



A COMPILATION

... OF THE ...

— VOLVÆ —

... OF THE ...

UNITED STATES.

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INTRODUCTION.

There are hundreds of botanists in the United States going over the same old ground year after year, flowering plants, when a practically unexplored field lies at their very doors. The study of the larger fungi, especially Agarics, is suffering for want of careful workers, and to-day, except in a limited field covered by Prof. Peck in the East, is practically unworked in this country. The chief difficulty is in a lack of literature. Little has been published on the Agarics of this country, save the numerous new species described by Prof. Peck and others, and these descriptions are so scattered through various publications that they are not available for the ordinary workers. Agarics should be studied by contrast and comparison, not each one as an isolated fact. We have several local lists, such as Johnson of Minnesota, Harkness of California, but they are for the most unreliable, and it were better for the science had they never been issued. It is to make a start to supply the literature needed that this pamphlet is compiled. It contains a synopsis of all the European species of *Volva* reported from this country (a number no doubt errors) and all the "new species" described from this country. Many of the "new species" are based on colored plates or dried specimens sent to Europe and we opine that reliable work can not be done with such material. Agarics must be studied *fresh* and in the woods where grown, and it will be many years before the errors of our "dried specimen" descriptions of "new species" are eliminated. It is a fortunate circumstance to help the beginner in the study of our Agarics that the most of them are European species, and further that Europe has had a *Genius*, **Elias Fries**, who mastered the agarics of Europe and left us the result of his work in a completed form. (*Epicriseos Systematis Mycologici*, 1874.) We advise every one who wishes to take up the study to obtain first a copy of Stevenson's *British Fungi*, (2 vols., 1886,) the best work ever issued in English, and next (if possible) a copy of Fries' work mentioned before. Stevenson's work is largely based on Fries and the American worker can with Stevenson alone, determine a large number of the Agarics he may meet. You will find many difficulties in your path, but you are needed in the work, and if a number of botanists in different sections will undertake to make a careful *study* of their local mycological flora, not contenting themselves to be mere collectors of dried specimens, but *students* in the *woods* making notes, descriptions, comparisons, contrasts, of the Agarics they meet, from their observations on the *growing plants*, it will not be many years until we can have a systematic American work of value on the subject.

 C. G. LLOYD.

VOLVÆ.

The tribe "Volvæ" is characterised by the young plant being enclosed in a thick membrane, called a volva. (See Fig. 1.) This is the theoretical character, practically, it is of little service, as most species pass this stage of their life beneath the ground, and the volva is ruptured before it peeps up out of the earth.* Yet after a little observation, you will recognize a specimen belonging to this tribe, by the *remains* of the volva which you see. If you find an agaric with slightly attached scales (or warts as they are generally called) on the pileus, (see note,°) or if you find a cup at the base of the stipe, (as fig. 2, p. 3,) or if you find scales at the base of the stipe (as fig. 5, p. 5) or scars where the scales have fallen off, (as fig. 6, p. 6,) your plant most probably belongs to this tribe.

Yet, there are many agarics† that have volvas‡ more or less pronounced and we must have some other way to limit the tribe.

In the first place, the tribe Volvæ belongs to the old genus *Agaricus*, as limited by Fries, viz:—The plants are soft and fleshy, they do not revive when dried—they are not tough, persistent or coriaceous. The gills are entire, thin, sharp—and not deliquescent when old. From the other tribes of the old genus *Agaricus*, the following is the technical distinction.

Hymenophore distinct from the stipe, and universal veil discrete from the epidermis of the pileus.°

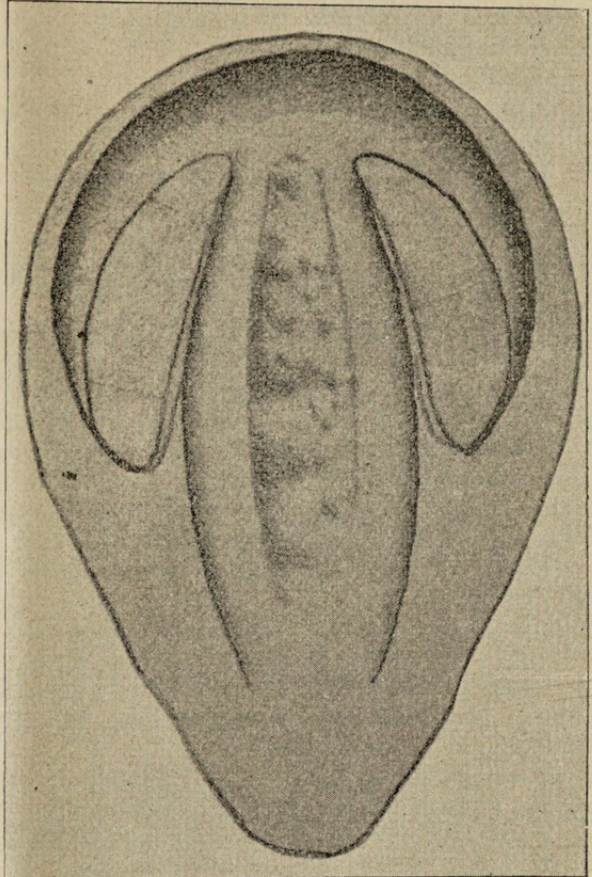


Fig. 1.—Section of a young *Amanita* in the volva.

*The books on edible mushrooms will tell you with great gravity, to always avoid eating a species where you find the young enclosed in a shell like an egg. It is good advice—but they are usually young phalloids which no one need be guarded against eating when mature. If you find an agaric in the egg shape, it is most probably *Amanita cæsaræa*, (an edible species, but my advice is *don't eat any Amanitas, and you will make no mistake,*) or *Volvaria bombycina*. Other species usually break their volvas before they appear out of the ground.

†The name agarics is a general term which we would apply to all fungi bearing gills, the genus *Agaricus* of the old botanists, and not restricted as limited by Fries.

‡*Coprinus picaceus* has a volva as evident as any *Amanita*. It breaks into scales on the pileus the same as an *Amanita*. Most *Coprinii* indeed have remnants of a volva, the micaceous particles on the pileus of the common species *micaceus*, the hairy covering of *fimentarius*, the scurfy particles which we see on the pileus of most other species are in the nature of a rudimentary volva. Likewise the dense coat of gluten covering young *Lepiota oblita*, *Pk.*, the white granules of *Lepiota cristatella* *Peck*, the thick gluten of many *Hygrophorii* and *Cortinari* are morphologically volvæ, though rudimentary. On the other hand some species of *Amanita* as *lenticularis* and *granulosa*, the volvæ are no more evident than in the cases cited above.

°These two terms will not convey much meaning to the beginner. The first means that the substances of the pileus and stipe are different, that they are not homogenous—hence the stipe is easily separable from the pileus, that it can be easily pulled out. It is also the case that the gills are free, that they are not attached to the stipe, though a few plants that have pileus and stipe homogenous have free gills. The second term means that the scales of the pileus are not a part of the epidermis. The beginner finding a white spored specimen with scales, may be puzzled to know whether it is an *Amanita* or a *Lepiota*. The scales, or warts may be easily differentiated. In *Amanita* they adhere (generally loosely) to the pileus, they can be pulled off without breaking the skin. In *Lepiota* they are the loose edges where the epidermis is torn, they are similar to the fragments of skin around the edges of one's finger nails known as hang nails.

The tribe *Volvæ* is divided artificially, according to the color of the spores.*

Genus 1.—**Amanita.**

Spores white.

This is our largest genus of this tribe, of which 33 species are recorded in the U. S.

Genus 2.—**Volvaria.**

Spores pink.

A small genus, only twelve species being recorded in the U. S.

Genus 3.—**Locellinia.**†

Spores ochraceous or ferruginous

A small genus not recorded in the U. S.

Genus 4.—**Chitonina.**

Spores fuscous—purple.

Not recorded in the U. S.

There are no black spores species of the tribe *Volvæ* known.

AMANITA.

The genus *Amanita* is a large family, about seventy-five species being known. The characters are those of the tribe *Volvæ* with white spores. *Amanitas* are all terrestrial plants—and mostly solitary in their habits. They are generally medium sized or large, frequently bright colored, and are conspicuous in the woods.

There have been two important publications on the *Amanitas* of the U. S. First, by Prof. Morgan, (In the *Journal of Mycology*, Vol. 3, 1887,) a compilation of the known species (28) at that time. Second, by Prof. Peck, (33rd Report, 1880), description of 14 New York species.

Forty-two species of *Amanita* have by various authors been ascribed to this country.

Of these, five are common, viz:—*cæsarea*, *phalloides*, *muscaria*, *rubescens* and *vaginata*, and will be met probably by every student.

Nine or less frequent—but their occurrence well authenticated, viz:—*sperta*, *virosa*, *pantherina*, *Frostiana*, *excelsa*, *solitaria*, *strobiliformis*, *volvata* and *farinosa*.

Nine European species reported need further confirmation, viz:—*recutita*, *mappa*, *spissa*, *nitida*, *aspera*, *lenticularis*, *adnata*, *nivalis*, *strangulata*.

Four are either varieties, or are too poorly described to be recognized, viz:—*pellucidula*, *verna*, *soleata* and *onusta*.

The remaining fifteen, many described from *dried specimens* have not been otherwise recorded than by the original author.

The genus is easily divided into two subgenera, viz:—

Ring present. Subgenus, **Amanita**, (typical.)

Ring none. Subgenus, **Amanitopsis**.

SUBGENUS AMANITA (Typical.)

The species are naturally divided into five sections by the character of the separation of the volva, at the base of the stipe. For illustrations and further remarks see under each section.

