

PORCHER (F. PEYRE)

FUNGI - EDIBLE & POISONOUS.



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follow unsuccessful attempts at their removal, as happened in a case under the care of Mr. Lucas.⁵ This, nature's process of removal of the bony mass, led Sir James Paget to suggest the possibility of setting up a destructive process in the osseous structure by exposing it and applying escharotics to its surface. In a very interesting case related by Bryant⁶ the growth was enucleated from its bed in the frontal sinus by means of an elevator, after removing a portion of the frontal bone overlying it. The osseous mass must have been detached, partially or completely, to have admitted of such ready extirpation. Mr. Bryant states that the growth was evidently dying when it was removed. The usual outcome of attempts at the removal of these bony growths occurring in the frontal sinus has been death, either from septicæmia or purulent meningitis, and abscess of the brain. How far the application of the principles of antiseptic surgery to these operations would prevent such sequelæ remains to be seen.

The treatment of sarcoma as it occurs in the frontal sinus may be dismissed in a very few words. The utter hopelessness of such a condition must be obvious. No amount of importunity on the part of the patient or his friends should induce the surgeon to entertain the thought of attacking such a growth with the means now at our command.

George R. Fowler.

¹ Inter. Encyc. of Surgery, vol. v., p. 446. ² Ops. of Surgery, p. 270.
³ Baillie's Morbid Anatomy, Fasciculus, x, Plate 1, Fig. 2.
⁴ Guy's Hospital Reports, vol. 1.
⁵ Paget: Surgical Pathology, p. 461. ⁶ Practice of Surgery, p. 525.

FROST-BITE We may divide frost-bites into three

grades, a character formation. The first might represent the most frequent form, sensation passes off there is increase of cold. It sometimes dilated; nose and which, vesicles; complete loss of always vesicles in frost-bite. A lin and brit glass, if to verif. German both fe they ht joint, se

Fungi - Edible & Poisonous.

Wood's Hand Book of the Medical Sciences. Vol III.

1886. By F. Peyre Porcher, M.D.

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(complete copy - very scarce -)

ness and numbness great care should be used in so raising the temperature, and attempts at resuscitation should be continued as long as a heart-beat can be detected. Artificial respiration should be tried if at any time the breathing become perceptible. As slight stimulants that may do good, enemata of cold water, and holding ammonia to the nostrils may be mentioned. Very gradually as the patient becomes conscious the surrounding temperature may be raised. The parts may then be placed in a moderately elevated position and covered with cotton wool. Warm drinks may now be given, as may be also a moderate quantity of alcoholic stimulant, if necessary. In the event of excessive local reaction, cooling lotions may be applied, and strict attention must be paid to the associated constitutional indications. As one by one the different parts of the body regain vitality there is occasionally some pain in the limbs, especially if they are warmed too rapidly; in these cases it is well to envelop the painful parts in cloths dipped in cold water.

Such cases of general freezing rarely escape without loss of some limbs or parts of them, and, in regard to the treatment of these frozen parts, there is not much to be done. The vesicles should be punctured and the serum evacuated; the frozen extremities may then be wrapped in cold wet cloths, and further than that there is nothing to do but to wait to see whether, and how extensively, gangrene will occur. If the bluish-red color passes into a dark cherry-red the chances of restoration of the part to life are slight. Gangrene will occur in the great majority of such cases. By testing the sensibility with a

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often a temperature of 100° F., and in seventy hours was walking about, with only a slight frost-bite on one of his toes.

John McG. Woodbury.

FRUITPORT WELL. Location and Post-office, Fruitport, Muskegon County, Mich.

ACCESS.—By Chicago & West Michigan Railroad.

ANALYSIS.—One pint contains (C. G. Wheeler):

	Grains.
Carbonate of soda	0.565
Carbonate of magnesia	0.308
Carbonate of iron	0.680
Carbonate of manganese	0.010
Carbonate of lime	0.443
Chloride of potassium	0.054
Chloride of sodium	53.003
Chloride of magnesium	5.851
Chloride of lime	19.888
Sulphate of soda	5749
Bromide of magnesium	0.005
Silica and silicates	1.325
Alumina	traces

(Temperature 48° F.)

86.971

The part frozen beyond recovery, or frozen to death, as it is usually termed, at first blanched, cold, and insensible, soon becomes swollen and discolored, and gradually passes into a contracted or shrivelled condition; chemical changes follow; a line of demarcation is formed, and the dead and living tissues are ultimately separated.

Mortification from severe frost-bite almost invariably involves all the tissues of the part affected. It seldom takes place immediately, but usually requires several days for its definite results to fully declare themselves. It is not unusual for a frost-bitten part to present quite a natural appearance for a day or two, and then to become discolored, passing from a light-blue color to a deeper blue, and ultimately black, and having an unmistakably gangrenous odor.

TREATMENT OF FROST-BITE.—Any sudden change to a higher temperature must be avoided, but warmth must be increased gradually. Such a patient should be placed in a cool room, on a cold bed, and friction should be made for several hours. If the patient be in a state of general stiff-

THERAPEUTIC PROPERTIES.—This is a saline water of marked value, and enjoys a high reputation among the people of the West as possessing excellent cathartic and diuretic properties. It is a favorite resort for the inhabitants of Chicago and neighboring cities.

The well is situated in the southwestern part of Michigan, on the border of Spring Lake. The surrounding country (16,000 acres) is devoted to fruit-raising, and is owned by a Chicago company. *Geo. B. Fowler.*

FRY'S SODA SPRING.—*Location,* Siskiyou County, Cal., about two hundred and twenty-five miles north of Sacramento.

ACCESS.—By Oregon Division of Central Pacific Railroad. This road is finished to Redding, one hundred and seventy miles. As surveyed it passes within a mile of the spring.

