 1980; Carco & Mendolia, 1983).

In FRANCE according to Gilbert (1941a) it is chiefly of southern distribution becoming rarer northward; Kühner & Romagnesi (1953) note it as common only in central areas, although Marchand (1973) reports it as common in the South East. Parrot (1960) notes that it is rare in the South West but Chavassut (1985) lists it as common in Roussillon and Côte d'Azur. It is also recorded from Languedoc, Provence and Lower Dauphiné (Chevassut & Mousain, 1973; Girel, 1983, 1985; Chevassut, 1985) and from 'l'Ampurdan et le Levante espagnols . . . jusqu'aux environs de Paris, dans le Jura, le Doubs etc. . . .' (Marchand, 1973). However Michael *et al.* (1977) list it from Normandy and Bon (1982) and Courtecuisse (1983) from northern France. In GERMANY Ricken (1913) observed that it only occurs in the south; recent reports include those of Bresinsky & Haas (1976), Michael *et al.* (1977), Winterhoff (1978), Krieglsteiner (1983), Winterhoff & Krieglsteiner (1984). From AUSTRIA it is reported from Burgenland and Wiener Neustaadt (Michael *et al.*, 1977; Marchand, 1973) and in SWITZERLAND it is said to be rare having been reported from Ticino (Benzoni, 1931; Clemençon *et al.*, 1981; Riva, 1983). It occurs in CZECHOSLOVAKIA where it is very rare (Pilát, 1951; Šebek, 1978; Kriz, 1979) and also in POLAND (Michael *et al.*, 1977; Marchand, 1973). There are also records from RUSSIA: Zerova (1963, 1974) reports it from the Ukraine and Samgina (1981) from Kazakhstan.

Coloured illustrations of *A. ovoidea* include the following: Anon (1983, pl. 54); Barla (1859, pl. 6; 1888, pl. 2); Binyamini (1975, fig. 45); Bresadola (1927, pl. 2); Calonge (1979, fig. 81); Carcò & Mendolia (1983, pl. 91); Cetto (1979, pl. 10); Clemençon *et al.* (1981, p. 93); Galli (1983, p. 43); Girel (1983, p. 32); Lucand (1881–1896, pl. 4); Marchand (1973, pl. 103); Merlo & Traverso (1983, p. 72); Michael *et al.* (1977, pl. 158); Nonis (1982, pl. 9); Pacioni (1980, fig. 2); Richon & Roze (1885, pl. 4); Rinaldi & Tyndalo (1972, p. 22); Rolland (1910, pl. 2); Romagnesi (1962, pl. 54; 1977, fig. 77); Vittadini (1835, pl. 2); Viviani (1834–37, pl. 34); Zerova (1974, pl. 101, fig. 2). A good black and white photograph has been published by Knudsen & Sørensen (1981, fig. 2).

Amanita pachyvolvata (Bon) Reid, **comb. nov.** Fig. 8a–c.

Syn.: *Amanitopsis pachyvolvata* Bon in Documents Mycol. 8:36 (1978).

Sporophores received as an exsiccatum and the following description is based on this. *Pileus* 8cm diam,, naked, shallowly convex with slightly gibbous centre, and strongly plicate 'pie-crust' margin, snuff-brown or

grey-brown with a dark blackish-brown centre; marginal plicate zone 1cm wide and paler. *Stipe* 13cm high, 0·8cm wide at apex to 1·3cm wide at base, uniformly snuff-brown thoughout. *Annulus* lacking. *Volva* firm, substantial and very thick, up to 6cm high, varying from 4–8·5mm in thickness, slightly flared above, creamy-white, pale snuff-brown internally. *Lamellae* ochraceous with slightly darker edge. *Spores* non-amyloid, globose or occasionally subglobose, 11–12μm diam. *Basidia* 4-spored, 56–71 × 15–17·5μm. *Structure of volva* comprising thin-walled, hyaline, septate hyphae, 4–8μm wide, intermixed with fewer broader hyphae up to 16·5μm wide, all lacking clamp-connections. These hyphae are somewhat interwoven but in parts, at least, appear to have an erect parallel orientation.
Habitat: near *Pseudotsuga douglasii,* Westonbirt arboretum, Silkwood, Gloucestershire, viii 1980, coll. G. Stone.

This specimen in which, according to the collector, neither the cap nor stem has changed appreciably in colour on drying, agrees closely with Bon's account of *A. pachyvolvata.* The only discrepancies are that the stipe of the Gloucestershire specimen is uniformly snuff-brown whereas according to Bon (1979a) in his material it was 'd'abord blanc, un peu floconneux puis + ou − chiné de gris-jaunâtre'. Further, Bon notes that toward the centre the cap cuticle was 'moucheté ou + ou − rivuleux par de fines squamules concentriques d'un beige + ou − brunâtre sur fond gris − fauvâtre on bistré'. This character is not obvious in the above material but observation of such detail is very difficult on a dried specimen where the cap surface is closely and minutely wrinkled. However, a subsequent specimen from the same locality does show this feature (see below). Another interesting observation by the collector was that the fungus had been observed in the same locality in the previous year (and subsequently), and that it had the same massive volva on each occasion. This is in agreement with Bon's (loc. cit.) observations which suggest that the development of the exceptionally thick volva is a constant character and not merely an accidental feature brought about by response to local environmental conditions. It does not exclude the possibility that this feature represents a genetic variant of some existing species such as *A. umbrinolutea* (Gillet) Bataille.

In addition to the collection cited and described above a second specimen from the same locality was received from Mr G. Stone in the autumn of 1981 (without precise date) with a note that the colour had not changed on drying. The sporophore has a uniformly deep buff cap, which under a lens can be seen to have a minutely scurfy or felty appearance at the disc. The latter feature is in agreement with Bon's observations.

Bon (loc. cit.) has discussed the similarity of *A. pachyvolvata* with *A. magnivolvata* Aalto, which differs markedly in having broadly elliptic spores 10–14·5 × 8–11·5μm, and a cap which is grey with slight olive tinge, but nevertheless has a similar robust appearance and strikingly thick volva. However, *A. magnivolvata* seems much closer to *A. mairei* Foley [*A. argentea*]. Less easy to separate from *A. pachyvolvata* is *A. umbrinolutea* which has similar colouring, and similarly shaped spherical spores. However, *A. umbrinolutea* lacks a strikingly thick, firm volva.

The specimens from Gloucestershire represent the first British records of *A. pachyvolvata*. Elsewhere it seems to be known only from the type locality in FRANCE (Lac du Bouchet, environs of le Puy, Haute Loire, under *Picea* and *Abies*), and WEST GERMANY (Krieglsteiner, 1984).

A. pachyvolvata has been figured in colour by Bon (1979a, pl. 88) and Krieglsteiner (1984, p. 190).

Amanita submembranacea (Bon) Gröger in Boletus 3:27 (1979). Figs 7a–c, 10a–b.

Syn.: *Amanitopsis submembranacea* Bon in Bull. Mens. Soc. Linn. Lyon 44:176 (1975).

Amanita submembranacea (Bon) Gröger var. *griseoargentata* Contu in Documents Mycol. 17(65):62 (1986).

Pileus 6·5–7cm diam., broadly campanulate or convex becoming shallowly convex to almost flattened, vandyke brown with a paler plicate 'pie-crust' margin, ornamented at the disc with thick, flattish, grey remnants of the universal veil. *Stipe* 13–16cm high, 0·8–1cm wide at apex, 1·5–1·6cm wide at the somewhat swollen base, surface disrupting below into grey or greyish-white, floccose zig-zag scales, but appearing more patchily stippled above; with age these scales may become more brownish in colour. Toward the extreme base of the stem some of the scales may form prominent bands or even a false ring-zone. *Annulus* lacking. *Volva* felty-membranaceous, saccate, often lobed or torn, closely adpressed and virtually fused with the base of the stem before becoming free and flaring abruptly, entirely grey both inside and out, although sometimes whitish below where buried in leaf litter. In some specimens the colour is more blue-grey on the inside and more of a brownish grey on the exterior passing to brownish at the extreme base. *Lamellae* white, becoming dirty white; in one collection almost all the gills reaching the stem with only a few short gills interposed. *Spores* thin-walled, hyaline, non-amyloid, varying from globose to subglobose with prominent apiculus, 9–13μm or (8·5–)9·75–14 × (8–)8·5–12·2(–13)μm. *Basidia* 42·9–66(–75) × 14–20μm, 4-spored, clavate. *Structure of volval tissue* comprising roughly equal proportions of hyphae and sphaerocysts. The hyphae, 3–10μm wide, have thin but distinct walls, are septate and may be encrusted with pigment but clamp-connections are lacking. The hyphal segments are often variously inflated and become transformed into sphaerocysts, 18–65μm diam., which are mostly born terminally.

Habitat: Under beech, Burnham Beeches, Bucks, 2 x 1960, coll. D. A. Reid; in mixed woodland, Gloucestershire, 12 x 1975, K. G. Preston-Maffham; Ranmore Common, Surrey, 10 x 1980, coll. P. Karpeles, leg. Audrey Thomas; also 19 ix 1981 & 1 x 1983, leg. D. A. Reid & Audrey Thomas; Burnham Beeches, between Egypt and Farnham Common, x 1980, coll. Mary Williams; under conifers, Glen Cloy track, Arran, ix 1981; in deciduous woodland, Grayswood, Surrey, 1 ix 1983, coll. R. Milton; Shelley's Wood, Christ's Hospital, Horsham, Sussex, 27 ix 1983, coll. Dr & Mrs Lewis; Windsor Great Park, Egham, Surrey, 15 x 1983; Epping Forest, 29 x 1983, coll. D. A. Reid & Audrey Thomas; Bedgebury Pinetum, Kent, 24 xi 1983, coll. Mrs J. Webb. Also many more recent collections.

Var. **bispora** Reid, **var. nov.** Fig. 9a–d.

A typo differt basidiis bisporis.

Type: Montain Wood, Ranmore, Surrey, 28 ix 1980, leg. D. A. Reid (**holo.** K).