Section 1.—Limb of volva free.

Section 2.—Volva definitely circumscissile.

Section 3.—Volva irregularly circumscissile.

Section 4.—Volva friable.

Section 5.—Volva rudimentary.

*To find the color of the spores, break off the pileus of the fresh agaric, and lay it gills down on a sheet of white paper. After a few hours, a deposit of spores will be found on the paper from which the color can be readily determined.

†In several English works this genus is called *Acetabularia*, and it is to be regretted that it had to be discarded, (on strict grounds of priority) as it was taken from the specific name of the only species of the genus known for many years.

SECTION 1.

Limb of the volva free, persistent as a cup surrounding the base of the stipe; splitting at the top, hence pileus usually naked, or only adorned with a few fragments of the volva, which accidentally adheres to it.

KEY.

Flesh yellow 1 *cæsarea*.
Flesh white*

*Stipe equal or slightly thickened at base, volva appressed. (†)

*Stipe bulbous or volva globose. (‡)

†Margin striate, pileus pale brown, 2 *sperta*.

†Margin even, stipe silky, 3 *recutita*.

†Pileus viscid, when young obtuse, spores globose, 4 *phalloides*.

†Pileus viscid, when young obtuse, spores elliptical 5 *magnivelaris*.

†Pileus viscid, when young acute 6 *virosa*.

1.—*Amanita cæsarea*, pileus, flesh, gills and stipe all yellow. Volva large, lax, white. Spores elliptical. Margin striate. (see Appendix p 13.)

This species is very large and easily recognized by the yellow color of the gills and flesh, no other species having gills a decided yellow color—though some have a cream tint; also by the persistent large volva at the base of the stipe. At first the plant is bright orange, fading with age to yellow. It is of very wide distribution in this country though nowhere common. In Europe it occurs in the Southern portions and Fries never saw a living specimen.

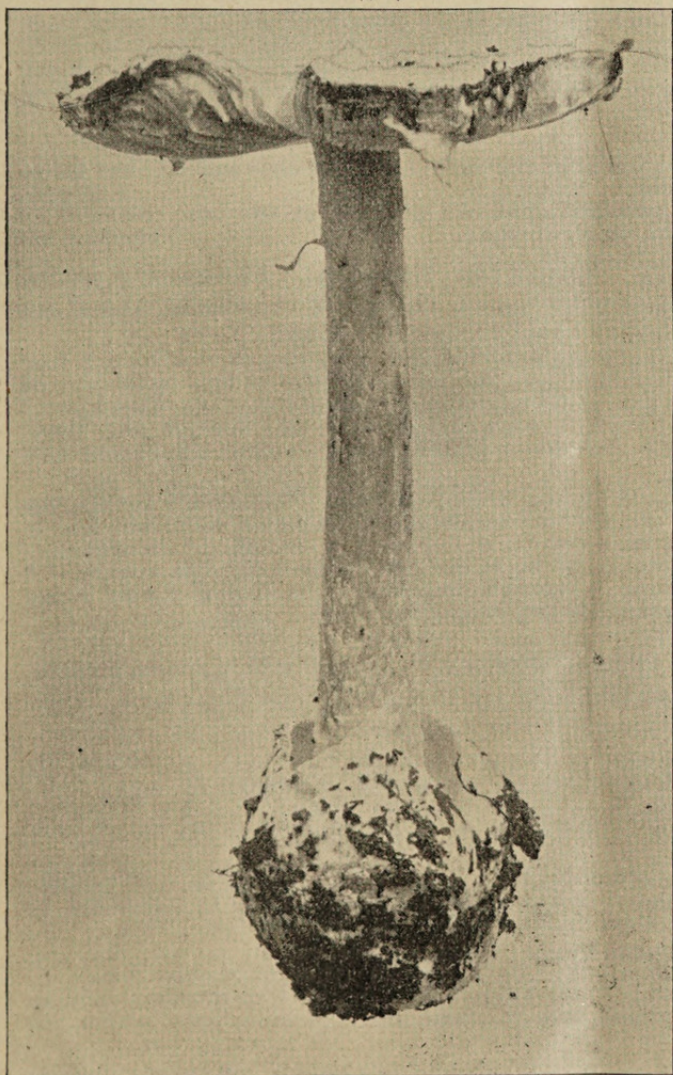


Fig. 3.—*Amanita phalloides*.

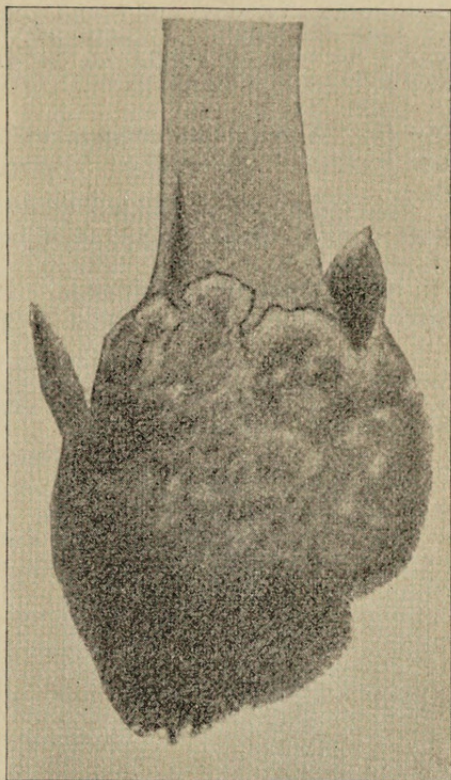


Fig. 2.—Base of stipe with free volva.

Amanita pellucidula. Under this name Miss Banning describes a new species (Peck's 44th Report) differing from *cæsarea* in having even margin and white stem, but it is probably only a form of *cæsarea*. (See Appendix, p. 13.)

2.—*Amanita sperta*. Stipe equal, Pileus smooth, substriate on the margin, pale brown (or whitish) spores elliptical. (See Appendix p. 13.)

This species was described by Prof. Peck in 1878. It is very closely allied to *A. porphyria* of Europe. It is distinguished from all the following of this section by its substriate margin. It grows in dry, sandy soil. Also reported Ala., U. and E.; Ohio, Morgan's Mss.; Penn, Herbst.

3.—*Amanita recutita*. Stipe slender, not bulbous at the base, volva not globose, stipe silky. Pileus dry, (not viscid when young). (See Appendix p. 13.)

This species has been recorded common N. C., Curtis—also Atkinson. We suspect that determinations were made from specimens of Peck's "*sperta*."

4.—*Amanita phalloides*. Pileus smooth, even, obtuse when young. Stipe slender. Volva globose, free, surrounding the base of the stipe. Spores globose. (See Stevenson, p. 4.)

This is one of the most common species in all sections. It is extremely variable in color. The prevailing color is white, though it occurs yellowish, brown or blackish brown. In Europe the illustrations are mostly white, bright green or bright yellow. We have collected pale greenish yellow specimens in Penn., though the bright green and yellow forms are not recorded in this country. We have twenty different records where this plant is mentioned from California to Vermont and from Canada to North Carolina. (See illustration on previous page.)

Amanita verna. This species, or rather form of phalloides, for it has no distinguishing marks, has been recorded from various places. It is simply a slender, pure white form of phalloides which occurs in early spring.

5. Amanita magnivelaris. Stipe slender with a bulbous base tapering and rooting. Ring large. Spores elliptical. (See Appendix p. 13.)

Described by Prof. Peck in 1897. The author does not state that the "appressed remains" form a cup at the base of the stipe, but we judge they do from his comparing the plant to verna.

6. Amanita virosa. Pileus smooth, even, at first conical and acute. Stipe slender, volva globose. Spores globose. (See Stevenson, p. 3.)

This species is pure white and is very close to phalloides differing only in the more acute form of the pileus especially when young. The stem is also more scaly. It has been recorded, N. C., Curtis; Ind., Underwood; Cal., H. & M.; Ohio, Lea; Alabama, U. & E.; Iowa, McBride; New England, Sprague.



Fig. 4. Volva separating circumscissile.

following the volva separates circumscissile, the upper portion being carried up and broken into scales on the pileus.

It is recorded N. C., Curtis; New England, Frost; Minn., Johnson. We suspect the species does not occur in this country and that the above records are all based on unusually warty specimens of phalloides. Peck in his early days reports it, but *omits it entirely* in the more recent synopsis of the N. Y. series. The species could be readily recognized by the free entire crown to the globular bulbous base of the stipe, whereas in phalloides the free globular volva has the same general appearance, but it surrounds the base of the stipe.

8. Amanita pantherina. Pileus with a viscous pellicle, margin striate. Stem stuffed, then hollow, greaved at the base by the circumscissile volva. (See Stevenson, p. 6)

Recorded from N. C. "frequent" by Schweinitz (under the name umbrina), also Penn. It can not be common in N. Y., as Peck does not report it until '83. Wisconsin, Bundy; N. C., Curtis; Indiana, Underwood; Cal., H. & M.; Cincinnati, Lea, Morgan; Ala., Atkinson; Iowa, McBride; Minn., Johnson; Dr. Herbst, (Penn.) finds it every summer in the jungle back of his house.

It appears to me that the species is characterized by a feature not found in many other species, and on which very little stress is placed in any of the books, viz.:—It is furnished at the base with two or more entire rings or collars "anello spurio" as Vittadini calls them.

These rings are very distinct and evident in every specimen preserved in my museum and in many of the European illustrations, notably Vittadini, (T. 39) (though poorly shown in Cook's figure.) They are formed by the circular laceration of the outer coat of the stipe near the base and have no relation to the scales often found at the bases of Amanitas which are remains of the volva.