ANALYSIS.—The only accessible description of this spring is contained in the "Geological Survey of California," vol. i., p. 331. It is described as being strongly ferruginous, sparkling, and with a temperature of 52° F.

The elevation of this spring is two thousand three hundred and sixty-three feet, and the locality possesses features of startling grandeur. *G. B. F.*

FUCUS VESICULOSUS Linn. (*Varech vesiculosa*, Codex Med.), Sea-Wrack, Bladder-Wrack, etc.; Order, *Fucoxideae* (Algae). This is a coarse, olive-colored marine alga growing in great abundance upon the rocky shores of the North Atlantic and upon the eastern shore of the North Pacific oceans. It arises from a dilated hard disk, by which it is attached to the rock or bottom, has a short flattened stem which soon forks, and becoming broader and more flattened repeatedly branches in a dichotomous manner, and forms an open fan-shaped compound thallus, composed of numerous strap-shaped divisions. The entire plant is a foot or more long, the ultimate foliaceous divisions of the thallus are from one-fourth to one-half inch wide. A well-marked midrib extends to the very extremities, and numerous large oval air-bladders are arranged in pairs on each side of the midrib. The reproductive organs are contained in turgid, club-shaped, and forked receptacles which terminate many of the branches of the thallus. They are minute cavities (conceptacles) lying just beneath the surface, with which they communicate through minute pores. They contain numerous hairs, and are either fertile or sterile; the former contain, besides the hairs just mentioned, a few large "sporangia," developing eight spores in each; the latter develop numerous small antheridia, each producing numerous ciliated "antherozoids."

Fucus vesiculosus should be gathered in midsummer and thoroughly dried in the sun, when it may be coarsely ground and preserved for use. It is a comparatively old remedy, having been used more than a hundred years ago as an alternative in strumous diseases. It has also had and lost a place in several pharmacopœias, and rather recently has been brought out of its obscurity again for a new purpose.

Its composition does not differ essentially from that of many other algae: *mucilage, mannite, coloring matters, a stearoptene,* and a large amount of mineral ingredients; among the last are *soda, lime, iron, iodine,* and *bromine* compounds, to the last two of which its virtues have been attributed.

The early employment of *Fucus vesiculosus* was in scrofulous enlargement of the glands, diseases of the bones, etc., for which a charcoal made by incinerating it has been extensively employed under the name of "Vegetable Ethiops," but it was completely superseded by the introduction of iodine, cod-liver oil, etc. In 1862, Dr. Duchesne-Duparc discovered, while giving it in chronic psoriasis, that his patients lost their excess of fat without suffering otherwise in their general condition. This observation led to its employment for obesity, and in this direction it has maintained some reputation for usefulness to the present time, although the value at which it was rated a few years ago is known to be too high. The mode of its operation is not known, nor with

certainty to which of its ingredients it owes its value, although probably it is to its saline compounds, especially the iodine and bromine salts. The most common preparation is a solid extract, from which pills can be made. From three to six decigrams, two or three times a day, may be taken. A suitably directed regimen should also be followed out.

ALLIED PLANTS.—Several other species of *Fucus* inhabiting the same area are frequently collected with or instead of this one; they are said to be inferior to it in medicinal qualities. Probably other algae have the same powers as this; for the Order, see ERGOT.

ALLIED DRUGS.—Numerous alkaline and sulphurous mineral waters, bromine and iodine salts, etc., are employed for the same trouble with some, but not marked, success. Plenty of exercise and a carefully-regulated diet are other means to the same end. *W. P. Bolles.*

FUERED, also known as *Báton-Füred*, a health resort and mineral springs situated in the Tapolcaer district, Zalaer County, Hungary, on the northwestern shore of the Platten lake, at an altitude of about five hundred feet above the sea-level, two hours by boat from Siofok, or by stage from Veszprim. The climate is moderate and healthful. Pleasant cold bathing is afforded at the lake. Warm sitz- and tub-baths are provided, the water being taken either from the lake or the mineral springs. Of the mineral springs, the Franz-Josef is the most important. It is to these baths chiefly that Füred owes its reputation as a resort. The average temperature of the lake is 20° C. (68° F.), the same as that of the North Sea, but the waves are not so strong as at the bathing places on the shores of the latter.

The arrangements for the care of patients are very good. Sheep's milk whey is drunk with the mineral water to a considerable extent at this place.

See also Franz-Josef.

J. M. F.

FUMITORY (*Fumetere*, Codex Med.), *Fumaria officinalis* Linn.; Order, *Fumariaceae*, an annual herb with branching stem, smooth and glaucous compound leaves, and small, rather irregular flowers in axillary racemes; the pods are one-sided, and the juice of the stems and leaves is not milky; in other respects of structure it accords with the poppy family. Fumitory is indigenous to Europe, and an introduced plant in the United States.

The leaves or the flowering herb are collected for use; they have a bitter, saline taste, but no odor. They contain a crystalline, bitter alkaline base, *fumarine, fumaric acid*, and a large amount of carbonate of soda.

Fumitory is an old European house-remedy for "visceral, obstructive, hepatic, and scorbutic troubles." It is but little employed at present.

ALLIED PLANTS.—*Corydalis* and *dicentra* are pretty flowers, some species of which are cultivated for ornament. There are several other species of *Fumaria* which have been employed also in medicine.

ALLIED DRUGS.—Fumitory is scarcely worthy of study in this respect. *W. P. Bolles.*

FUNGI, EDIBLE AND POISONOUS. This paper will contain an account of the most important fungi, edible and poisonous, which are known to grow in this country, with the distinctive characteristics of many of them.

For some of these descriptions, which will aid in identifying species, and enable us to distinguish more readily the benign from the virulent, we are indebted, among others, to Cordier's elaborate and elegantly illustrated work, "Les Champignons—Histoire—Description, etc." (Paris, 4th ed., 1876.)