This variety, of which the author has a coloured illustration, differs from the type variety in having regularly 2-spored basidia measuring 40–50 × 15·4μm, which is somewhat smaller than the basidia of the 4-spored variety. However, despite their origin from 2-spored basidia the spores fall within the same size-range as those of var. *submembranacea* i.e. globose 9·5–12μm or subglobose 9·75–12 × 9·5–11·5μm [measured from the spore-print]. Examination of spores taken from the gill tends to show a higher percentage of subglobose spores (8·75–)9–12(–13·2) × 8·2–10·5(–12.2)μm. Volval structure is exactly comparable with that of the type variety. Macroscopically there is close agreement with var. *submembranacea*: the pileus, 7cm diam., and vandyke brown with paler plicate margin, is shallowly convex with prominent central umbo, but lacks all trace of volval remains, while the stipe up to 15cm high, and 1·5cm wide below is ornamented with grey zig-zag scales. The volva shows the same abruptly pinched-in base and flared mouth, and is grey both inside and out except for the extreme base which is whitish due to having been buried in leaf litter. The lamellae are pinkish.

A. submembrancea would seem to be not uncommon in the South and West of the British Isles, although Nethercoat (1986) has listed it from Holmesfield Wood, Yorkshire, but in the past it has doubtlessly been confused with *A. vaginata* (Bull.: Fr.) Vitt. and *A. inaurata* Secr. It is readily distinguished from the former by having a grey volva and also from the structure of the volval tissue which comprises a large number of sphaerocysts whereas in *A. vaginata* it has a hyphal construction. From *A. inaurata* it is separated by being less robust and in having mouse grey rather than dark grey or blackish volval remnants on the cap. These volval remains are more cohesive and have a submembranous rather than powdery texture. In addition, the volva of *A. submembranacea* is well developed and saccate while in *A. inaurata,* due to its powdery nature, it is usually poorly formed and adpressed to the stem.

It should be noted that Gröger (1979) has observed that the volva of his material was coloured lightly, usually whitish, and only in the upper lobed part light grey. A similar situation was observed in one of the British gatherings where the lower portion of the volva was white, but this was thought to be due to its having been buried in leaf-litter.

Another point which requires comment is that whereas the continental material seems to occur mainly on acid soils, associated with conifers this is not the case with the British specimens and indeed the Ranmore area is calcareous. However Trimbach (1983) has reported an alpine form growing on calcareous soil or soil which was not very acid in South Eastern France.

A submembranacea is known from North Africa: MOROCCO: Tangiers where it is rare (Bertault, 1965, sub *A. inaurata* p. 368; 1980) and Europe: NORWAY: (Brandrud & Bendiksen, 1984; Bendiksen, 1986). DENMARK: (Knudsen & Sørensen, 1980; Brandt-Pedersen & Svane, 1983). FRANCE: North Eastern Region (Courtecuisse, 1982); South Eastern Region of Verlay (Bon, 1975); Kruth-Haut-Rhin (Courtecuisse, 1982); Pralog en Vanoise (Trimbach, 1983); St

Georges d'Esperanche (Poisy, 1984). WEST GERMANY: Southern Bavaria, Northern Bavaria, Baden-Wurttenberg, Rheinhessen, South Lower Saxony (Krieglsteiner, 1984); Berchtesgaden National Park (Schmid-Heckel, 1985). EAST GERMANY: not uncommon Pappenheim, Thuringer Wald, also Suhl and possibly Vogtland also Hügelland, Dresden, Karl-Marx-Stadt (Gröger, 1979; Kreisel, 1987). AUSTRIA: (Krieglsteiner, 1984). ITALY: (Bernicchia & Furia, 1980; Merlo & Traverso, 1983). SARDINIA: (Anon, 1980).

Illustrations of *A. submembranacea* have been published as follows: Bon (1975, fig. 5); Gröger (1979, p. 29); Knudsen & Sørensen (1980, fig. 2); Krieglsteiner (1984, p. 190); Merlo & Traverso (1983, p. 48).

Amanita umbrinolutea (Gillet) Bataille in Bull. Soc. Mycol. France 26:139 (1910). Figs 11a–c, 14d.

Syn.: *Amanita inaurata* var. *umbrinolutea* Gillet, Hyménomycètes, 42 (1874).

Amanita umbrinolutea Secr., Mongr. Suisse 1, 34 (1833); (nom. inval.).

Amanitopsis umbrinolutea (Secr.) Gilb. in Bull. Soc. Mycol. France 44:164 (1928).

Amanita vaginata var. *umbrinolutea* (Secr.) Gilb., Le genre Amanita Pers., 146 (1978).

Amanitopsis battarae Boud. in Bull. Soc. Mycol. France 18:272 (1902).

Amanita vaginata var. *battarae* (Boud.) Konrad & Maubl., Icones Fungorum 6:35 (1930).

Amanita battarae (Boud.) Bon in Documents Mycol. 16(61):16 (1985).

Sporophores robust to medium-sized. *Pileus* to 9cm diam., conical then flattened and finally deeply concave with prominent obtuse umbo; margin conspicuously sulcate. Colour either uniformly ochraceous-buff, or ochraceous-buff with dark brown umbo and submarginal zone at the inner limit of the sulcae, surface smooth, moist, devoid of volval remains. *Stipe* to 16cm high, 2cm wide at base, narrowing to 1cm at the apex, tinged ochraceous-buff and with the surface disrupting into indistinct pallid zig-zag scales on the lower portion. *Annulus* lacking. *Volva* well developed, thick, sheathing, concolorous with pileus both inside and out. *Lamellae* whitish, faintly tinged with buff. *Spores* globose to subglobose with prominent apiculus, 10–12μm diam., thin-walled, hyaline, non-amyloid, smooth in profile but an appreciable number in some mounts showing what appears to be an internal but conspicuous reticulum* with the meshes about 2μm diam. *Basidia* 50–75 × 16μm, 4-spored, almost lanceolate, broadest above the mid-point before narrowing to the apex, thin or sometimes thick walled, the latter with a conspicuous, dense granular subsurface ornament; basal clamp lacking. *Cheilocystidia* not recovered. *Structure of volva at stem base* comprising: (1) branching,

*In connection with the occurrence of spores showing what appears to be an internal reticulum in the collection of *A. umbrinolutea* from Epsom Common, it is noteworthy that on two prior occasions collections of *A. gemmata* (Fr.) Gill. have been observed by Dr B. M. Spooner, Royal Botanic Gardens, Kew, with spores showing precisely the same phenomenon. One collection from under pines, near Weymouth, Dorset, xi 1984, coll. Eileen Chataway, had started to decompose in transit, but another from mixed woodland, Windsor Great Park, Egham, Berks, 18 x 1986, was in good condition when studied. See Fig. 14.

hyaline hyphae, 5–8μm diam., with thin but distinct walls, lacking clamp-connections at the septa; (2) ovoid to globular, thin-walled, hyaline elements to $60 \times 40\mu$m, these formed by local inflation of individual hyphal segments. In the volval tissue the hyphae are dominant.
Habitat: Prince's Covert, Epsom Common, 1 xi 1984, coll. C. Whaley.

The collection cited above comprised three sporophores; the large one described had a dark umbo and submarginal band of colour at the inner limit of the sulcae, while another, equally large had a uniformly coloured cap lacking all trace of a darker submarginal zone; a third specimen, somewhat smaller, also lacked this dark colour-zone. These data confirm the observations of a number of European authors as to the unreliable nature of this particular character.

This collection of *A. umbrinolutea* represents the first authentic British record of the species backed by herbarium material. Although Kibby (1979) illustrates it in his book *Mushrooms and Toadstools* (p. 59, fig. 2) it is unsafe to assume that it constitutes a record of its occurrence in this country for the author includes a number of species which are not British. However if Kibby, when referring to its frequency as 'uncommon', intended this observation to apply to its status in the British Isles, then it would be very misleading as it is extremely rare here.

The nomenclature of *A. umbrinolutea* is complicated. Initially Secretan (1833) described this species clearly and recognizably, but because he used a trinomial system of classification his names are to be rejected as invalidly published according to the ICBN (Sydney) (Art. 23.6(c) ex. 10). Since Gillet (1874) was the next author in line to take up the epithet, albeit as a variety of *A. inaurata,* the epithet has to be ascribed to him.

When Secretan (1833) published his account of *A. umbrinolutea* he described it as having a viscid cap devoid of warts, which was at first conical then plane with a central boss, varying in colour from pale bistre-yellow to darker with a nuance of blackish toward the centre, and finally pale bistre with the centre remaining blackish, and the margin blackish with striae about 1·5cm long. The gills were said to be white with a black dotted edge; the stipe white with plushiness in the form of interlaced striae, and a membranous volva. It was collected under *Abies* at the end of September, Chalet à Gobet, Switzerland.

When Gillet (1874) published his very brief account of the fungus he named *A. inaurata* var. *umbrinolutea* he merely noted the cap was pale bistre-yellow with darker centre and that the stipe was white and plushy. Clearly he had the same fungus as that described by Secretan. The British material closely matched these descriptions with the exception that it lacked a dark gill-edge. However, according to Gilbert (1941a) this is a feature which develops in age.

Amanita umbrinolutea has been reported from most European countries and appears to be fairly frequent in both montane and lowland regions. It is known from North Africa: Morocco. Europe: Spain, France, Belgium, Netherlands, West Germany, Switzerland, Italy, Jugoslavia, Czechoslovakia, Poland, Norway, Finland, Russia (Leningrad area).

However, in view of its rarity in Britain it is perhaps significant that Courtecuisse (1982) notes that it is fairly rare in northern France

becoming more frequent toward the south. Unfortunately there is considerable variation in regard to cap colour judged by various accounts in the literature, some indicating that it can even be quite dark grey brown. This could be taken to indicate that more than one species might be involved, were it not for the following observations by Gilbert (1941a) 'Cette variété est extrêmement instructive parceque, aux trois stades de son développement, elle se présente sous trois aspects si distincts que personne ne peut songer à les réunir. En effet, très jeune, elle est blanc verdâtre plus ou moins jaunissant, ou blanc olivacé, adulte, elle est brun d'ombre plus ou moins foncé, et, à maturité, elle devient plus ou moins progressivement gris noirâtre et c'est alors seulement qu'apparaît, sur une minorité infime de carpophores, cette zone annulaire qui a tant attiré l'attention des descripteurs qu'ils ont fait passer cette particularité, presque négligeable, avant les caractères véritables.