European descriptions and plates usually represent this plant as brown, (olivaceous-umber) but in this country it is very light color, usually white with a slightly darker disk.

SECTION 2.

Volva separating circumscissally the lower part remaining as a definite crown to the bulbous base of the stipe or a definite ring surrounding the lower portion of the stipe.

Several species in the following section by rights belong here, but most of them instead of the volva forming an entire ring at the base of the stipe, breaks up into scales often disposed in rings. The difficulty of deciding from the often imperfect description of American species where to place the species has induced me to throw all the doubtful ones into the next section.

KEY.

Stipe globose at the base, the bulb crowned by the entire ring, 7 mappa.
Stipe enlarged (but not globose) at the base encircled by one or more rings, 8 pantherina.

7. Amanita mappa. Pileus dry, even, covered with scales, volva circumscissile, the stipe globose at base. (See Stevenson, p. 4.)

All of the species of the preceding section have a free volva splitting at the top, hence the pileus is devoid of scales excepting a few fragments of the volva which accidentally may adhere to it, but in this species and those

SECTION 3.

Volva separating in an irregular circumscissile manner, usually breaking up into scales disposed in rings.

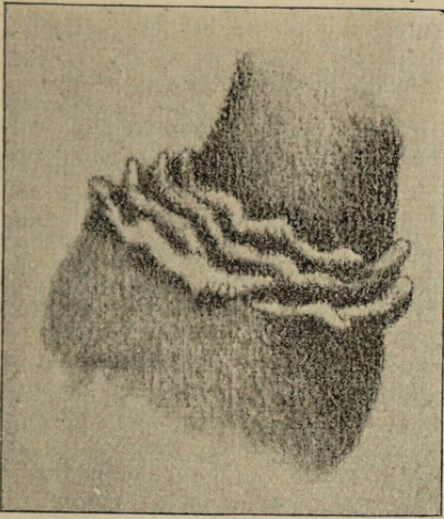


Fig. 5. Volva separating irregularly circumscissile.

Notwithstanding the confusion regarding whether many American species belong in this section or the preceding, the sections are clearly distinct and all the confusion is a result of imperfect observations and records; also of great disadvantage that many of our American species have been described from dried specimens, where the author is not familiar with the growing plant.

In the preceding section the volva separates definitely circumscissile, as though cut around with a knife, leaving an entire circular scar (or usually a ring) at the base of the stem; in this section it breaks irregularly circumscissile leaving at the base of the stem scales (more or less persistent) which are disposed in rings.

KEY.

Plant colored (white in a form of *muscaria*.)*

Plant white.†

*Spores elliptical.‡

*Spores globose, 10 *Frostiana*.

‡Margin of pileus striate, apex of stem striate from decurrent lines of the gills, 9 *muscaria*.

‡Margin of pileus striate. Gills rounded, not reaching the stem, 12 *excelsa*.

‡Margin of pileus sulcate, 11 *russuloides*.

†I conceive that the white species of this and the next section have been much confused, perhaps several of them are the same species re-described.

I cannot construct a key that would be of any value and only refer to the original descriptions in Appendix of this work. Most of these plants have solid stems, even margins, and usually large bulbous bases to the stipes. The white variety of *muscaria* can be readily distinguished from them by having neither of these characters.

Those who meet with a white species of *Amanita* should make a careful study and notes on it and compare it with the descriptions of the following species of this and the next section.

13. *Candida*.
14. *Solitaria*.
15. *Polypyramis*.
16. *Strobiliformis*.
17. *Ravenelii*.

NEXT SECTION.

Chlorinosma.
Daucipes, (said to be yellowish.)
Monticulosa.
Prairicola.
Abrupta.
Nitida.

9. *Amanita muscaria*. Pileus in wet weather with a glutinous pellicle, margin striate, flesh yellowish under the pellicle. Spores elliptical. (See Stevenson, p. 5)

This species is common and reported on every list that has been published from Nebraska east. It is not recorded from the Pacific Coast. It is an extremely variable plant as to color. It is usually orange when young, fading to yellow, though variations occur, which are brown, livid, yellow, and even pure white. European plates of the plant are the most brilliant hues, generally bright flaming red. The gorgeous colors do not occur in this country, the usual color being a pale yellow, though I have seen very young specimens bright crimson, but they fade as the plants mature. Prof. Peck has mentioned the following varieties based on size or color, but the varieties are not constant, "var. *regalis*," "var. *umbrinus*," "var. *alba*," "var. *formosa*."

10. *Amanita Frostiana*. Color orange or yellow resembling *muscaria*, margin striate, spores globose. (See Appendix, p. 13.)

This species was originally listed (though never published) by Frost, under the name *Amanita affinis*. In Peck's early work he called it *Amanita muscaria* var. *minor*, describing it as a distinct species and changing Frost's name in his revision of the genus. It resembles a small form of *muscaria* in every respect save it has globose spores. It has been reported N. Y., Peck; Mass., Frost; Wis., Bundy; Ala., U. & E.; Penn., Herbst.

11. *Amanita russuloides*. Color pale yellow. Margin of pileus widely striate-tuberculate. Spores elliptical. (See Appendix, p. 14.)

This is an extremely rare plant. It was discovered by Prof. Peck and described in 1871, but has not been met with by him or recorded by others since. Dr. Herbst a few seasons ago found a plant which he doubtfully referred here. Should it be again found it should be readily recognized by the widely striate tuberculate margin of the pileus, similar to *Russula fragilis*, (whence its name.)

12. *Amanita excelsa*. Pileus fuscous grey, stem stuffed becoming hollow, margin striate. Gills free, (not decurrent as a line down the stem.) (See Stevenson, p. 6.)

Reported N. C., Schweinitz and Curtis; Cal. H. & M.; Mass., Frost and Andrews; Minn., Johnson.

13. *Amanita candida*. Pileus even on margin. Stem solid bulbous. Annulus attached to the top of the stem. Spores elliptical. (See Appendix, p. 14.) Described by Prof. Peck, 1897, from dried specimens collected by Underwood in Ala.

14. *Amanita solitaria*. Pileus even on margin. Stem solid, bulbous, narrowed into a long root-like projection below the ground. (See Appendix, p. 14.)

Appears rare in New York, as Peck does not report it until 1880. Maryland, Banning; Cincinnati, Morgan, Lloyd; Alabama, Atkinson and U. & E.; North Carolina, Atkinson; Penn., Herbst. I am inclined to think that more than one species are confused under the name. It is usual to consider the bulbous root, the bulb below the ground, as distinguishing this species, but I have a photograph of a specimen from Trexlertown, supposed to be this species devoid of all bulbous swelling to the root.

15. *Amanita polypyraxis*. Prof. Morgan considers this a synonym for *solitaria* and I can see no points in its description that do not apply to this species. (See Appendix, p. 14.)

Described by Berkeley (1853) from dried specimens submitted by Curtis from North Carolina.

16: *Amanita strobiliformis*. (See Stevenson, p. 7.)

Rare in New York but usually attains a large size. Peck; Md., Banning; N. C., Curtis; Cal., H. & M.; Mass., Frost; Ala., U. & E.; Penn., Herbst.

I doubt very much if the plant usually ascribed to this species in this country belongs to it. The specimen that I have seen at Trexlertown, Pa., and specimens in my museum from Dr. Herbst characterized by a bulb above the ground, as emphasized by Prof. Peck in his description of the plant, do not accord with Vittadini's excellent plate either in the shape of the bulb, the shape of the warts, or the nature of the separation of the volva. The plate would indicate that separation is definitely circumscissile as in *pantherina*, throwing the plant into the preceding section, while the plant I have seen evidently belongs to this section the separation being similar to *solitaria*.

Besides all European authors describe the plant as having a subterranean bulb while in our plant the bulb is almost entirely above the ground.

17. *Amanita Ravenelii*. A species very closely related to the preceding. (See Appendix, p. 54.)

Described by Berkeley 1859, from dried specimen collected in Carolina by Ravenel. Atkinson since has collected specimens in Alabama which he referred to this species.

SECTION 4.

Volva wholly friable, breaking up into scales at the base of the stipe.

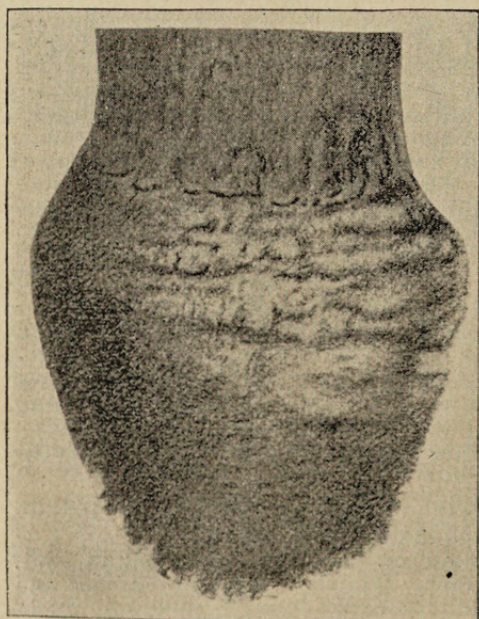


Fig 6. Volva friable

This section is somewhat similar to the preceding, differing in the less permanent nature of the scales at the base of the stem. In some species they adhere so loosely that they hardly leave scars where they fall off.

KEY.

Color white or with yellowish scales.*

Color umber or olivaceous.†

Color reddish yellow or dingy red.‡

*Stem bulbous, Gills touching stem, Pileus yellowish, 18 *daucipes*.

*Stem bulbous, Gills touching, Pileus white, 19 *abrupta*.

*Stem bulbous, Gills remote, 20 *monticulosa*.