Frequent reference is necessarily made to the Carolinas, because, from the researches of the "accomplished Dr. Schweinitz," and the late Rev. M. A. Curtis, D.D., who was associated with Mr. Berkeley, of England, and who thoroughly investigated the flora of North Carolina—materially aided by H. W. Ravenel, Esq., of South Carolina, the precise localities where a great number of these plants grow have been indicated and recorded. Doubtless a large proportion of these are widely diffused, and

we would gladly have given the habitat of each everywhere in the United States, could they have been procured.* But fungi are much more abundant in a temperate zone where warmth and humidity favor their growth; so also on mountains their range is limited to certain altitudes.

Many new species which have been ascertained to be eatable by Curtis, Ravenel, and others will be included; and as Dr. Curtis tested many of these plants personally, we make special allusion to him in such cases. A number of others were long since known to be esculent.

The composition of such a paper by a physician occupied with his ordinary professional and hospital duties, and who has not made collections of the "flowerless plants," is tedious, and requires great care and research in order to insure fulness and accuracy; but, we hope that it will furnish a source of reference for all those in this country who shall hereafter desire to examine, investigate, or use our native fungi.

GENERAL CHARACTERISTICS.—These plants, consisting of *cells* and *fibres*, bearing reproductive sporida, belong to one of the grand subdivisions of the vegetable kingdom, namely, the Cryptogamia, and occur of all colors except pure green. In them the organs of vegetation and reproduction are distinct.

Their qualities, remarks Mr. Berkeley ("Cryptogamia of England"), are various; many are used very extensively as articles of food; a few are endowed with valuable medicinal properties; numbers are highly poisonous; and the ravages of several in dock-yards, buildings, corn-fields, orchards, etc., are incalculable. Corn-smut (*Ustilago Maydis*), which contains a fixed oil and a crystalline principle, used in place of ergot, affects the male florets of maize in every country; smut also attacks grasses, barley, and rice—a thread-like mycelium growing at the expense of the tissues. Bunt (*Tilletia caries*) seizes upon the whole farinaceous portions of the grains of wheat. A few possess the remarkable property of exhaling hydrogen gas; some, however, exhale carbonic acid, and inhale oxygen.

They exist in vast profusion almost everywhere, and need only to be known to be utilized or avoided. This country is exceedingly rich in the fleshy fungi, and new discoveries will reward further research. Fries discovered 2,000 species within the compass of a square furlong in Sweden. Curtis, in his catalogue of the Plants of North Carolina, includes 2,976 species of flowerless plants.

Mr. Berkeley says of the properties of this important order, and his remarks may be justly applied to this country, that in England *fungi* are so generally objects of prejudice and disgust that their real importance, as useful productions, is little appreciated. With the exception of the common *mushroom*, scarcely a single species of *agaric* is generally accurately distinguished; and though many speak of another kind, under the name of *champignon*, there are few persons who know what to gather; and that the fatal mistakes which have in consequence been made have increased the disinclination to any but the mushroom.

Mr. Curtis has designated 111 species as edible, 40 of which he had himself eaten, collected within two miles of his residence.† He had prepared a work on the "Edible Fungi," still unpublished, accompanied by colored drawings from nature of many of our native species by his son, the Rev. C. J. Curtis. It has been our extreme

* That our course is not only justifiable, but compulsory, M. C. Cooke, LL.D. (Fungi, their Nature and Uses, London, 1875), while referring to Lew's collections in Cincinnati, Wright's in Texas, and contributions from Ohio, Alabama, Massachusetts, and New York, says: "A great portion of this vast country is mycologically unknown. Of the whole extent of the New World, only the Carolina States of North America can be said to be satisfactorily known." Special reference is made by this writer to the researches of Schweinitz, Curtis, and Ravenel—to whom is ascribed this thoroughness, which has given them a reputation which is world-wide. One genus and fifty-three species have been named after the last-mentioned, who by no means outranks his co-workers.

† We must take this occasion to express our obligations to Dr. Thomas F. Wood, of Wilmington, N. C. (who has published an admirable sketch of the botanical work of Dr. Curtis), for favors extended to us in the preparation of this article: in imparting most liberally his choice collection of plates, books, and pamphlets. We record our obligations also to our friend and correspondent, Mr. Ravenel.

good fortune to procure the use of these drawings, and through the liberality of the publishers of the HANDBOOK selections from them will illustrate this paper. The "Edible Fungi" will be illustrated entirely by the Curtis drawings, which are unique and original; for the Poisonous, the publishers will select from Cordier's work, and Prang's publication.

The smaller cuts are (with the single exception of that of *Agaricus procerus*), enlarged from pen sketches executed by the writer, and are used to exhibit the characteristic forms of some of the most important families, genera, and species.

Mr. Worthington G. Smith, in his "Mushrooms: How to distinguish easily the Differences between Edible and Poisonous Fungi," London, 1875, has accompanied his pamphlet with two colored charts. In one of these, twenty-nine edible species are figured: "Most of them abundant and instantly recognizable when seen; every one is a wholesome and delicious object of food full of aroma and flavor." They are easy of detection, he adds, as we only use the larger species. The reproduction of Smith's charts in this country, a greater extension given to the illustrated work issued by Prang ("The Mushrooms of America, Edible and Poisonous," edited by Julius A. Palmer, Jr.), would reinforce the present efforts made by the publishers of the HANDBOOK, and would tend to diffuse and make popular a knowledge of this highly important class of plants. This would add enormously to the food-supply of the entire country, and be greatly beneficial to poor and rich; for the almost animal character of the mushrooms—which exist in such profusion at our very doors—will supply without cost a most nutritious, as well as a delicious addition to their tables.