Au sortir de la volve, le champignon est facile à reconnaîte, mais à mesure qu'il grandit, il devient plus difficile á distinguer des formes typiques du *A. vaginata,* qui présentent aussi une zone submarginale plus foncée, mais par temps très pluvieux seulement'.

A. umbrinolutea has been illustrated in colour by Anon (1975, p. 44); Calonge (1979, fig. 87c); Cetto (1979, pl. 17); Clemençon *et al.* (1981, p. 7); Dahncke & Dahncke (1980, p. 227); Galli (1983, p. 91); Gilbert (1941b, pl. 4); Heim (1929, pl. 29); Merlo & Traverso (1983, pl. 40); Romagnesi (1962, pl. 48).

Amanita umbrinolutea var. **flaccida** Reid, **var. nov.** Fig. 12a–c.

A typo differt sporophoro gracili fragili delicato; pileo grandi usque 10·5cm diam., flaccido pallide griseo-brunneo in centro fusco ad marginem conspicue sulcato; stipite brevi fragili delicato, 8·3cm alto, pallide aureo-brunneo exannulato volvato; volva parvula extra laete rufo-brunnea interna grisea; lamellis albis ad marginem minute fusco-punctatis. Characteribus microscopicis a varietate typica (var. *umbrinolutea*).

Sporophore gracile, fragile and delicate. *Pileus* large, flaccid, to 10·5cm diam., becoming plane and finally plano-concave, smooth, thin-fleshed, pale grey-brown, darker at the depressed disc; margin conspicuously sulcate for almost half the radius of the cap. *Stipe* 8·3cm high, tapering upward from 1cm diam. at the base to 0·7cm at the apex, pale golden brown with the surface disrupting into darker brown zig-zag floccose markings. *Annulus* lacking. *Volva* very short and spreading, less than 2cm high, bright red-brown externally, pale grey internally. *Lamellae* white, but with minutely punctate dark brown edge (sub lente) most conspicuous toward the cap margin, but scarcely visible to the naked eye. *Spores* globose to slightly subglobose with prominent apiculus, 8·75–11μm diam., smooth, thin-walled, hyaline, non-amyloid. *Basidia* 40–53 × 13–16μm, 4-spored, clavate or broadest above the mid-point before narrowing to the apex, thin-walled, lacking a basal clamp-connection. *Cheilocystidia* not recovered. *Structure of volva at the stem base* comprising both hyphae and sphaerocysts with the hyphae dominant as in var. *umbrinolutea.*

Habitat: in grassy ride through mixed woodland, with nearby trees including *Picea, Betula* and *Crataegus,* Madehurst, West Sussex, 11 viii 1982, coll. D. A. Reid & Audrey Thomas (**holo.** K).

The feature of this variety is the large floppy cap supported by a remarkably short and narrow stem, with a very small spreading red-brown volva. It is quite atypical of species of *Amanita* section *Vaginatae* to have a cap diameter in excess of the height of the stem, and likewise to have such a large floppy cap supported by such a delicate stipe with such a small spreading volva. However, the microscopic data match those of *A. umbrinolutea* (Gill.) Bataille.

Amanita vittadinii (Moretti) Vitt., Tent. mycol. s. Amanita Ill., 31, pl. 1 (1826). Fig. 13a–c.

Syn.: *Agaricus vittadinii* Moretti in Giorn. Fis. 9:66 (1826).
Lepiota vittadinii (Moretti) Quélet in Mém. Soc. Émul. Montbéliard, Sér. 2, 5:326 (1873).
Lepidella vittadinii (Moretti) Gilb. in Bull. Soc. Mycol. France 41:304 (1925).
Aspidella vittadinii (Moretti) Gilb. in Bresadola, Iconog. Mycol. 27(1):79 (1940).
Armillaria vittadinii (Moretti) Locq. in Bull. Soc. Mycol. France 68:167 (1952).

Pileus 8–16cm diam., hemispherical to shallowly convex, whitish, varying in ornamentation according to the specimen. In some young sporophores the cap is ornamented with pale brown, densely crowded, upturned squarrose scales especially toward the margin, and a few darker grey-brown pyramidal warts in the vicinity of the disc. In larger sporophores the cap is ornamented with thick, crowded flat-topped, polygonal buffy-brown patches of volval tissue at the centre which give way to thin squarrose or adpressed brown scales toward the margin. Margin conspicuously over-reaching the lamellae for up to 1cm in young sporophores, and strongly striate on the inside from the impression of the gills. *Stipe* 12–16cm high, 2–5·5cm wide, cylindric, white, usually with yellow tint near base, ornamented below the thick spreading annulus with striking bands of dark brown to almost black squarrose scales. *Annulus* spreading, cog-wheel-like as in the *Agaricus arvensis* group, white above, but with thick floccose buff-coloured scales on the underside. *Lamellae* up to 1·5cm deep, rounded at the margin of the cap, pale yellowish-cream. *Flesh* white, but pale lemon yellow in the stem except for the central strand. *Smell* strong, unpleasant, dried material also has a strong unpleasant pungent smell. *Spores* amyloid, varying from elliptic, 9·2–11·2 × 7–7·2μm, to broadly elliptic or ovate, 9–11·5(–13) × 8–9·5(–10)μm. *Basidia* 57–62 × 10–14μm, 4-spored, clavate with a basal clamp-connection. *Structure of warts on cap* comprising densely crowded, vertical, thin-walled, elliptical elements, up to 90μm long and 30μm wide, in chains, intermixed with occasional ovate elements up to 40 × 26μm. *Structure of annulus* comprising similar elements to those described above. *Habitat*: in grazed pasture, Houlton near Oxford, 5 x 1976, coll. M. P. Hassell [a large collection with specimens in all stages of development].

The only other recent British collection at K is that from the Glasshouse Crops Research Institute, Rustington, West Sussex, 10 xi 1978, coll. P. Bisset. This material, received in poor condition, is

accompanied by colour transparencies showing a young and old sporophore—the latter evidently past its prime when collected. Nevertheless although the specimens are shown as being more grey than the material from Houlton, and the stipe of the older sporophore having lost virtually all trace of squarrose scales, the microstructure accords closely with that of *A. vittadinii*.

Two much earlier gatherings at K were examined by Berkeley: Overton Longueville, Hunts, 22 vi 1853; Diss, Norfolk, 1859. Both are probably correctly named, although microscopic examination is difficult.

As with the two previous records most of the published data from the British Isles refers to material collected in eastern England, and more particularly from Norfolk. The first record appears to have been from Wymondham, vii 1847, collected by Rev. Badham, and illustrated by Hussey (1847, pl. 85) such that its authenticity is beyond doubt. Three further gatherings are detailed by Plowright (1873) from 'under a gorse fence at Billingford in June 1856; .. at Kenninghall in September 1859, and it occurred again in 1862 at Royden near Diss'. There is a further indication that Plowright may have seen additional specimens from Norfolk in 1901, since his unlocalized material on display at a B.M.S. Foray at Exeter probably came from his home county (Anon, 1902). Another record is based on a painting (in K) by Miss E. M. Wakefield of a specimen collected by C. H. Hubbard from under a Yew tree, but without further collection data beyond giving the county as Norfolk.

There are also two records from Swarraton, Hampshire: the first based on a drawing in the Rea collection (at K) made from material collected, 28 viii 1901 on the Downs; the second collected in September 1808 (Anon, 1909). Finally there is a record from S W Yorkshire (Mason & Grainger, 1937).

A. vittadinii occurs in North Africa where it is rare although sometimes locally abundant. It is known from MOROCCO and ALGERIA (Bertault, 1964; Malençon & Bertault, 1970). There are also records from the Middle East: ISRAEL (Binyamini, 1975). In Europe it has a predominantly southern and central distribution, occurring sporadically further north, but it is nowhere common. It is reported from PORTUGAL: rare (Camara, 1956). SPAIN: rare (Font-Quer, 1937; Maire, 1937; Zugaza *et al.*, 1977; Calonge, 1979; Rocabruna, 1984), but abundant in the vicinity of Aveinte (Avila) (Moreno, 1980). FRANCE: rare and chiefly of central and southerly occurrence (Gillet, 1874; Gilbert, 1941a, Kühner & Romagnesi, 1953; Remy, 1964; Mesplède, 1980b; Chevassut, 1985). ITALY: uncommon (Bernicchia & Furia, 1980; Pacioni, 1980; Cetto, 1979; Merlo & Traverso, 1983; Galli, 1983). BULGARIA: (Hinkova, 1955; Hinkova & Stoičev, 1983). ROUMANIA: (Eliade, 1965). RUSSIA: Ukraine (Wasser, 1973, 1974; Zerova, 1963, 1974). Kazakhstan (Burova & Nezdoiminogo, 1982). Turkenistan: (Batyrova, 1985). Uzbekistan: (Petrova, 1985). HUNGARY: (Bas, 1969; Babos, 1982). POLAND: (Bas, 1969). CZECHOSLOVAKIA: (Krombholtz, 1836; Fabry, 1967; Bas, 1969; Dermek, 1976, 1977; Landa, 1981; Hlaváček, 1982; Biber, 1984). GERMANY: (Ricken, 1913) and NETHERLANDS: (Bas, 1969; Arnolds, 1984).

Amongst the illustrations of this species may be cited Bas (1969, figs 27, 28); Calonge (1979, fig. 89); Cetto (1979, pl. 16); Dermek (1977, pl. 170); Font-Quer (1973, p. 19); Galli (1983, p. 39); Gilbert (1941b, pls 59, 60); Hussey (1847, pl. 85); Krombholz (1836, pl. 27); Landa (1981, figs 31, 32); Marchand (1971a, pl. 12; 1971b, pl. 186); Merlo & Traverso (1983, p. 116); Pacioni (1980, fig. 11); Zerova (1974, pl. 106, fig. 1).