*Stem not bulbous, Pileus 10 to 15 cm. broad, 21 *chlorinosma*.

*Stem not bulbous, Pileus 4 to 7 cm. broad, 22 *prairicola*.

†Flesh clear white, warts small, adnate, 23 *spissa*.

†Flesh clear white, warts thick, large, . 24 *nitida*.

†Flesh fuscous under the cuticle, 25 *aspera*.

‡Flesh quickly turning reddish when bruised, 26 *rubescens*.

‡Flesh yellowish unchangeable, 27 *flavo-rubens*.

18. *Amanita daucipes*. Plant saffron colored. Stipe solid with bulbous root. Warts pyramidal. (See Appendix, p. 14.)

This species is founded by Montagne on a colored drawing sent to Paris by Sullivant* from Columbus, Ohio., along in the fifties.

19. *Amanita abrupta*. Plant white. Stipe solid with bulbous base. Warts pyramidal. (See Appendix, p. 14.)

Described by Peck from dried specimens collected in Ala. by Underwood and Earle.

20. *Amanita monticulosa*. Pileus with discolored warts. (See Appendix, p. 14.)

Gills remote from stem, the only character where the distinction from the preceding two is obvious. Indeed, considering that all the descriptions have been drawn up from dried specimens it would not be surprising if all turned out to be the same thing.

Described by Berkeley from specimens sent from S. C. by Curtis who in his Catalogue says "common in sandy woods."

21. *Amanita chlorinosma*. A large white species with the margin of the pileus covered with a dense white coat of powdery substance; also characterized by a strong chlorine-like odor. (See Appendix, p. 15)

Originally sent Peck from New Jersey by Austin. Reported from same state by Gerard and also from Ala. by U. & E.

22. *Amanita prairicola*. Stem not bulbous at the base. Pileus only slightly warty. (See Appendix, p. 15.)

Described by Peck from dried specimens sent by E. Bartholomew which grew on the open prairie, Kansas. Not reported elsewhere.

23. *Amanita spissa*. Flesh white unchangeable. Pileus with a few not sharp warts. (See Stephenson, p. 8.)

The occurrence in this country is very doubtful. Reported from Maryland by Miss Banning and from Nova Scotia, Somers.

24. *Amanita nitida*. Flesh white unchangeable. Readily recognized by the thick angular warts. (See Stephenson, p. 9.)

This must be very rare in this country. Peck does not report it till 1889, and omits it entirely in his N. Y. monograph 1880. Reported from California, Harkness, (very poor authority.) Miss Banning says however "common in nearly every woods in Maryland," but I think she is mistaken.

25. *Amanita aspera*. Flesh not pure white. Pileus thickly covered with sharp warts. The illustrations of the plant remind one very much of *Lepiota acutesquamosa*. (See Stephenson, p. 9.)

Rarely reported from this country. N. C., (rare late in Autumn,) Schweinitz; Wisc., Bundy; Minn., Johnson.

26. *Amanita rubescens*. This species is readily distinguished from all other *Amanitas* known in this country by the flesh turning reddish when bruised. (See Stephenson, p. 8.)

This is one of the most common species in this country though it is not reported west of the Mississippi. At Mammoth Cave, Ky., I have seen the woods fairly covered with it. Around Cincinnati it is the most frequent species we meet, though all *Amanitas* are rare here. The warts densely cover the young plant but they easily separate and fall off; especially in wet weather, and after rains I have frequently seen mature specimens perfectly smooth. The plant can always be known by the red spots where it is bruised or worm eaten. The color of the bruised flesh is dull red, (inclined to brown) not bright as erroneously shown in Kromholz's figure.

27. *Amanita flavo-rubens*. Pileus reddish-yellow. Stipe hollow. (See Appendix, p. 15.)

Species was founded on Sullivant's figure and specimens sent Montagne from Columbus. (See note* below.) Nuttall refers a plant here from W. Va.

Notwithstanding the author compares this plant only with *rubescens* I have a strong suspicion it is only a yellow form of *muscaria*. At Cincinnati, one hundred miles south of Columbus, yellow *muscaria*s are all we find, and in addition European authors are accustomed to associate *muscaria* with the bright red form which occurs there.

SECTION 5.

Volva rudimentary, flocculose, wholly disappearing. But one species of this section has ever been ascribed to this country, viz:

28. *Amanita lenticularis*. Pileus naked, margin even. (See Stephenson, p. 10.)

*Over forty years ago Sullivant collected over 400 specimens of fungi around Columbus, Ohio, which he dried and also had water color drawings of them made by Robinson. These were sent to Montagne at Paris, France, who founded on them about sixty "new species" which he published in his "Sylloge." During the winter of 1897-98 I made a visit to Paris almost with the sole object of studying these specimens and securing photographs of these pictures, but was very much disappointed to learn from my friend N. Patouillard, that the entire set has been lost and is not preserved in any Museum in Paris. It is certainly to be hoped that the set will yet be found.

The illustrations of this species show neither warts nor traces of a volva and we should think a beginner would naturally think it was a *Lepiota* should he meet a specimen.

The occurrence of this species in the U. S. is exceedingly doubtful. Curtis lists it from N. C. but he questions his own determination and Bundy (extremely poor authority) reports it from Wisconsin.

SUBGENUS AMANITOPSIS.

Ring none. Saccardo has separated the species devoid of a ring from the genus *Amanita* under the name *Amanitopsis* but inasmuch as it only complicates the system of classification we have preferred to retain them under one genus.*

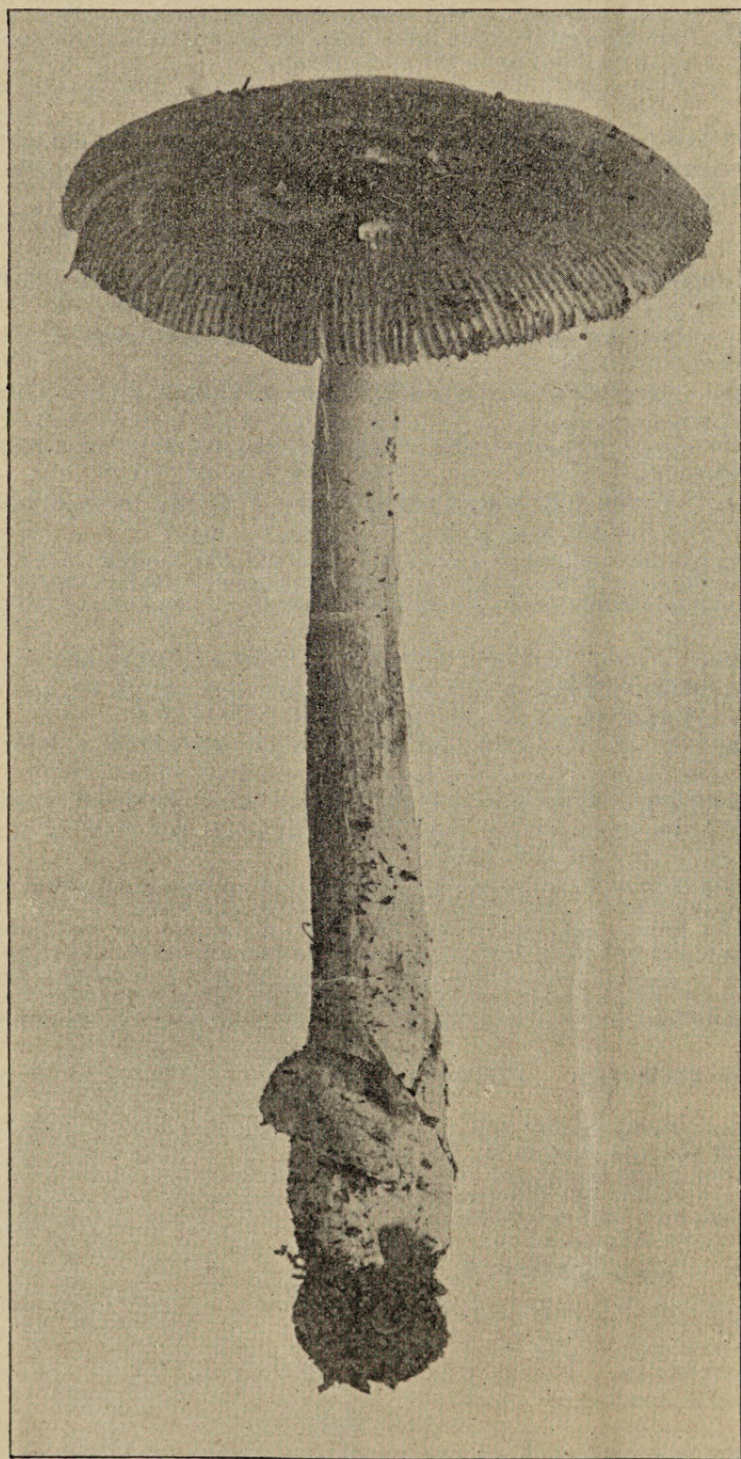


Fig. 7. *Amanita vaginata*, (from photograph.)

Section 6.

Volva persistent, present when the plant is mature, though in some species so deeply in the ground that it is apt to be overlooked.

KEY.

- Pileus deeply sulcate.*
- Pileus striate (not sulcate)†
- Pileus with even margin.‡
- *Spore globose. Pileus with few warts, . . . 29 *vaginata*.
- *Spores globose. Pileus warty. Gills somewhat adnate, 30 *velosa*.
- *Spores elliptical, 31 *agglutinata*.
- †Margin striate, volva large, 32 *volvata*.
- ‡Margin even. Gills adnate, 33 *adnata*.
- ‡Margin even. Gills free, 34 *pusilla*.