In many portions of Europe, but especially Poland and Russia, they form a most important part of the food of the common people; and in the latter country whole tribes are mainly supported by them, scarcely any species, except the dung and the fly *agarics* being rejected. Even those kinds which are elsewhere refused by common consent, as poisonous on account of their extreme acidity, are taken with impunity—being extensively dried or pickled in salt or vinegar for winter use. It is probable that this harmlessness arises from the particular mode of preparation; for, from the exact account of Pallas, and the general diffusion of various species in various countries, there is no reason to doubt the fact that kinds *justly esteemed poisonous are really used*; and it is well known that the noxious qualities of that most virulent species, *Agaricus verna*, are communicated to brine, vinegar, etc., and that the *olive-tree agaric* loses all its poisonous properties when salted, and becomes eatable. The pickle is, probably, in general, thrown away; while as to dried fungi, he had been informed by a gentleman of great acuteness and observation that in some town of Poland, where he was detained as a prisoner, he amused himself with collecting and drying the various fungi which grew within its walls, among which were many commonly reputed dangerous; and that to his great surprise, his whole collection was devoured by the soldiers. It is, however, the practice, in some districts, to use *fungi* without any preparation whatever, as in their simple state they are considered more wholesome and nutritious. Notwithstanding what has been stated, some fungi, as is well known, are extremely poisonous, and great care must be exercised with regard to their use. In our report on "The Medicinal, Poisonous, and Dietetic Properties of the Cryptogamic Plants of the United States" (Trans. Am. Med. Assoc., vol. vii., Reprint, Baker, Godwin & Co., New York, 1854, p. 126), can be found a number of similar examples, with a variety of information bearing on these subjects.

COMPOSITION AND TOXICOLOGICAL CHARACTERISTICS.—The medical uses of fungi are being more fully developed—though many which were formerly held in high repute are now neglected. According to Braconnot, most of the fungi contain a peculiar principle denominated *fungin*, a peculiar acid called *fungic acid*, usually combined with potassa, and a peculiar saccharine matter less sweet than other varieties of sugar, less soluble in alco-

hol and water than that of the cane, and distinguished by some writers as the *sugar of mushrooms*.

Fungin constitutes the basis of these vegetables, and is the principle upon which their nutritive properties chiefly depend. It is the fleshy substance which remains when they are treated with boiling water, holding a little alkali in solution. It is whitish, soft, and insipid; inflammable; insoluble in water, alcohol, ether, weak sulphuric acid, and weak solutions of potassa and soda; soluble in heated muriatic acid; decomposed by nitric acid and by concentrated alkaline solution; and converted by destructive distillation into substances resembling those which result from the distillation of animal matter.

Letellier found in some of them one, in others two, poisonous principles. One of these is an acrid matter, so fugacious that it disappears when the plant is either dried or boiled, or macerated in weak acids, alkalies, or alcohol. To this principle, he says, is owing the irritant properties of some fungi. The other principle is more fixed, as it resists drying, boiling, and the action of weak alkalies and acids. To this principle he attributes the narcotic properties of the fungi. He found it in *Am. muscaria*, *bulbosa*, and *verna*; and he proposed to call it amanatine. Its effects on animals appear to resemble considerably those of opium. The term *muscarine* has been applied to the poison of mushrooms. It has a close similarity in its action to pilocarpine, and is almost completely antagonistic to atropia (see under *Am. muscaria*, *postea*). Chansarel found that the poisonous principle resides in the juice, and not in the fleshy part after it is well washed ("Repert. für die Pharm.," lxxvi., 117; Christison on "Poisons," p. 704; see also recent researches of Sidney Ringer, Lauder Brunton, and others, on Muscarine).

Paulet long ago established that fungi are poisonous to animals as well as to man. The toxic or active principle, according to Mialhe, depends upon their power to coagulate the albumen of the blood, and hence to arrest the circulation ("Essai sur l'Art de Formuler," ccxcix.). The symptoms produced by them in man are endless in variety, and fully substantiate the propriety of arranging them in the class of narcotico-acrid poisons (see *Agaricus campanulatus*, and *pantherinus*). Some of them taken a long time induce a depraved state of the constitution, suppuration and gangrene. Ergot is a sufficiently strong example.

POISONING BY FUNGI.—In case of poisoning with the fungi there is a great difference in the interval which elapses before the symptoms begin—ranging from a few minutes to many hours. Gmelin has quoted a set of cases, seventeen in number, in which it was said to have been a day and a half. Portions of them have been discharged by vomiting so late as fifty-two hours after they were swallowed (Aymen, in "Hist. de la Soc. Royale de Méd.," i., 344). Even the purely narcotic effects have been known to last above two days; the symptoms of irritation have been noted by Orfila to continue for about three weeks. Through idiosyncrasy, some persons have been affected by the small portion of mushroom-juice which is contained in an ordinary catsup seasoning (Christison). W. G. Smith experienced severe ill effects, for several days, from eating a deleterious fungus.

The morbid appearances left in the bodies of persons poisoned by the deleterious fungi have been detailed by Christison and others: The body is in general very livid, and the blood fluid; so much so, sometimes, that it flows from the natural openings in the dead body. In general the abdomen is distended with fetid air, which, indeed, is usually present during life. The stomach and intestines of some French soldiers who died of it (see *Ag. muscarius*) presented the appearance of inflammation, passing in some places to gangrene. In two of them the stomach was gangrenous in many places, and far advanced in putrefaction. In the cases mentioned by Picco, there was also an excessive enlargement of the liver. The lungs have been sometimes found gorged or even inflamed, and the vessels of the brain very turgid. They were particularly so in a case related by Dr. Beck, where death was occasioned in seven hours by an infusion of the *Ag. muscarius* in milk.