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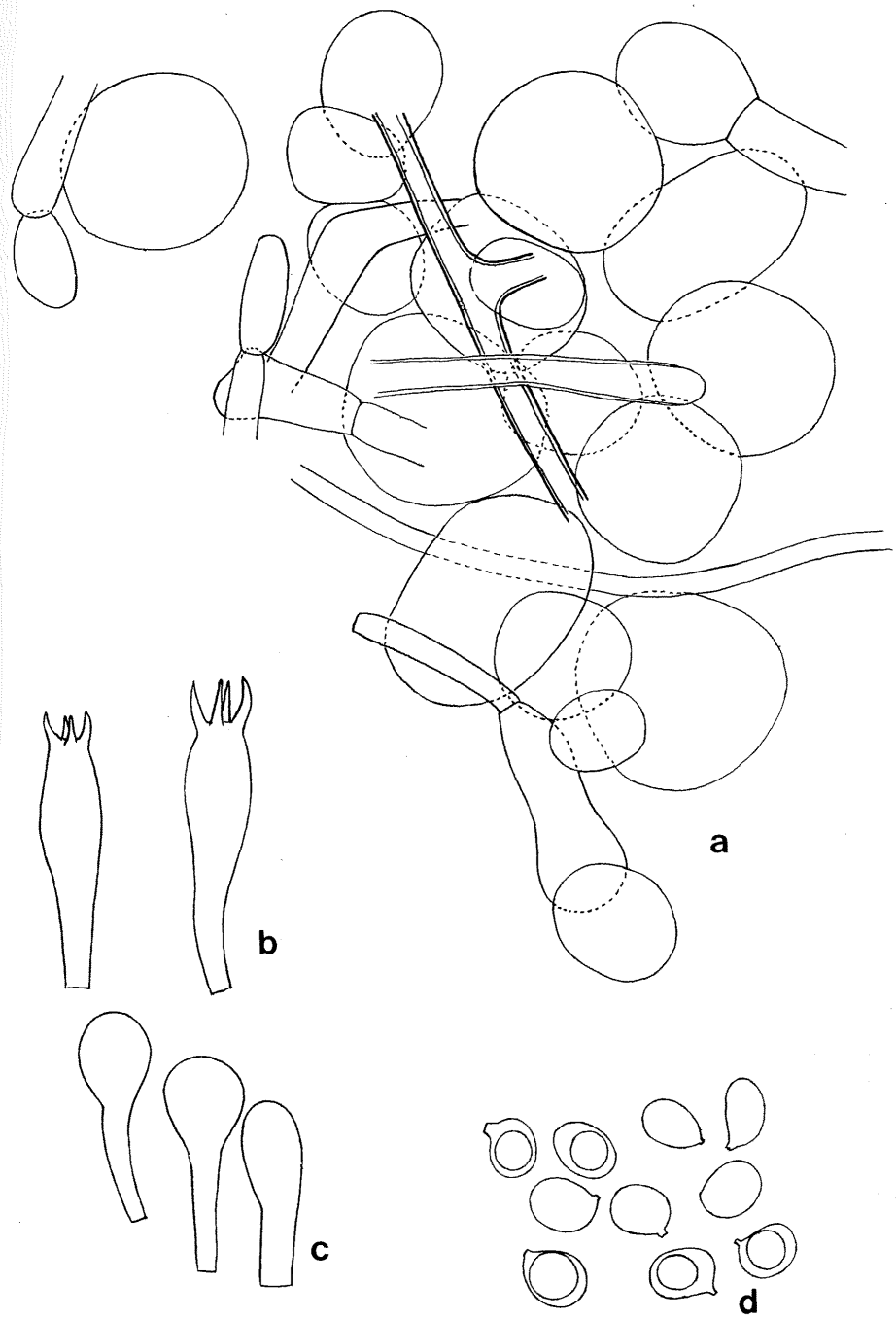


FIG. 1. *Amanita friabilis*: a, structure of velar remains on pileus; b, basidia; c, sterile cells on gill-edge; d, spores. All ×666.

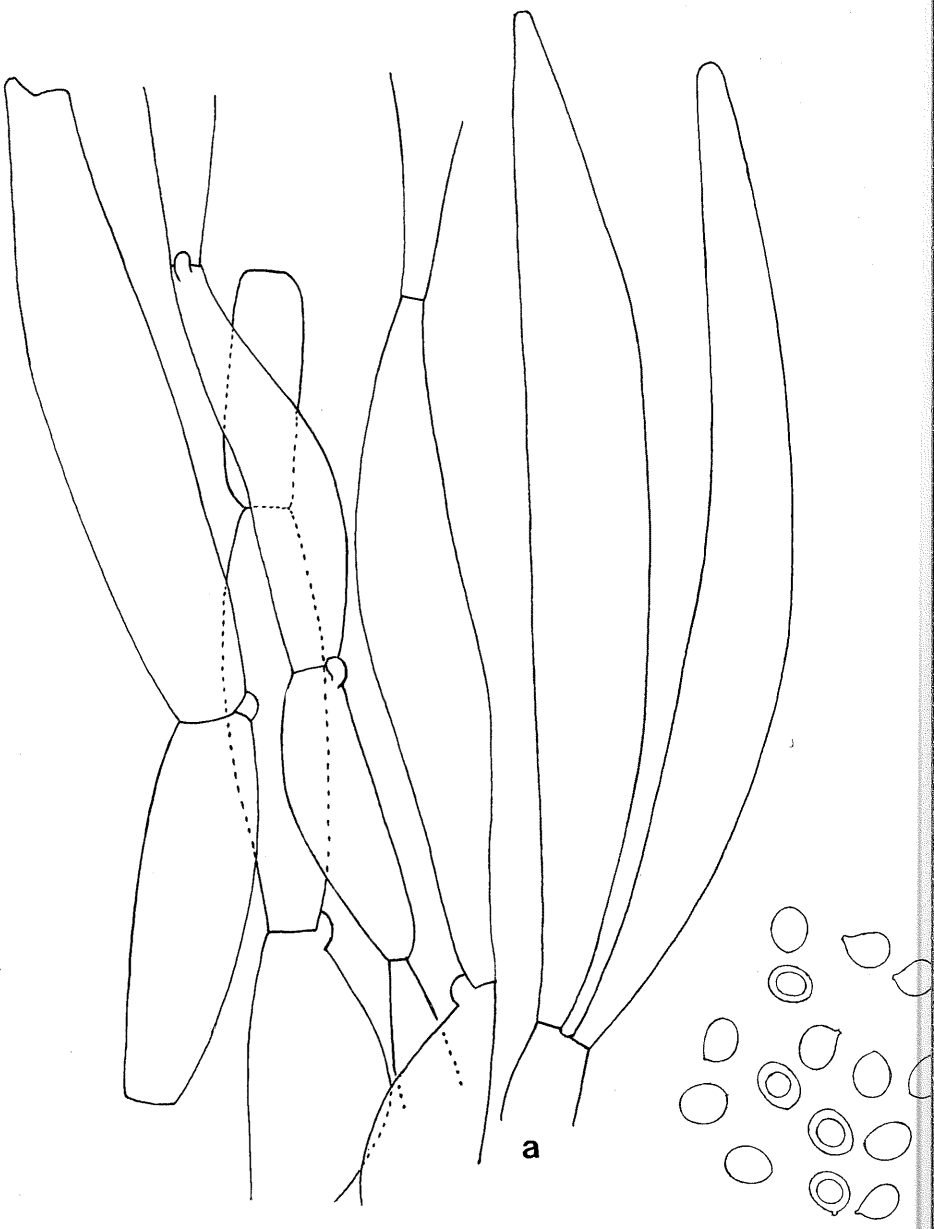


FIG. 2. *Amanita inopinata*: a, structure of basal portion of wart on pileus; b, spores. Both from Type material and × 666.

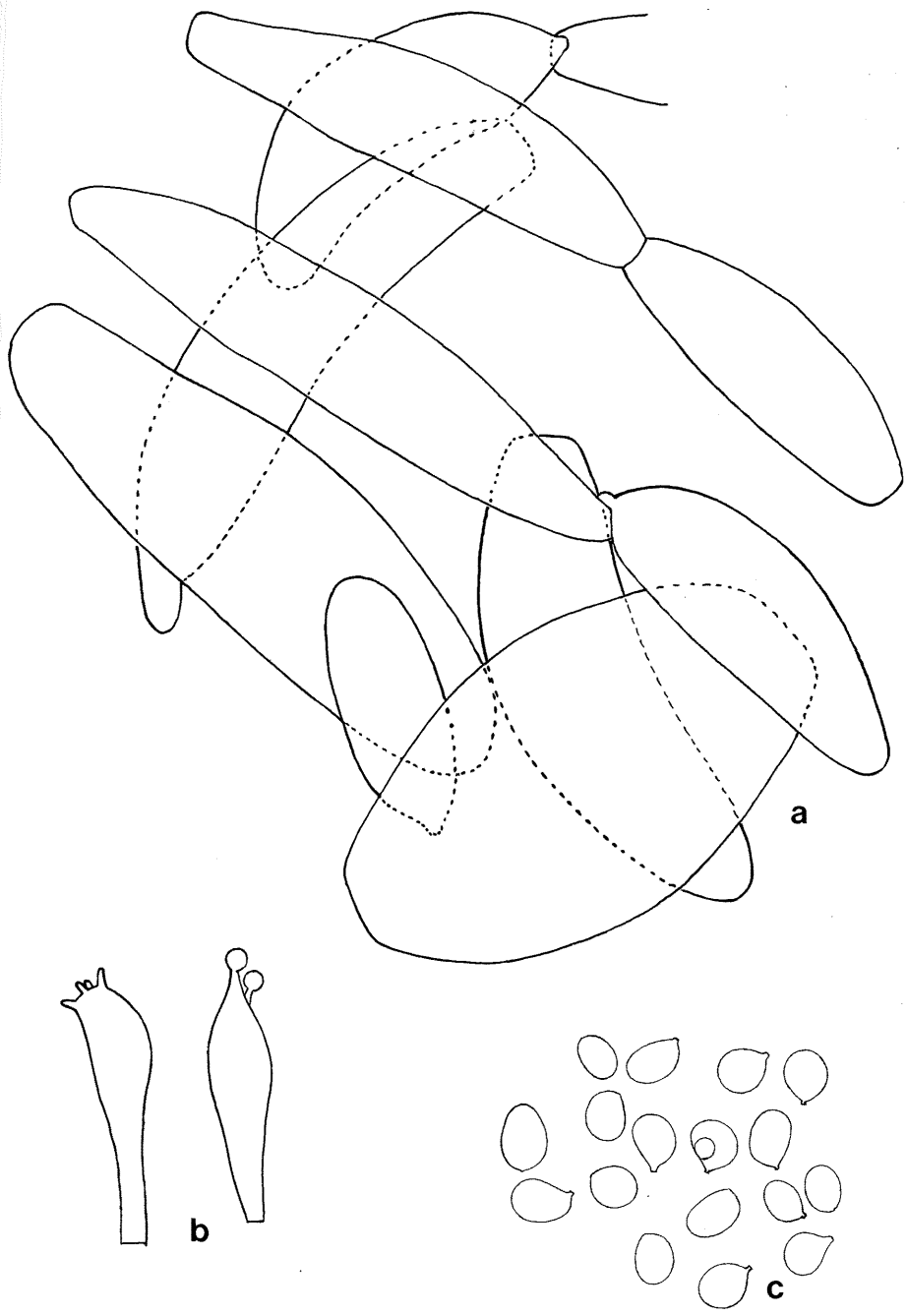


FIG. 3. *Amanita inopinata*: a, structure of apical portion of wart on pileus from Type material; b, two- and four-spored basidia; c, spores. Both from Kingston Cemetery collection. All ×666.