29. *Amanita vaginata*. Pileus naked or with a few warts; deeply sulcate. Volva lax. Gills free. (See Stevenson, p. 11.)

There is no more common species in this country nor one that is more variable. The beginner is sure to make several species of it. It is recorded from every section, Cal. to the Atlantic. It varies in size from a couple of inches to ten inches, and in color from light umber to tawny orange. We have near Cincinnati two colors which no one at first would suppose could be the same species: first deep umber in the immediate vicinity of the city where I have never found the next; second, a bright orange tawny color about 20 miles south in Kentucky where it seems to be the only form to occur. The volva of this species is deep in the ground and will only be noticed by digging up the plant.

*Besides according to Stevenson the ring is present in *vaginata*. He makes the rather paradoxical statement, "the ring though obsolete is present, more or less conspicuously at the base of the stem, disclosed in the volva." We have never seen any trace of a ring.

30. *Amanita velosa*. (See Appendix, p. 15.)

A western plant very closely related to *vaginata* (too close we are afraid, taking into account the variability of this species) described by Prof. Peck, from dried specimens sent by McClatchie. It differs in the more numerous and thicker warts and in somewhat adnate gills.

31. *Amanita agglutinata*. Spores elliptical. Pileus white. Stipe solid. (See Appendix, p. 15.)

Described from dried specimens sent Berkeley by Curtis from S. C. Not reported otherwise. Very close to *vaginata* but said to differ in solid stipe, more viscid pileus and elliptical spores.

32. *Amanita volvata*. Pileus striate (not sulcate). Spores elliptical, volva large, persistent, firm. (See Appendix, p. 15.)

A well marked species described by Peck in 1871 and widely distributed. N. Y., Peck; Maryland, Banning; Mass., Frost; Cin., Morgan, Lloyd (it grows here only in one rather marshy woods at College Hill.) Ala., U. & E.; N. C., Atkinson; Penn., Herbst. Nothing demonstrates how little attention was paid to the Agarics by Schweinitz after he went to Penn. than the fact that he entirely overlooked this characteristic species. That it is common on his collecting ground we know from personal collections.

***Amanita soleata*.** (See Appendix, p. 15.) No doubt the same as *volvata*, poorly, (and subsequently,) described by Howe.

33. *Amanita adnata*. Margin even. Gills adnate. (See Stevenson, p. 12.)

A plant said to be rigid like a *Russula*. Reported from this country by four observers, but none of them trustworthy and its occurrence is doubtful. Cal., Harkness; Wis., Bundy; Nova Scotia, Sommers; Minn., Johnson.

The volva said to break into scales, though the excellent figure of Saunders, Smith and Bennett shows a distinct cup-shape volva.

***Amanita onusta*.** (See Appendix, p. 16.) The folly of a beginner in Mycology describing new species when he has not even a passing acquaintance with the old, cannot be too severely condemned. It only encumbers the science with a lot of useless synonyms

34. *Amanita pusilla*. Pileus even. Gills free. Stipe bulbous.

Described by Prof. Peck, 1897. A little plant pileus about one inch broad. (See Appendix, p. 16.)

Section 7.

Volva rudimentary, floccose, or soon breaking into scales.

KEY.

Large plants, 8 cm. or more.*

Small plants, 5 cm. or less.†

*Pileus white or slightly tinged with yellow, warts few, 35 *nivalis*.

*Pileus warty, grayish brown, 36 *strangulata*.

†Pileus mealy, grayish brown, 37 *farinosa*.

†Pileus pubescent, yellow, 38 *pubescens*.

35. *Amanita nivalis*. Pileus naked or with a few warts Spores globose. (See Appendix, p. 16.)

This species is considered by Fries a form of *vaginata* but Prof. Peck finds a plant which he considers distinct, chiefly because the volva breaks up into scales. As Greville's figure shows a prominent entire volva (and Greville is remarkably accurate in his excellent figures) and besides, he describes it as *persistent*, we opine that Prof. Peck's plant belongs somewhere else, perhaps a new species. Also reported Ala., Atkinson; West Va., Nuttall.

36. *Amanita strangulata*. Pileus grayish-brown, thickly covered with warts. (See Stevenson, p. 11.)

Berkeley (Outlines, p. 92,) describes a plant under the name *Ceciliae* stating that it differs from *vaginata* in having a stuffed stem instead of a few cottony fibers. Fries united Berkeley's plant to his *strangulata* which he chiefly distinguishes from *vaginata* in having the pileus closely covered with broad close scales. Smith states the English plant has oval spores. Peck that the American plant has globose spores and the English plate of Saunders, Smith and Bennett shows globose spores. Very rare. Prof. Peck has found it but once, (twenty years ago on Long Island,) Frost reports it from Massachusetts and Bundy and Johnson thought they found it in Wisconsin and Minnesota.

37. *Amanita farinosa*. Pileus deeply striate; mealy with a white powder very dense near the center of the pileus. (See Appendix, p. 16.)

A very small species described by Schweinitz from N. C. Reported also N. Y., Peck; Cincinnati, Morgan Mss; New Jersey, Ellis; Penn., Herbst.

38. *Amanita pubescens*. Pileus pubescent, yellow. (See Appendix, p. 16.)

Another small species never reported since originally described by Schweinitz from N. C. seventy-five years ago. If met with it should be readily recognized by its small size and pubescent pileus.

VOLVARIA.

The genus *Volvaria* is rosy-spored corresponding to *Amanita*, excepting the spores are not white. None of the species have rings. The volva is firmer and not friable as in many *Amanitas*, hence it usually remains as a cup around the base of the stipe and does not break up and seldom forms warts as in most of the *Amanitas*.

A few *Volvarias* grow on rotten wood, but most of the species are found in rich mould or manured ground. One grows on decaying fungus.

KEY.

- Plant growing on rotten wood.*
- Plant growing on decaying fungus.†
- Plant growing on the ground.‡
- *Pileus dry, 1 *bombycina*.
- *Pileus viscid. 2 *Peckii*.
- †Plant growing on decayed fungus, 3 *Loveiana*.
- ‡Plant very small, less than an inch.¶
- ‡Plant medium, 2 inches or more.§
- ¶Pileus even, silky, 4 *parvula*.
- ¶Pileus striate, 5 *striatula*.
- ¶Stipe with spreading hairs, 6 *pubescentipes*.
- §Pileus dry.||
- §Pileus viscid.£
- ||Pileus even, 7 *volvacea*.
- ||Pileus striate.⊕
- ⊕Volva cup shape, 8 *Taylorii*.
- ⊕Volva merely a rim, 9 *emandator*.*
- £Pileus fulvous=ochraceous, 10 *viscosa*.
- £Pileus grey or umber at disk, 11 *speciosa*.
- £Pileus fuliginous, 12 *gloicephala*.
- £Pileus white 9 *emandator*.*

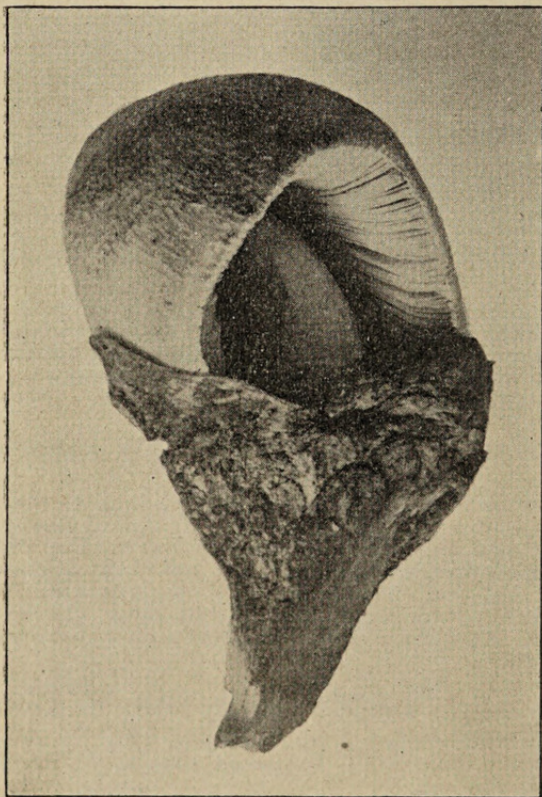


Fig. 8. A young plant *Volvaria bombycina*.
(From photograph.)

1. *Volvaria bombycina*.

Pileus campanulate then expanded, dry silky fibrillose. (See Stevenson, p. 183.)

A large plant growing on rotten wood recorded from all sections of the country. Though of wide distribution it is nowhere abundant. It usually grows on maple frequently being found on the decay around a sugar tap. Farlow records it on oak and we have seen it on beech. Millspaugh in reporting it gives its habitat "on dead insect" which is evidence enough that he is in error. The volva is quite thick and we frequently find the plant in the egg state looking like a young phalloid.

2. *Volvaria Peckii*. Pileus thin, convex, viscid. (See Appendix. p. 16.)

Described from a single specimen collected in N. Y. by Atkinson and never recorded elsewhere.

3. *Volvaria Loveiana*. Pileus white, silky, margin involute. (See Stevenson, p. 184.)

Though there is no printed record of this plant in the United States, we have been favored with specimens from Prof. John Dearnness, London, Canada, which grew on a decaying *Clitocybe monadelphus*. It is rare in Europe and Prof. Dearnness' find is of great interest. The peculiar habitat of the plant (decaying agarics) would enable it to be recognized at once.

(*) The author does not state whether the pileus is viscid or dry, a fatal omission in describing a *Volvaria*. He no doubt did not know however, as he described it from a dry specimen.