Remedies for Poisoning.—In cases of poisoning by fungi, common salt, sulphuric ether, in full dose, and Hoffman's anodyne, were all found beneficial after the use of evacuations. Large draughts of warm water should be taken, which dilute the poison and promote vomiting. An emeto-cathartic should always be administered. The following prescription is advised:

B. Ant. tartarizat grs. iij.
Ipecac grs. xxiv.
Sulph. sodæ grs. vj.

This to be followed by oil, and subsequently by ether. Milk has likewise been recommended. Chansarel found acids useless as a remedy, but he thought infusion of galls advantageous. Paulet said (1776), that salt and vinegar, or boiling, or allowing them to soak in vinegar and water, removed every deleterious principle from that poisonous species the *Ag. bulbosus*; and that the Russians are in the habit of salting their fungi, which may be the cause of their harmlessness. So the pickling and subsequent washing of the poisonous agaric of the olive renders it eatable in the Cevennes (Delile, "Lind. Nat. Syst.,"). Both Pallas and Orfila assure us that vinegar will destroy the noxious power of the most dangerous ("Toxicol.," ii., 89). On some persons all mushrooms, even the very best of the eatable kinds, act more or less injuriously—they cause vomiting, diarrhoea, and colic. In this respect they are on the same footing as the richer sorts of fish, which by idiosyncrasy act as poisons on particular constitutions.

To Select Mushrooms, and to Distinguish the Edible from the Poisonous.—Fodere, De Candolle, and Greville have laid down general directions for distinguishing the esculent from the poisonous varieties, but their rules are not safe, as they would exclude many species in common use, and the number of edible species is daily being increased.

Cordier cites numerous examples to prove that there are no fixed general rules or tests to guide us in the rejection of a mushroom; for of those growing in any kind of soil or locality, whatever be their form, hue, appearance, or taste, some are exceptionally edible, or noxious. The best rules will be those derived from the identification of species, which is sufficient for all practical purposes, as the species are well marked and easily recognized by study or observation. Notwithstanding this, taste, color, aroma, and other physical qualities, often furnish important indications. Messrs. Cooke and Berkeley express similar views, in saying that we must learn by experiment and observation which are the edible and poisonous mushrooms, just as we distinguish the character and qualities of any other plant. How much alike, among Phanerogams, for example, are angelica and cicuta; each must be known and recognized to be used with safety, or to be shunned.

M. Richard ("Dict. des Drogues") lays down rules to guide those who eat mushrooms in their selection of them: Those should be rejected which have a narcotic, pungent, or fetid odor, or an acrid, bitter, or very acid taste; which occasion a sense of constriction in the throat when swallowed; which are very soft, liquefying, changing color, and assuming a bluish tint upon being bruised; which exude a milky, acrid, and styptic juice; which grow in very moist places and upon putrefying substances; in fine, all such as have a too coriaceous, ligneous, or corky consistence. The last, however, are injurious, in consequence rather of their indigestible than of their poisonous nature.

It has also been said that of those which grow in woods and shady places a few are esculent, but most are unwholesome; and if moist on the surface, they should be avoided; also that those which grow in tufts or clusters, from the trunks or stumps of trees, ought likewise to be shunned. Exceptions exist here also. Agarics of orange, or rose-red color, and boleti which are coriaceous or corky, or which have a membranous collar around the stem, are also unsafe; but these rules are not universally applicable in other genera.

In a recent letter from Mr. Ravenel he writes as follows: "There are certainly some, perhaps many, poison-

ous species, but I am satisfied that a large majority of the fleshy fungi are either wholesome or innocuous. Yet, it is well to lay stress on the fact of there being some virulently poisonous, so as to give a prudent caution to those who may not know the wholesome kinds."

1. Every mushroom should be rejected, whatever its species, which is too old, or with perforations which show the presence of maggots.

2. All of which the texture is woody.

3. All those the taste of which is acrid, burning, bitter, acid, or peppery—although some are edible which are either acrid, or peppery. Valmy says that the taste is the first and best indication of the quality of a mushroom ("Les Champignons, Guide Indispensable," etc.).

4. All those which exhale a disagreeable and nauseous odor; which are slimy and deliquescent.

5. The following is an indication of danger: the presence of a bulb or swelling of the base of the stem, its being surrounded by a volva, or white envelope, in the form of an egg-shell, and remaining as a socket at the base when the mushroom is pulled up; a collar or ring large and reflexed, or falling back; lastly, the head covered with the débris of the volva and made scaly and warty, as in *Amanita Muscaria*. In the poisonous, the scales or protuberance rub easily off, leaving the skin intact. In the poisonous *amanitas*—and death is said not to occur from eating any other family—all these signs exist. So the amateur should avoid all *amanitas* which he does not know.

It is a dangerous error that all mushrooms which change color when cut are poisonous; or that those which do not change when cut are edible. Among the Boletes, for example, the greater number which do not change color are poisonous; among agarics scarcely one which is poisonous changes its color, but remains white; while the best one of the edible species does change its color when cut, or becoming old.

It is also a mistake to suppose that if a piece of silver, or an onion, does not change color when cooked with a mushroom, that it is edible, or *vice versa*; neither will vinegar added to the water in which they are cooked surely deprive the poisonous of their hurtful qualities.

TO PREPARE MUSHROOMS FOR THE TABLE.—Accidents from eating mushrooms would be much less frequent if consumers would use only young, fresh, and sound specimens, and reject all those which are stale, semi-putrid, and worm-eaten.

The limited space at our disposal forbids our giving many directions for the preparation of mushrooms for the table; these may however be obtained from almost any of the works treating of them—as well as from most treatises on cookery. MM. Roques, Cordier, Savarin, and others are very enthusiastic upon the subject. Mr. W. G. Smith, Mrs. Mussey, and others make a few simple but very sensible suggestions. He says that it is apparent that the addition of "good beef gravy," "a few slices of fowl," "rich veal stuffing," and various other savory condiments, must occasionally give an extra zest to a dish of mushrooms; but that broiled, stewed, or pickled, most species are "always good alike;" indeed, mushrooms, in their whole composition, resemble meat in so remarkable a manner that any method of cookery in vogue for delicate preparations of meat apply with equal force to mushrooms. "I must confess," he adds, "that I consider no preparation of mushrooms can exceed the delicious, inviting, and grateful flavor possessed by them when simply fried with butter, salt, and pepper."