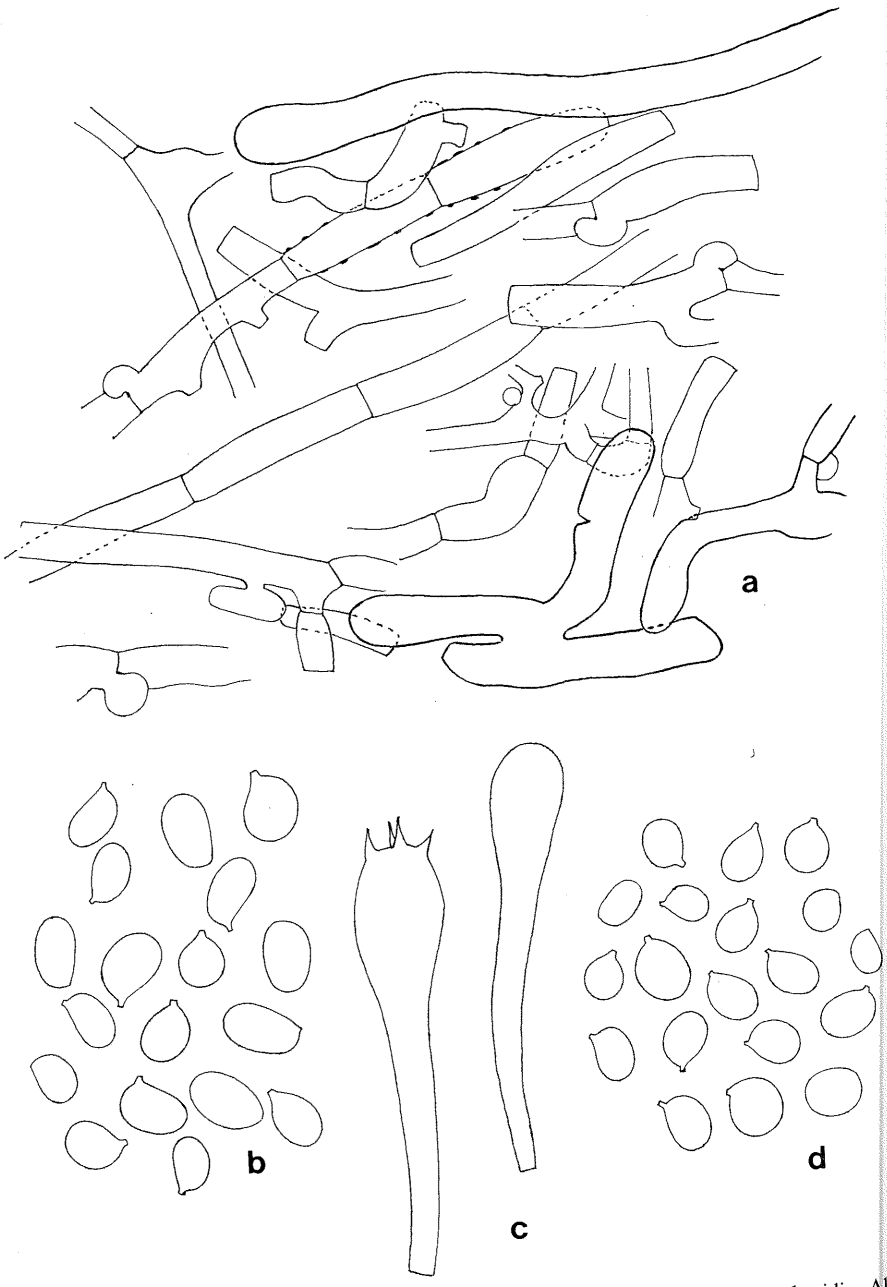


FIG. 4. *Amanita mairei*: a, structure of volval remains on pileus; b, spores; c, basidia. All from Sevenoaks collection, d, spores from Kington collection. All ×666.

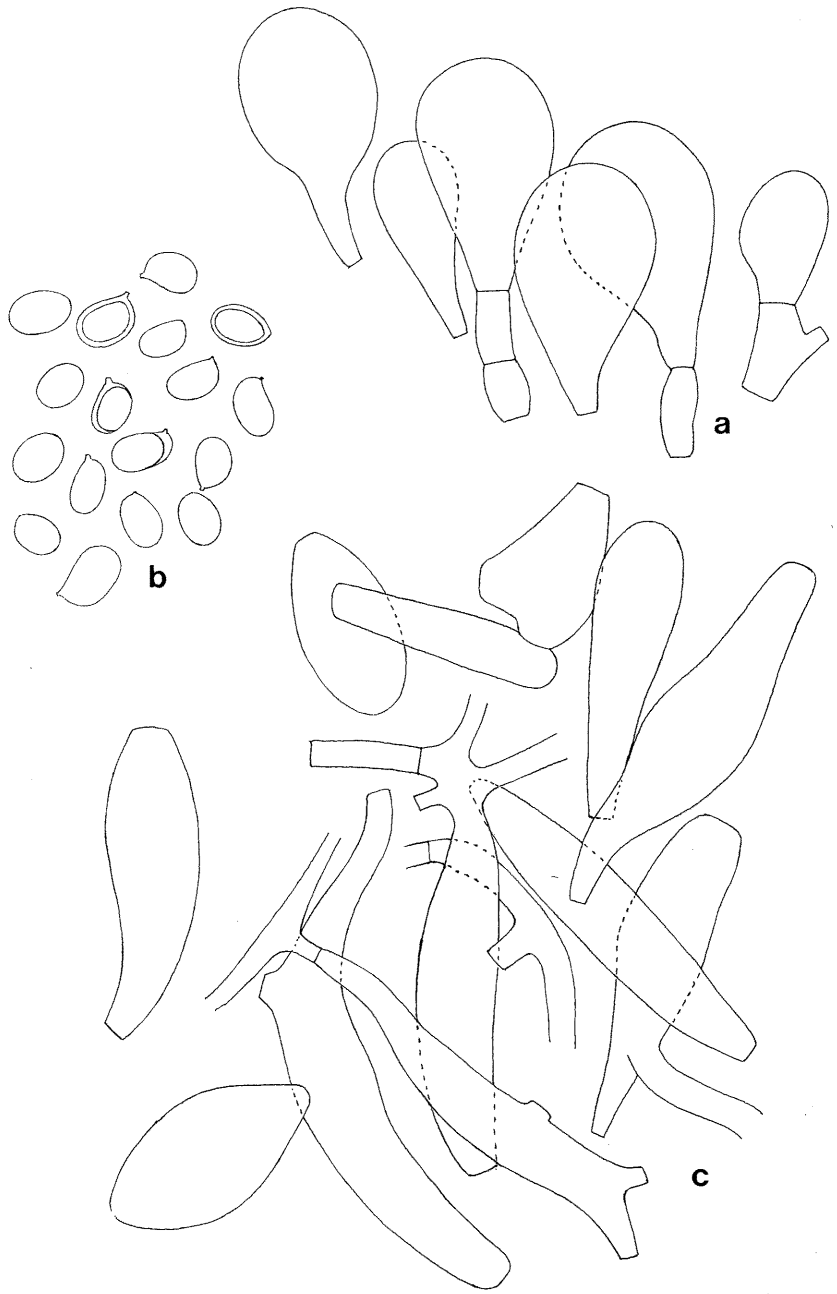


FIG. 5. *Amanita mairei*: a, cheilocystidia from Sevenoaks collection. *Amanita ovoidea*: b, spores; c, structure of annulus. All ×666.