4. *Volvaria parvula*. Plant small. Pileus even, silky. (See Stevenson, p. 186.)

This plant is recorded from N. C., Schweinitz and Curtis; Md., Banning; Mass., Frost; Wisc., Bundy; New England, Sprague; but how many records are based on the following plant it is difficult to say.

5. *Volvaria striatula*. Pileus thin, silky, striate on the margin. Plant small. (See Appendix, p. 16.)

Described by Prof. Peck from dried specimens sent from Kansas by Bartholomew. The *small* species of *volvaria* deserve further study. I have before me a fresh specimen found in a hot house of *parvula* agreeing with the description and Cooke's, Krombholz' and Patouillard's figures, but it is *not* umbonate (nor do the three figures so show it, and the margin is even, (as the figures show) though it dries striate. I have alcoholic specimens of what I took at the time of collection to be the same species which shows faintly striate. I have another species (dried, and in alcohol) agreeing with the description in being *umbonate* (and Fries underscores *umbonate*) and it is also *striate*. Cordier's figure of "*parvula*" is *strongly striate*. Additional specimens and notes on the small species of *Volvaria* are earnestly desired.

6. *Volvaria pubescentipes*. A small plant about an inch high, distinguished by the spreading hairs on the stipe. (See Appendix, p. 17.)

Described by Peck in 1875. No records since save Morgan's Mss. from Cincinnati. Saccardo spells the name *pubipes* but whether intentional or a misprint is doubtful.



Fig. 9. *Volvaria volvacea*. (From photograph.)

7. *Volvaria volvacea*. Pileus campanulate then expanded. Fibrils appressed, dark. Volva lax. (See Stevenson, p. 183.)

This is a much smaller plant than *bombycina* and grows in the ground. It is usually found in hot houses, cellars, etc., though we once collected a specimen at the roots of a tree in the woods. It occurs every year in the cellar of our drug store. Reported also N. C., Schweinitz; Minn., Johnson; Preston, O., Morgan Mss.

8. *Volvaria Taylorii*. Pileus conical-campanulate, deeply striate. (See Stevenson, p. 184.)

Only reported from this country on very doubtful authority. Minn., Johnson.

9. *Volvaria emendatior*. Pileus umbonate, smooth, white. Volva forming merely a rim around the stem. (See Appendix, p. 17.)

Described by Berkeley from dried specimens from New England, Sprague, and N. C., Curtis. The author does not state whether the pileus is viscid or dry which leaves us in doubt in which section to place it, though it is probably viscid as most smooth species are. There is no other record of the plant.

10. *Volvaria viscosa*. Pileus campanulate-convex, very viscous, ochraceous. Stipe bulbous. (See Appendix, p. 17.)

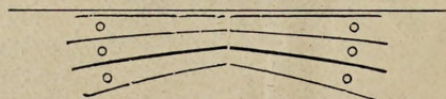
The habitat is not stated though presumably in the ground. Described from Nebraska by Clements, no other record.

11. *Volvaria speciosa*. Pileus grey, umber at the disk, viscous. Stipe villous at the base. (See Stevenson, p. 185.)

"Common in cultivated soil, especially grain fields and along roads. A fine edible Agaric and our most abundant one in California"—McClatchie. Not reported elsewhere save Wisc., Bundy, and that doubtful.

12. *Volvaria gloiocephala*. Volva fuliginous, glutinous, striate on the margin. Stipe smooth. (See Stevenson, p. 185.)

Cal., H. & M.; Cincinnati, Morgan Mss.; Minn., Johnson.



APPENDIX.

Descriptions* of American Volvae and references to European species reported from this country.

AMANITA, (Typical.)

Section 1.

Amanita cæsarea. Pileus hemispherical, then expanded, smooth, bright red or orange, fading to yellow, widely and *distinctly striate on its margin*; lamellæ free, *yellow*; stem equal or slightly tapering upward, flocculose, stuffed with cottony fibrils or hollow, yellowish, bearing a yellowish annulus near the top and inserted at the base in a *large loose membranous white volva*; spores elliptical, 8-10 mc. long. Plant 12-20 cm. high, pileus 10-20 cm. broad, stem 8-12 mm. thick. (Peck, 33rd Rep.)

Amanita pellucidula. Pileus at first campanulate, then expanded, slightly viscid, fleshy in the center, attenuated at the margin, smooth, bright red, deeper at the top, shaded into clear transparent yellow at margin, glossy, flesh white, unchanging; lamellæ ventricose, free, numerous, yellow; ring descending, fugacious; stem stuffed. (Banning, Peck's 44th report.)

Amanita sprete. Pileus subovate, then convex or expanded, smooth or adorned with a few fragments of the volva, substrate on the margin, whitish or pale-brown; lamellæ close, reaching the stem, white; stem equal, smooth, annulate, stuffed or hollow, whitish, finely striate at the top from the decurrent lines of the lamellæ, not bulbous at the base, but the volva rather large, loose, subochreate; spores elliptical, generally with a single large nucleus, 10-12 mc. long, 6-8 mc. broad. Plant 10-11 cm. high, pileus 7-12 cm. broad, stem 8-12 mm. thick. Ground in open places. (Peck 32nd Report.)

Amanita recutita. Pileus convex then explanate, *dry* glabrous, often squamulose with fragments of the volva; margin almost even; stipe stuffed then hollow, attenuate, *silky*, vaginate with the narrow appressed margin of the obliterated circumscissile volva. (Fries Epic., p. 19.)

Amanita phalloides. (Stevenson, p. 4. Fries Epic., p. 18.)

Amanita magnivelaris. Pileus convex or nearly plane, glabrous, slightly viscid when moist; even on the margin, white or yellowish-white, lamellæ close, free, white; stem long, nearly equal, glabrous, white, furnished with a large membranous volva, the bulbous base tapering downward and radicating; spores broadly elliptical, 10 mc. long, 6-8 mc. broad. Pileus 7-12 cm. broad, stem 12-18 cm. long, 8-12 mm. thick. Solitary in woods. (Peck, 50th Report.)

Amanita virosa. (Stevenson p. 3. Fries Epic., p. 18.)

Section 2.

Amanita mappa. (Stevenson p. 4. Fries Epic., p. 19.)

Amanita pantherina. (Stevenson, p. 6. Fries Epic., p. 21.)

Section 3.

Amanita Frostiana. Pileus convex or expanded, bright-orange or yellow, warty, sometimes nearly or quite smooth, striate on the margin; lamellæ free, white or slightly tinged with yellow; stem white or yellow, stuffed, bearing a slight, sometimes evanescent annulus, bulbous at the base, the bulb *slightly margined* by the volva; spores *globose*, 7-10 mc. in diameter. Plant 5-8 cm. high, pileus 2½-5 cm. broad, stem about 4 mm. thick. (Peck, 33rd Report.)

Amanita muscaria. (Stevenson, p. 5. Fries Epic., p. 20.)

Amanita excelsa. (Stevenson p. 6. Fries Epic., p. 21.)

*While no quotation marks are used it must be understood that these are taken from original descriptions. European species described in Stevenson are not reproduced here, though when the species is not English, descriptions are drawn either from Fries' *Epicrisis* or Peck's summary of New York species.

Amanita russuloides. Pileus at first ovate, then expanded or convex, rough with a few superficial warts, or entirely smooth, viscid when moist, widely striate-tuberculate on the margin, pale yellow or straw color; lamellæ close, free, narrowed toward the stem, white; stem firm, smooth, stuffed, annulate, equal or slightly tapering upward, bulbous; annulus thin, soon vanishing; volva fragile, subappressed; spores broadly elliptical, 10 mc. long, $7\frac{1}{2}$ mc. broad. Plant 5-8 cm. high, pileus 4-5 cm. broad, stem 6-10 mm. thick. Grassy ground in open woods. (Peck, 25th Report.)

Amanita candida. Pileus thin, broadly convex or nearly plane, verrucose with numerous small erect angular or pyramidal easily separable warts, often becoming smooth with age, white, even on the margin; flesh white; lamellæ rather narrow, close, reaching the stem, white; stem solid, bulbous, floccose-squamose, white, the annulus attached to the top of the stem, becoming pendent and often disappearing with age, floccose-squamose on the lower surface, striate on the upper, the bulb rather large, ovate, squamose—not margined, tapering above into the stem and rounded, or merely abruptly pointed below; spores elliptical, 10-13 mc. long, 7 mc. broad. Pileus 7-15 cm. broad. stem 6-12 cm. long, 10-16 mm. thick, the bulb $2\frac{1}{2}$ to 4 cm. thick in the dried specimens. (Peck, Bull Torr. Club. Vol. 24, p. 137-138.)

Amanita solitaria. Pileus convex or plane, *warty*, white or whitish, *even* on the margin; lamellæ reaching the stem, white or slightly tinged with cream color; stem at first mealy or scaly, equal, *solid*, white, bulbous, the bulb scaly or mealy, *narrowed below into a root-like prolongation*, annulus lacerated, often adhering in fragments to the margin of the pileus and lamellæ; spores elliptical-oblong, 7-12 mc. long, 6 mc. broad. Plant, 10-20 cm. high, pileus 8-15 cm. broad, stem 8-12 mm. thick. (Peck, 33rd Report.)

Amanita polypyraxis. Pileus 15 cm. across, pure white, shining areolate, beset with thick, rather small, pointed pyramidal warts, especially in the center. Stem, 15-20 cm. high, 2-5 cm. thick, solid, incrassated and rooting below, almost smooth with the exception of a few little narrow transparent scales; ring broad, evanescent. Gills white, reaching the stem, quite linear at the extremity. Odor strongly alkaline. (Berk., Ann and Mag. Nat. Hist. Vol. 12, 2nd series, p. 417.)