For special directions, see (*postea*) *Ag. procerus*, *Ag. campestris*, *Ag. oreades*, and others.

Some species are stored up for future use, being dried in a current of air, in a sunny window, or in a cool oven; and then kept in tins, or threaded on strings and kept in a dry place. If much dried, they form "mushroom powder," and are often sold as such. Mushrooms are often pickled by throwing them into scalding vinegar, allowing them to boil for ten minutes or so, and then by adding cayenne pepper, mace, or spices adapting them to various tastes.

The liquor extracted from the various mushrooms under the name of "ketchup" is prepared by placing the freshly gathered plants in earthen jars with layers of salt; after a few hours the ketchup exudes, and the process is completed by mashing the remains of the mushrooms with the hands. It is then strained and boiled with spice and pepper, or strained and bottled—the corked and sealed bottles being placed for several hours in boiling water (Smith). Our common horse-mushroom (*Agaricus arcensis*) is particularly suitable for this purpose. Those possessing a firm and coriaceous flesh should not be treated in the same fashion as those which are soft and watery.

Every kind of frying suits mushrooms. They should be warmed, entire or cut in pieces, by exposing them for fifteen or twenty minutes to a fire in a vessel without water; the water which has exuded from them is thrown away; then they are rolled into a mass with corn-flour, pepper, salt, onions and fine herbs cut fine, after which they are fried in butter, oil or lard. For soft mushrooms, white or fish sauces, or meat-juice, suit best.

Mushrooms can be eaten alone, or mixed with anything to advantage; they can be served with meats, fish, or even with legumes and eggs.

In preparing young subjects the pellicle on the cap should not be removed; they should simply be brushed with a soft towel to remove the sand and dirt, then washed in warm water. When collected, the gills should be turned up, that the spores, which possess much perfume, may not escape.

CULTIVATION OF MUSHROOMS IN CAVES.—In "Fungi, their Nature, and Uses," by M. C. Cooke, LL.D., and M. J. Berkeley, F.L.S. ("International Scientific Series," 1875), it is stated, p. 255, that the profits of mushroom-grounds near London are very great, although only the common mushroom was cultivated. The profits amounted to from one hundred to one hundred and fifty per cent. Immense quantities are produced in Paris, as is well known, in caves. In one of these subterranean vaults at Montrouge, the proprietor sends three hundred to four hundred pounds per day to market. Large quantities of preserved mushrooms are exported, one house sending to England not less than fourteen thousand boxes in a year. One cave, near Frépillon, in 1867, sent three thousand pounds to the Parisian markets daily. In 1867 M. Renaudot had over twenty-one miles of mushroom-beds in one great cave at Méry. The temperature is so equal that the cultivation is possible at all seasons. The open-air culture is also practised, and can be carried on by the gardener or the cottager. That this industry may become possible near our large cities, we insert in the "Bibliography" the titles of several special treatises on this subject.

TO CULTIVATE MUSHROOMS IN THE OPEN AIR.—The Paris system is the best, and is as follows, which we translate from Lamy's little brochure—only the common mushroom (*Ag. Campestris*) is used for this purpose:

In December, in a dry and sandy soil, exposed to the south and east, a trench is made 65 to 80 centimetres in breadth, 15 to 20 deep, and of a convenient length, bordered with earth from the excavation. If the land is moist, the trench may be deepened and the extra space filled with a layer of lime and stones covered with a little sand and earth.

On the top is placed a layer of manure, covered freely with dung which is not too large; that of the horse is best when not fed on wheat-straw. It is dressed with a good layer of mushroom spawn (*blanc de champignon*). This is pressed with the feet, raised in the shape of an ass' back or a cone 65 centimetres high; then covered with about 3 centimetres of earth and sand, and also of manure mixed, if too compact. At the beginning of April it is covered 5 to 6 centimetres, more or less, with a large litter of straw, well shaken—called in France the *chemise*. At the end of May it will begin to produce.

The trench, or fosse, may be dispensed with, and the layer may be made in any of the spring or early summer months. Lamy tates that a gardener exhibited a suc-

cessful bed bearing mushrooms, at an exposition in Paris, made upon a board.

To succeed well it is necessary to unite to moisture a certain heat, 17° to 18°, Réaumur, or 21° to 22°, Centigrade. This heat is maintained by means of the *chemise*, which is diminished or increased as necessary. In summer it is necessary to moisten the layer, in order to keep the moisture at the same temperature. When the atmosphere is at 15° Réaumur, or 19° Centigrade, the layer requires no "chemise"—the mushrooms grow naturally, as was the case at the Exposition.

These layers can be made in the open air, or in caves; they succeed better in caves, because the temperature approaches 15° Réaumur, and they require less care. We should guard against allowing the *chemise* to become stale by too much heat or moisture; to prevent which it should be occasionally stirred or renewed.

A layer of mushrooms, made at the beginning of August, can produce in two months; and a bed established at the end of summer will produce in winter. To preserve the bed leave some of the mushrooms to dry upon their stems, while renewing the manure, and watering it with the water which served to wash the mushrooms which were gathered.