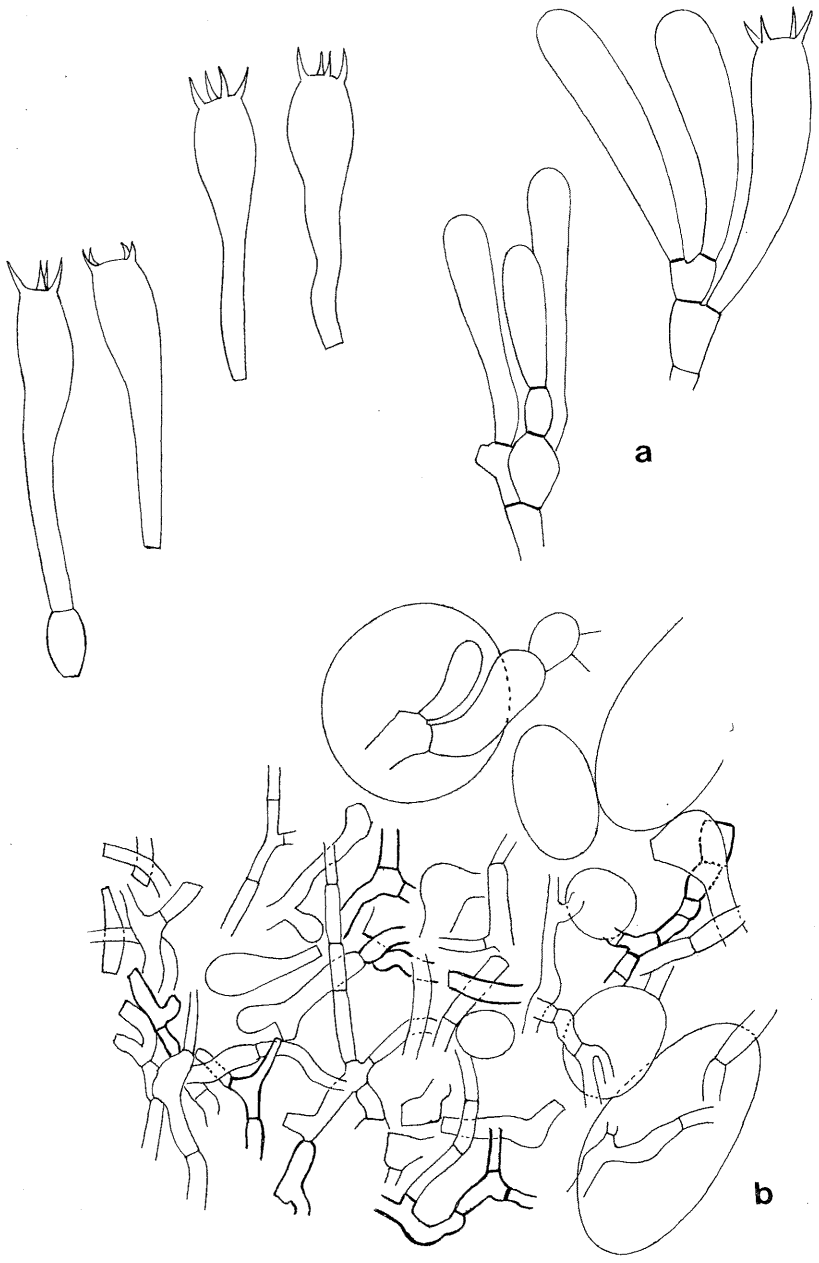


FIG. 6. *Amanita ovoidea*: a, basidia; b, structure of basal portion of scale on pileus. A
× 666.

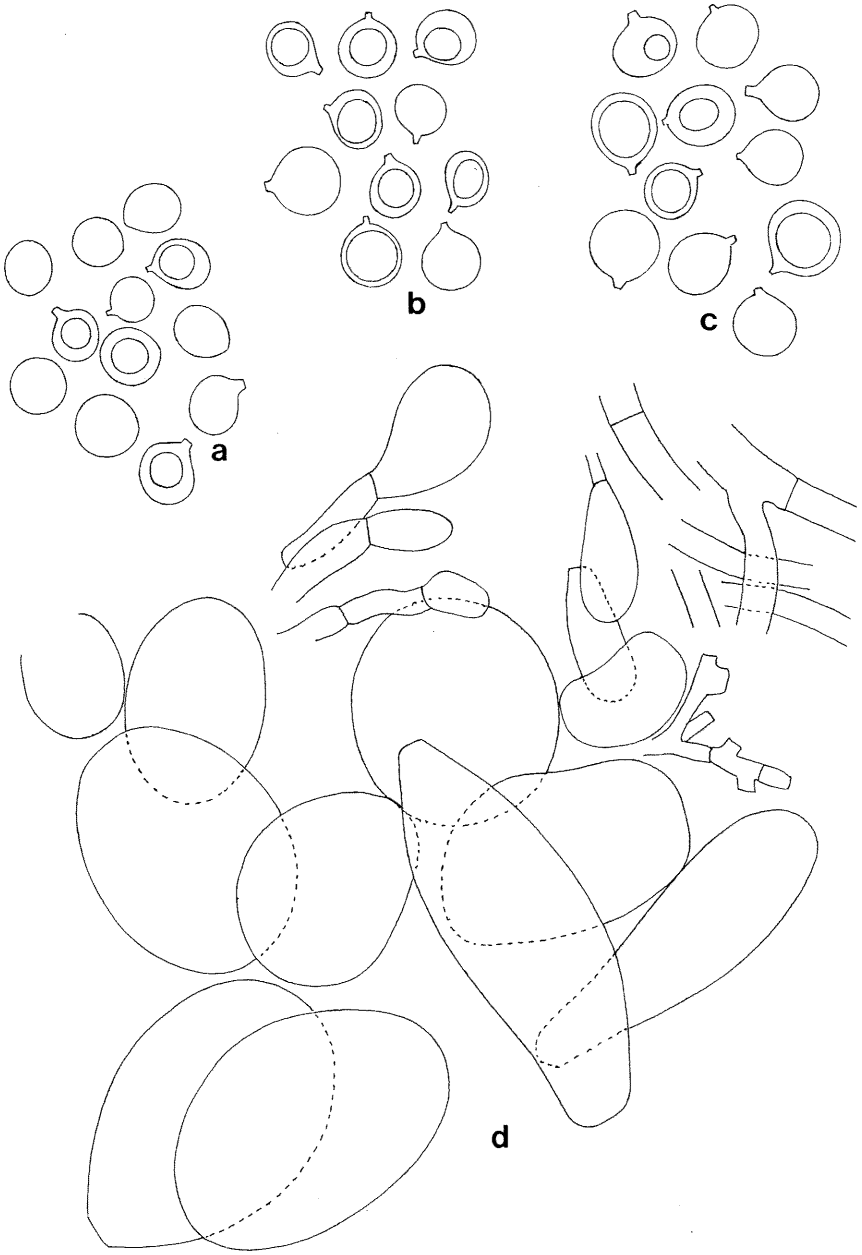


FIG. 7. *Amanita submembranacea*: a, spores from Burnham Beeches collection; b, spores from Farnham Common collection; c, spores from Ranmore collection. *Amanita ovoidea*: d, structure of main portion of scale on pileus. All ×666.

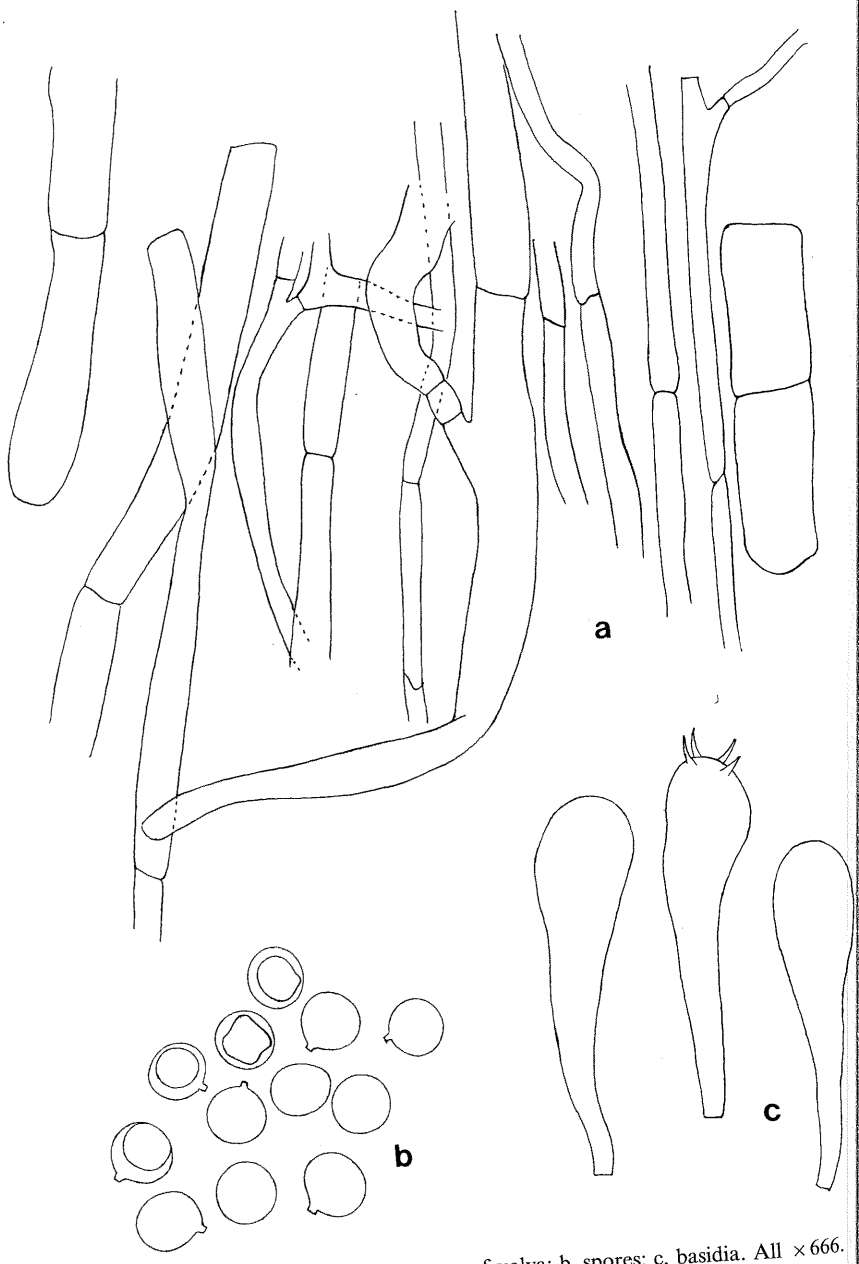
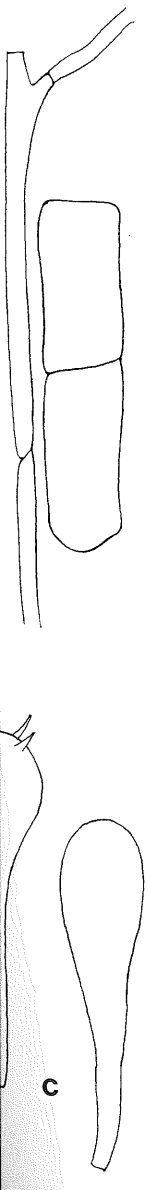


FIG. 8. *Amanita pachyvolvata*: a, structure of volva; b, spores; c, basidia. All ×666.



ia. All ×666.