Amanita strobiliformis. (Stevenson, p. 7. Fries Epic., p. 21.)

Amanita Ravenelii. Pileus 10 cm. across; convex broken up into distinct areae, each of which is raised into an acute rigid pyramidal wart; stem 8 cm. high, $2\frac{1}{2}$ cm. or more in thickness at the base, furnished with a thick warty volva, and a deflexed ring. (Berk., Ann and Mag. Nat. Hist. Vol. 4, 3rd series, p. 284.)

Section 4.

Amanita daucipes. Volva fugacious. Pileus hemispherical-globose, compact, uniformly warted. Warts pyramidical, saffron color. Flesh soft white. Stipe solid with a bulbous root, with a constricted cortina above and squamulose downward. Gills narrow, touching (the stipe) attenuate both ways. Stipe 12-15 cm. long, pileus 6 cm. broad, veil fibrillose extending from the margin of the pileus to the apex of the stipe, fugacious. In cultivated fields. (Montagne Sylloge p. 96.)

Amanita abrupta. Pileus thin, broadly convex or nearly plane, verrucose with small angular or pyramidal erect somewhat evenescent warts, slightly striate on the margin, flesh white; lamellæ moderately close, reaching the stem and sometimes terminating in slightly decurrent lines upon it, white; stem slender, glabrous, solid, bulbous, white, the bulb abrupt, subglobose, often coated below by the white persistent mycelium, the annulus membranous, persistent; spores broadly elliptical or subglobose, 7-10 mc. long, 6-7 mc. broad. Pileus 5-10 cm. broad; stem 6-10 cm. long, 6-8 mm. thick. (Peck, Bull. Torr. Club. Vol. 24, p. 138.)

Amanita monticulosa. Pileus 6-8 cm. across, convex, areolate, with a wart in the center of each areola; those toward the margin consisting of soft threads meeting in a point, but sometimes simply flocculent, the central warts angular, pyramidal, truncate, discolored. Stem bulbous, scaly, flocculent, white;

veil thick at length distance. Gills free, ventricose, remote, forming a well defined area around the top of the stem. The warts are not hard and rigid as in *A. nitida*, and the free remote gills separate it from that and the neighboring species. (Berk., Ann and Mag. Nat. Hist. Vol. 12, 2nd Ser. p. 418.)

Amanita chlorinosma. Pileus convex or expanded, warty on the disk, covered on the even margin with a light powdery at length evanescent substance, white; lamellae white; stem nearly cylindrical, stout, deeply penetrating the earth; spores broadly elliptical, 7-10 mc. long, odor distinct, chlorine-like. Plant 15-18 cm. inches high, pileus 10-15 cm. broad, stem 3-5 cm. thick. (Peck, Bot. Gaz., Vol. 4, p. 137.)

Amanita prairicola. Pileus thin, convex, slightly verrucose, white, more or less tinged with yellow, even on the margin, flesh white; lamellae rather broad, subdistant, reaching the stem, white; stem equal or slightly tapering upward, somewhat squamose toward the base, white or whitish, the annulus persistent; spores large, broadly elliptical, 12-14 mc. long, 7-9 mc. broad. Pileus 4-7 cm. broad, stem 5-6 cm. long, 4-8 mm. thick. Bare ground on open prairies. (Peck, Bull. Torr. Club. Vol. 24, p. 138.)

Amanita spissa. (Stevenson p. 8. Fries Epic., p. 23.)

Amanita rubescens. (Stevenson p. 8. Fries Epic., p. 23.)

Amanita flavo-rubens. Pileus convex, then expanded, reddish-yellow, strewn with thick unequal mealy warts. Stipe stuffed or hollow, tall, squamulose, naked bulb at the base, mealy above. Ring above, reflexed, lacerate. Gills, close, white, attenuated and touching (the stipe). Pileus 9 cm. broad, obscurely umbonate, variegated with red and yellow. Warts yellowish, thinly spread. Margin striate. Stipe 15 cm. long, bulbous at base, a cm. thick in the middle. Spores white, globose, 10 mc. in diameter. (Montagne Sylloge p. 96.)

Section 5.

Amanita lenticularis. (Stevenson p. 10. Fries Epic., p. 26.)

Section 6.

Amanita vaginata. (Stevenson p. 11. Fries Epic., p. 27.)

Amanita velosa. Pileus at first subglobose, then campanulate or nearly plane, generally bearing patches of the remains of the whitish felty or tomentose volva, elsewhere glabrous, becoming sulcate-striate on the margin, buff or orange-buff, flesh compact, white; lamellae close, reaching the stem, subventricose, pale cream color; stem firm, at first tomentose and attenuated at the top, then nearly equal, stuffed, white or whitish, closely sheathed at the base by the thick volva; spores globose, 10-12 mc. broad. Pileus 5-10 cm. broad; stem 7-10 cm. long, 6-8 mm. thick. (Peck, Bull., Torr. Club. Vol. 22 p. 485.)

Amanita agglutinata. White, pileus 2-5 cm. broad, scaly from the remains of the volva, margin thin. Stem 1-4 cm. high, 4 mm. thick, enlarged at the apex bulbous at the base, furnished with a volva whose margin is free. Ring wanting. Gills broad, ventricose, round and free behind. Spores white, elliptical. (Berk, Ann, Jour., Arts and Sci., 2nd Ser., Vol. 8, p. 401)

Amanita volvata. Pileus fleshy, convex, at length expanded, striate on the margin sprinkled with small floccose scales, whitish, the disk pale brown; lamellae close, free, white; stem equal or slightly tapering upward, stuffed, minutely floccose, scaly, ringless, whitish; volva large, firm, loose; spores subelliptical 6 mc. long, plant, 5-7 cm. high, pileus as broad, stem, 6-8 mm. thick. (Peck, Report 24, p 60.)

Amanita soleata. Pileus 5-7 cm. broad, fulvous brown, somewhat uneven, with patches of tomentum, sprinkled with a fine, dingy yellow powder; margin thin, striate; stem 5 cm. high, 6-8 mm. thick, ringless, smooth, attenuated downwards, fistulose; volva 2-3 cm. broad, even, entire or with a shallow sinus; gills whitish, changing to a cinerous brown in drying. (Howe Bull. Torr. Bot. Club. Vol. 5, p. 42.)

Amanita adnata. (Stevenson p. 12. Fries Epic. p. 28.)

Amanita onusta. Pileus 12-15 cm. broad, brownish gray, clothed with dust colored warts which easily rub off, (persistent about the dark center) leaving spots of a deeper brown; margin thick, not at all striate; stem 7 cm. high, 2½ cm. thick, attenuated upwards, enlarging as it enters the cap, farinose, ringless, white, stuffed, concentrically squamulose below, the large bulb firmly rooting. Flesh and gills white, the latter changing to fulvous hue in drying. Slightly acrid. Stem very glutinous, at length hard and fibrous. (Howe, Bull. Torr. Bot. Club. Vol. 5, p. 42.)

Amanita pusilla. Pileus thin, broadly convex or nearly plane, subglabrous, slightly umbonate, even on the margin, pale brown; lamellae narrow, thin, close, free, becoming brownish; stem short, hollow, bulbous, the bulb margined by the remains of the membranous volva, spores broadly elliptical, 5-6 mc. long, 4 mc. broad. Pileus about 2½ cm. broad; stem 1½-2½ cm. long, 2-4 mm. thick. (Peck, 50th Report.)

Section 7.

Amanita nivalis. Pileus at first ovate, then convex or plane, smooth, *striate on the thin margin, white*, sometimes tinged with yellow or ochraceous on the disk, flesh white; lamellae subdistant, white, free; stem equal, rather tall, nearly smooth, *bulbous*, stuffed, white, the volva very fragile, *soon breaking up into fragments or sometimes persisting in the form of a collar-like ring at the upper part of the bulb*; spores globose, 7-10 mc. in diameter. Plant 10-15 cm. high, pileus 5-7 cm. broad, stem 4-8 mm. thick. (Peck, 33rd Report, p. 48)

The above is Prof Peck's description of the American plant. As stated in part 1, we do not think it applies to Greville's plant.

Amanita strangulata. (Stevenson p. 11. Fries Epic., p. 27.)

Amanita farinosa. Pileus mealy, with plicate margin. Gills entire, white, unchangeable. Stipe bulbous, solid (*) livid. Related to *vaginata* but smaller and not furnished with a volva. (†) Pileus with the margin elegantly plicate, mealy, principally in the center, where the powder is a copious heap and can be wiped off. An inch broad. Stipe mealy. Ring wanting. Plant two inches high. (Schw., Syn. Fung. Car. Sup. No. 553.)

(*) Peck states "stuffed or hollow."

(†) It is evident that Schweinitz description "*nec volva instructa*" must not be taken *literally* else it would not be an *Amanita*. Peck describes the volva as evanescent.

Amanita pubescens. Pileus pubescent, yellow, margin involute. Gills white. Stipe short, bulbous, pubescent, white, becoming yellowish. Pileus covered with a thin pubescence. Stipe short, scarcely exceeding an inch. Bulb fleshy. Volva vanishing. Ring none. (Schw., Syn. Fung. Car. Sup. No. 554.)

VOLVARIA.

Volvaria bombycina. (Stevenson, p. 183. Fries Epic., p. 182.)

Volvaria Peckii. Pileus thin, convex, glabrous, viscid, finely striate on the margin, whitish; lamellae rather close, thin, pale flesh color; stem slightly tapering upward, glabrous solid, whitish, with a loose, well developed membranous volva at the base; spores even, subelliptical, 7-10 mc. long, 5-6 mc. broad, stem 7-9 cm. long, 6-8 mm. thick. (Peck, 48th Report.)