To establish a bed, the layer of manure is covered with the dried sporidia, or seeds of the mushrooms (*blanc de champignon*, as the gardeners call it), when it only has a slight warmth, which occurs about seven

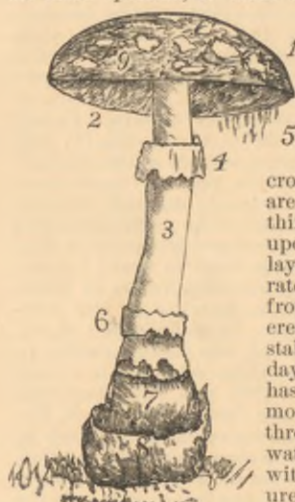


FIG. 1355.—Diagram Showing Different Parts of a Mushroom.

to eight days after they are put in position; in order to do this, little furrows should be traced, crossing like checkers, which are filled with the spawn, about thirty centimetres apart, only upon the upper three-fourths layer of the bed, that is: separated about fifteen centimetres from the earth. It is then covered with litter (straw from stables), and examined eight days after to see if the spawn has reddened, if it possesses more smell, or has thrown out threads; if it is working, it is watered a little and covered with a slight thickness of manure, and this covered with a fresh litter.

A layer of mushrooms can last many years; but it is necessary to renew the manure. The mushroom white, or spawn (for seed), is procured of good quality by taking it from a good bed. It can be bought, and kept either in the shade or in a cave.

Our author insists that a mushroom-bed is a source of extra profit, because the material used is worth more for the garden, the mushrooms can be got at all seasons, and sell very high. They, after truffles, are the best addition to a repast; they serve as an appetizer for the rich, and a resource for the poor. Why their culture is not more extensive, in the provinces as well as in the cities, can only be accounted for by a want of knowledge, the fear of being poisoned, or both causes combined.

PARTS OF A MUSHROOM.—The different parts of a mushroom are distinguished as follows (see Fig. 1355):

1. *The expanded disk, cap, or head (pileus).*—On the under surface of this is the spore-producing receptacle (Hymenophore) and the organ which bears the membrane (Hymenium) upon which the spores or seminules grow. The cap or pileus is of diverse shape, structure, and color.

2. *The spore-bearing membrane.*—Takes the form of plated folds, leaves or lamæ (gills), as in agarics; of tubes in boletes; of little needle-shaped spines, as in the "beef tongue" (*Hydnum*); smooth in the clavarias; and with salient nervures or protuberances, in the morels (*Mor-*

chella). Over the plated folds of the agarics, or the surface of the spines of hydnei, is spread the spore-bearing surface (*Hymenium*). The sporules, sporidia, or seeds, are exceedingly minute, and appear like fine dust.

The gills, lamæ, or leaves, which form the under surface of the cap, are either entire, or alternate with half leaves. They are either detached from the stem, or adhere to it; sometimes they bifurcate. They form important distinctions between the edible and poisonous mushrooms.

3. *The foot or stem.*

4. *The collar, or ring (annulus).*—This in some species forms a partial envelope, adhering to the borders of the cap; but sometimes becoming detached, it forms a movable ring around the stem.

5 and 6. *The veil, a membrane, or web* which extends from the margin of the cap when the plant is young, and thus encloses the gills.

7. *The bulb, or swelling of the base of the stem, surrounded by:*

8. *The volva, or matrix at base of stem*—a kind of membrane, sheath or wrapper, which, in many species, envelops the fungus in its early stage, and tears when it becomes developed:—often leaving portions of its substance (9) upon the scurfy top, in the ring, on the veil, or at the base of the stem. (See also Figs. 1367, 1368, and 1369.)

STRUCTURE, REPRODUCTION, AND CLASSIFICATION OF FUNGI.—It is our desire in this paper to avoid being too technical or scientific, but we should say of the fungi or mushrooms that they belong to the class *Amphigens*, which for the most part have no determinate axe, and develop in every direction in contradistinction to the *Acrogens*, the development of which takes place from the



FIG. 1356.—Mycelium of Clavaria. (F. P. P. after Payer.)

summit, possessing an axe, leaves and vessels, and which embrace mosses, ferns, etc. The fungi are entirely cellular, that is, completely deprived of vessels, but having filaments, tubes, and lamæ (gills). There is no frond or leaf; no epidermis, and consequently no stomata.

The mushroom is composed in general of two parts quite distinct: one vegetative, the other that of reproduction.

The first, or the *Mycelium*, appears to be the origin and primitive state of every mushroom, since it results from the development of the spores, and is composed of filaments which are slender, simple, or ramifying, naked, or uniting with the substance on which the mushroom lives as a parasite. The filaments are composed of white elongated cells placed end to end, and are completely deprived of endochrome. The second, or that of reproduction, which springs from the first, of which in some sort it seems to be a dependent, is composed of spores which are naked, or are contained in a receptacle of variable form and size called the *peridium* in mushrooms of round form (*Richard*). This last part, which is often the only visible exteriorly, is commonly regarded as the mushroom properly speaking; for example, in the cultivated mushroom (*Agaricus campestris*). This springs from a mass of white filaments (*Mycelium*), which is sold in a dried state, and known as "*blanc de champignon*," or spawn. The plant may remain a long time in the mycelium state before it shoots up and becomes visible.

The spores are sometimes simple and naked, and spring, as was stated, immediately from the mycelium, which they at times entirely replace; at other times they are collected together in a common envelope which is excessively thin, and forming a *theca* which is a receptacle closed.

In other forms, as in puffballs (*Lycoperdon*), for example, the spores are contained in the cavity of the plant, and are inserted upon *receptacles* designated *basides* (see Fig. 1359).

These organs of reproduction develop upon different points of the *mycelium*, sometimes solitary, sometimes

many together. The process is as follows: Tubercles composed of very small and hexagonal utricles form upon the filaments, grow and develop according to the species. If it is an *agaric*, a kind of cap borne upon a long stem springs out of the bosom of this tubercle and fructifies externally. Is it a *Lycoperdon*: there forms in the cavity of its tissue a multitude of lacunae, and from the circumference of each there arises elongated utricles bearing four spores upon their surface (Figs. 1358 and 1359).