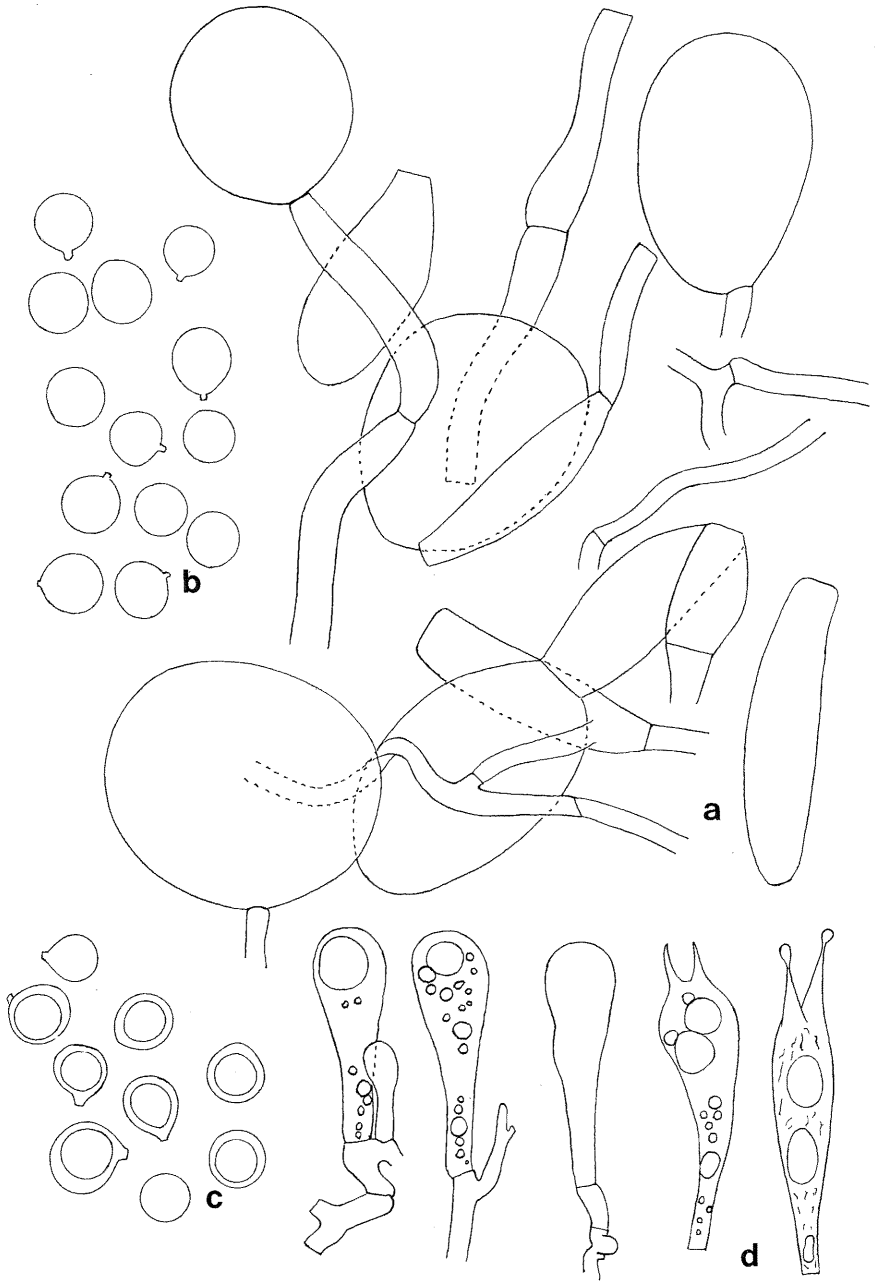


FIG. 9. *Amanita submembranacea* var. *bispora*: a, structure of volva; b, spores from print; c, spores from gill; d, basidia. All ×666.

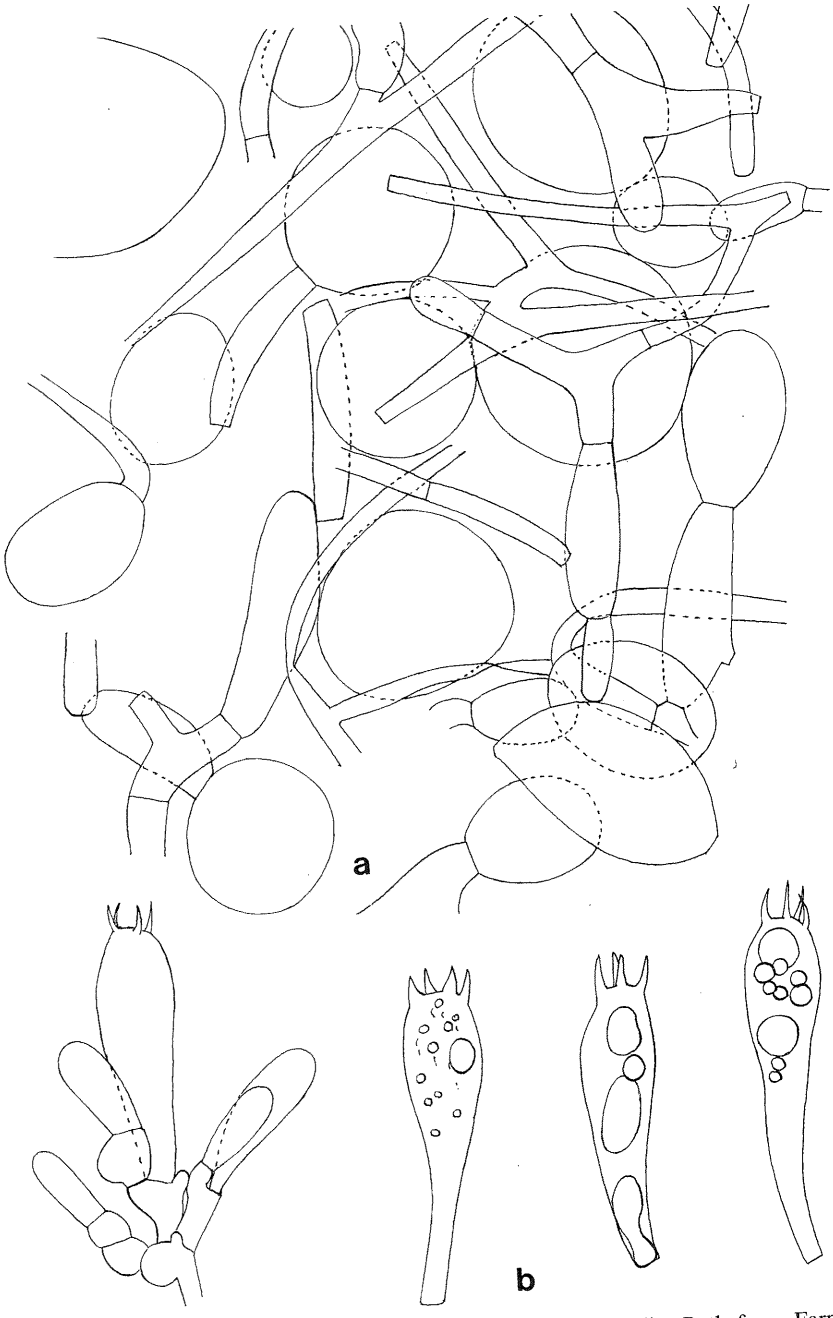


FIG. 10. *Amanita submembranacea*: a, structure of volva; b, basidia. Both from Farnham Common collection and ×666.

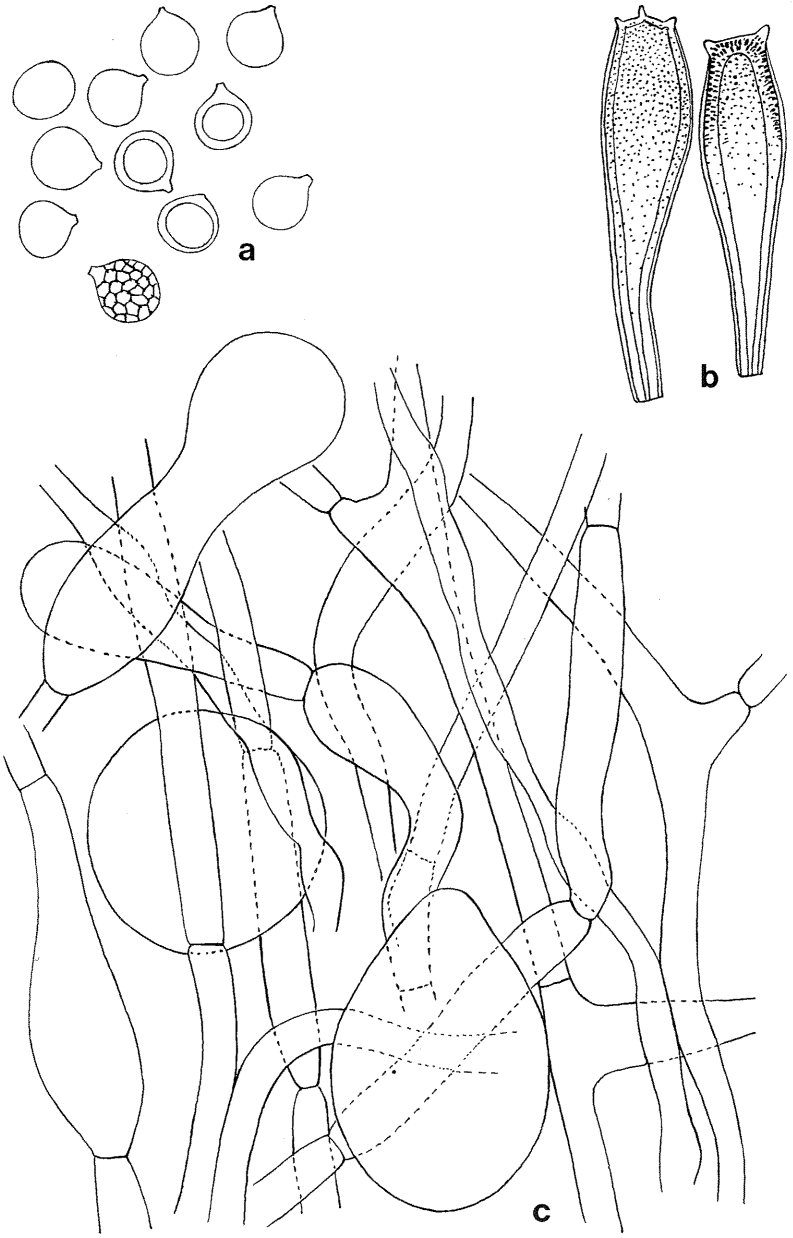


FIG. 11. *Amanita umbrinolutea*: a, spores one showing internal reticulum; b, basidia showing internal ornament; c, structure of volva. All ×666.