Volvaria Loveiana. (Stevenson p. 184. Fries Epic., p. 182.)

Volvaria parvula. (Stevenson p. 186. Fries Epic., p. 184.)

Volvaria striatula. Pileus thin, convex or nearly plane, minutely silky, striate on the margin and somewhat reticulate when dry, white; lamellae narrow, free, white, becoming flesh color; stem short, glabrous, white, with the cup-like remains of the membranous volva at the base; spores subglobose, uninucleate, 7 mc. long, nearly as broad. Pileus 1-2 cm. broad; stem about 3 cm. long, 1-2 mm. thick. Wet ground under weeds. (Peck, Bull. Torr. Club. Vol. 22, p. 488)

Volvaria pubescentipes. Pileus convex, dry, white, clothed with minute hairy squamulose or reflexed fibrils, fimbriate on the margin; lamellae close, free, white, then flesh colored, sometimes minutely serrated or eroded on the edge; stem slender, subequal, pubescent; volva subappressed, white; spores elliptical, 6-7 mc. long, usually containing a single nucleus. Plant about 2 cm. long, pileus 1-2 cm. broad, stem 2 mm. thick. (Peck, 29th Report.)

Volvaria volvacea. (Stevenson p. 183. Fries Epic., p. 182.)

Volvaria Taylorii. (Stevenson p. 184. Fries Epic., p. 183.)

Volvaria emendation. Pileus 7 cm. across, flat, with an obtuse umbo, smooth white; margin thin striate; stem 7 cm. high, 8 mm. thick, slightly incrassated above and below, very slightly arachnoid-fibrous, solid, volva forming merely a rim; gills ventricose, remote, free and rounded behind, white, at length flesh colored, extending in front beyond the ragged margin of the pileus as in Montagnites. Spores broadly cymbiform, 5 mc. long. Smell disagreeable but not strong. In the northern State the pileus is areolate. On rich garden soil. (Berk., Ann and Mag. Nat. Hist. Vol. 4, 3rd ser., p. 288.)

Volvaria viscosa. Pileus fleshy, campanulate-convex, smooth, very viscous, fulvous-ochraceous; stipe prominently bulbous, nearly equal above, solid, smooth, ochraceous; volva ample, lobed, concolorous; lamellae touching, brown; spores ovoid-ellipsoid, dilutely flesh colored, with a large nucleus, 8-5 mc. Pileus 6 cm wide; stipe 6 cm. long, at base $1\frac{1}{2}$ cm. wide, above $\frac{1}{2}$ cm. (Clements Botanical Survey of Nebraska, No. 2)

Volvaria speciosa. (Stevenson p. 185. Fries Epic., p. 183.)

Volvaria gloiocephala. (Stevenson, p. 185. Fries Epic., p. 183.)

APPENDIX II.

CORRECTION.

Under *Chitonia* it was stated in first part of this work that no species had been recorded from the United States. We have since learned that Clements has described a new species under the generic name *Clarkeinda*, and it was overlooked from that fact. I do not approve at all of the application of the Rochester rules to cryptogams. It would result in an endless confusion in regard to nomenclature and retard the study fifty years. The Lord knows we have enough troubles to contend with now without adding new and needless ones.

Chitonia plana. Pileus carnose, applanate, exactly plane, even, glabrous, ochraceous, or slightly fulvous; stipe short, stout, solid, attenuate above, fibrillose-squamulose, becoming fulvous; volva ample, adpressed, membranaceous; lamellae free, ventricose, crowded, black-cinnamon-colored; spores short ellipsoid, or globose, uniguttate, purple-fulvous, 4-6x6-6 mc. Pileus 7 cm. wide; stipe 3 cm. high, 2 cm. thick. On manured ground. Described by Clements in recent number of Bot. Serv. of Neb., IV., p. 23.

APPENDIX III.

The natural tribes of the old genus *Agaricus*.

We would arrange the various genera which formerly were included in the Friesian genus *Agaricus* under the following tribes. There is nothing new in this arrangement as it was proposed by W. G. Smith nearly thirty years ago, but no author has adopted it. It is admitted that the usual system where the genera are arranged primarily by the color of the spores is purely artificial, corresponding to the Linnaean system in the flowering plants. The following arrangement is in keeping with the natural affinities of the genera, and it seems to us would greatly facilitate the study. A beginner meeting an *Omphalia* would be impressed with the characters of all the Tribe Umbilicæ, and as a matter of fact will soon learn to ascribe to the proper tribe, on sight, any specimen he may meet. It only remains to determine the color of the spores (which after a little experience he will guess correctly almost every time from the color of the gills) to know the genus.

Most of the terms used in the tables are self-explanatory, but the distinction between the fleshy and cartilaginous stem is very apt to puzzle one at first. A cartilaginous stem is usually like a tube with a *smooth, even* often polished surface and tough. A fleshy stem is more brittle, and the surface is dull and under a glass seems as if made of fibers. We learn to recognize these stems by experience but it is hard to describe them.

The term "Pileus distinct from the stem" is explained in Note o, page 1 of the *Volvæ*. In order to determine whether the margin of the pileus is at first straight or involute, *very young* specimens must be examined. It is important to always note this point in a plant of Series 3. Some plants with the general appearance of *Collybias* are placed in *Mycena*, because the margins of the young pilei are straight.

Series 1.

Pileus distinct from the fleshy stem.

Plant furnished with a volva. Tribe 1. ***Volvae.***

Plant without volva, ring present. Tribe 2. ***Annulae.***

Plant with neither volva or ring. Tribe 3. ***Exannulae.***

Series 2.

***Pileus confluent and homogenous with the
fleshy stem.***

Plant with a ring. Stipe central. Tribe 4. ***Armillae.***

Plant without a ring. Gills attached with a sinuate tooth. Stipe central.

Tribe 5. ***Dentae.***

Plant without ring. Gills decurrent. Stipe central. Tribe 6. ***Clivae.***

Stipe excentric or pileus laterally attached. Tribe 7. ***Excentrae.***

Series 3.

Stipe cartilaginous.

Gills not decurrent. Pileus explanate, margin at first involute.

Tribe 8. ***Explanae.***

Gills not decurrent. Pileus campanulate, margin at first straight.

Tribe 9. ***Campanulae.***

Gills decurrent. Pileus umbilicate. Tribe 10. ***Umbilicae.***

	SPORES WHITE.	PINK.	FERRUGINOUS, LIGHT BROWN, SEPIA BROWN.	PURPLE OR VANDYKE BROWN.	BLACK.
Series 1.					
<i>Tribe 1, Volvae,</i>	Amanita,	Volvaria,	Locellina,	Chitonina,	.....
<i>Tribe 2, Annulæ,</i>	Lepiota,	Annularia,	.....	Psalliota,	.....
<i>Tribe 3, Exannulæ,</i>	Schulzeria,	Pluteus,	Pluteolus, ‡	Pilosace,	.....
Series 2.					
<i>Tribe 4, Armillæ,</i>	Armillaria,	.....	Pholiota,	Stropharia,	Anellaria,
<i>Tribe 5, Dentæ,</i>	Tricholoma,	Entoloma,	Hebeloma,*	Hypholoma,	Panaeolus,
<i>Tribe 6, Clivæ,</i>	Clitocybe,	Clitopilus,	Flammula,	.....	.....
<i>Tribe 7, Excentræ,</i>	Pleurotus,	Claudopus,	Crepidotus,	.....	.....
Series 3.					
<i>Tribe 8, Explanæ,</i>	Collybia,	Leptonia,	Naucoria,	Psilocybe,	.....
<i>Tribe 9, Campanulæ,</i>	Mycena,	Nolanea,	Galera,	Psathyra,	Psathyrella,
<i>Tribe 10, Umbilicæ,</i>	Omphalia,	Eccilia,	Tubaria,	Deconia,	.....

‡Stipe subcartilaginous but otherwise closely related to *Pluteus*.

*Including *Inocybe*.

SYNONYMS.

The following names, considered now synonyms have been used in descriptions of American species. The name of the author given is not the authority for the name but the author who used it.

Amanita affinis, Frost,	equals Amanita Frostiana.
“ aurantica, Schw.,	“ “ Caesarea.
“ badia,† Peck,	“ “ vaginata.
“ bulbosa, Schw.,	“ “ phalloides.
“ bulbosa, Rav.,	“ “ Ravenelii.
“ Ceciliae, Peck,	“ “ strangulata.
“ citrina,* Schw.,	“ “ phalloides.
“ formosa,† Peck,	“ “ muscaria.
“ incarnata, Schw.,	“ Volvaria bombycina.
“ livida, Schw.,	“ Amanita vaginata.
“ muscaria var. minor. Peck,	“ “ Frostiana.
“ muscaria var. major, Peck,	“ “ solitaria.
“ onusta, Howe,	“ “ ?
“ pellucidula, Banning, . . .	“ “ Caesarea.
“ polypyraxis, B. & C., . . .	“ “ solitaria.
“ pusilla, Schw.,	“ Volvaria parvula.
“ soleata, Howe,	“ Amanita volvata.
“ spadicea, Schw.,	“ “ vaginata.
“ umbrina, Schw.,	“ “ pantherina.
“ virescens, Schw.,	“ “ phalloides.
“ virgata, Schw.,	“ Volvaria volvacea.
“ viridis, Schw.,	“ Amanita phalloides.
Volvaria pusilla, Schw.,	“ Volvaria parvula.

*In reality this name was first used by Schaeffer, is now considered in Europe a synonym for mappa.

†Name used only as a synonym.

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Names in *ITALICS* are synonyms.

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