th from Farnham

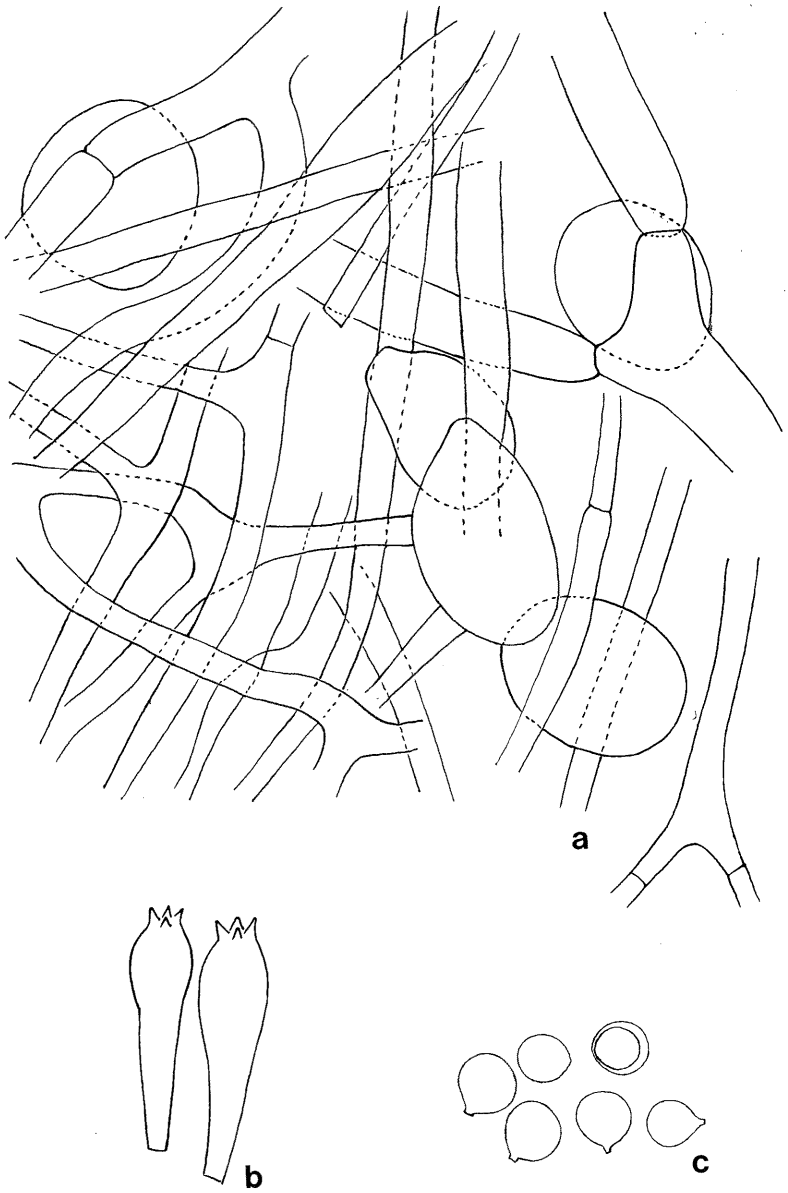


FIG. 12. *Amanita umbrinolutea* var. *flaccida*: a, structure of volva; b, basidia; c, spores. A
×666.

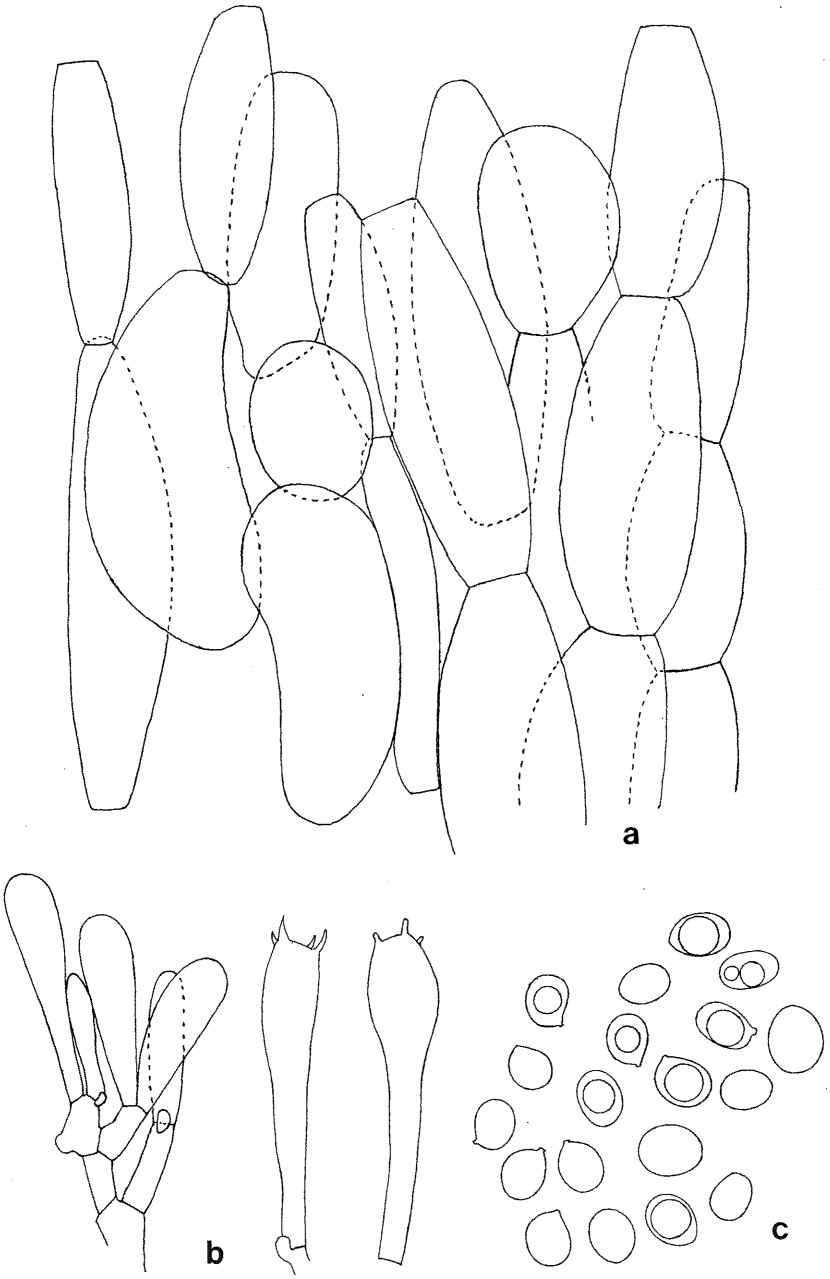


FIG. 13. *Amanita vittadinii*: a, structure of warts on pileus; b, basidia; c, spores. All from Houlton collection and all × 666.

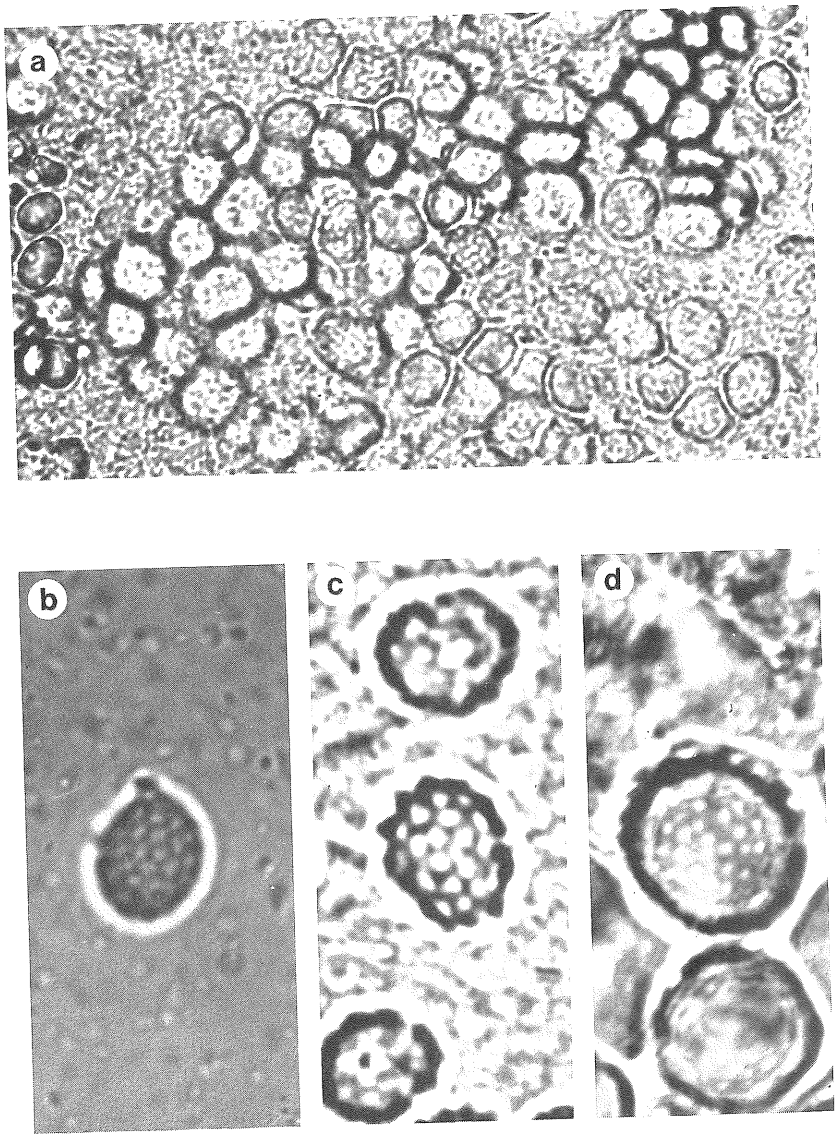


FIG. 14. *Amanita gemmata*: a, spores ×850; b, spores ×1300; c, spores ×2000. All from Weymouth collection. *Amanita umbrinolutea*: d, spores ×3300 from Epsom Common collection.