Fungi reproduce by spores; but the origin of these spores, their nature, and the form of the body which supports them, vary greatly. The spores are formed in three principal ways: they either grow in a special cellule or utricle, in which case the utricle is called a *theca*, and the fungi are *endospores*; or they appear at the exterior of the utricle upon which they are fixed; then the utricle is named *baside*, and the fungi are *exospores*. Lastly the spores develop in the midst of a gelatinous mass in which no distinct organization can be recognized, and the fungi are said to be *myzospores*. So we have these as grounds for classification.

Fungi have also been conveniently classified thus: The spores in chaplets at the extremities of the filaments, or order of *Arthrospores* (ἄρθρον, joint, articulation); those of which the spores develop at the extremity of a filament more or less lengthened out, or second order *Trichospores* (τήξ, a hair), as in *Botritis nutans* (see Fig. 1357). Those in which the spores appear by fours upon each utricle, or fourth order, or *Basidiospores*, as in agarics, boletes, lycoperdons, etc. (see Fig. 1358). The third

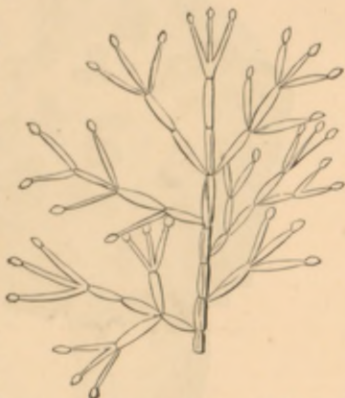


FIG. 1357.—*Botritis Nutans*. The last subdivision of a filament which disarticulates to form a spore. (F. P. P. after Payer.)

order is that of *Thecaspories*, where the spores spring from the interior of a utricle, a closed sporange or theca. The *Myzospores* (referred to above) constitute the fifth order.

The more recent arrangement of fungi is, first, into: *Hymenomyces* (ὄμβη membrane, and μύκης mushroom). These include the larger proportion of the edible and poisonous fungi, namely, agarici, coprinus, cantharellus, cortinarius, lactarius, boletus, hydnum, clavaria, etc. In these the sporidia are placed upon the surface of the

proliferous membrane, called the *hymenium* which covers a special part of their surface; it invests the *gills* of agarics, the *tubes* of boleti, the lower surface of the *head* of helvella, the lower surface of the *head* of helvellas, and the periphery of the ramifications of clavaria.

Gasteromyces (spores enclosed in a cavity, or stomach, γαστήρ). These include phallus, lycoperdon, bovista, etc.

Ascomyces (ἀσκός, pouch or sac) include morchella, helvella, leotia, etc., which have cup-shaped depressions, lacunae, and sinuosities.

We do not refer to other orders which contain genera which do not concern us in this paper.

The *hymenium* (Fig. 1359), of which the position also

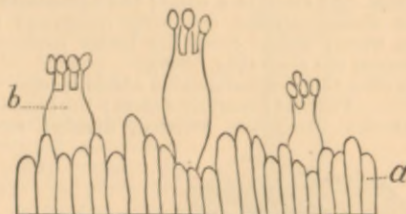


FIG. 1359.—Portions of the Hymenium, much enlarged. a, Paraphyses; b, Basides, or sporophores. (F. P. P. after Richard.)

varies, is formed of utricles; upon its surface, it presents, first, the *paraphyses* (Fig. 1359, a), elongated cellules placed parallel, the one against the other, forming a kind of villosity; second, the *basides* or *sporophores* (Fig. 1359, b), situated between the paraphyses; longer than the latter; the basides are swollen utricles, terminating at their summits by four tubes, each bearing an ovoid or globular spore; in this case the spores are naked. (See, also, Fig. 1358.) Third, in the hymenium of certain mushrooms *antheridies*, or male spores (as they were thought to be) exist, generally filled with a limpid or colored juice and organic corpuscles.

As a consequence of the complete absence of green matter in the interior of their utricles, fungi behave like



FIG. 1358.—*Bovista (Lycoperdon) Plumbea*, Spores in Fours upon each Utricle. (F. P. P. after Payer.)

order is that of *Thecaspories*, where the spores spring from the interior of a utricle, a closed sporange or theca. The *Myzospores* (referred to above) constitute the fifth order.

The more recent arrangement of fungi is, first, into: *Hymenomyces* (ὄμβη membrane, and μύκης mushroom). These include the larger proportion of the edible and poisonous fungi, namely, agarici, coprinus, cantharellus, cortinarius, lactarius, boletus, hydnum, clavaria, etc. In these the sporidia are placed upon the surface of the



FIG. 1360.—*Clavaria*. (F. P. P. after Valmy.)

the colored parts of the superior plants: they always absorb oxygen and disengage carbonic acid; while they get the considerable proportion of nitrogen, which exists in

them from the earth; thus they naturally live on organic matter in a state of decomposition. The cryptogamia are to a great extent the scavengers of the earth, and the destroyers of dead and rotten matter.

Some fungi, as is well known, develop upon living animals, man included, and become sources of disease: for which see researches of Robin, Pasteur, and others.

DISTINCTIVE CHARACTERISTICS OF A FEW OF THE MOST IMPORTANT FAMILIES AND GENERA.—We begin with the least highly organized:

Clavaria.—None are poisonous. They are simple or branching, fleshy or coriaceous, with no distinct head. Their form and color vary, with round branches resembling a tree, or a club, or a coral; the hymenium is composed of linear cellules, enclosing numerous rounded sporules which escape from the entire surface of the plant, except the stem (Fig. 1360).

Curtis cites thirteen indigenous edible species.

Helvella.—There is generally a stem; the head is fleshy, membranous, irregular, twisted, divided into lobes

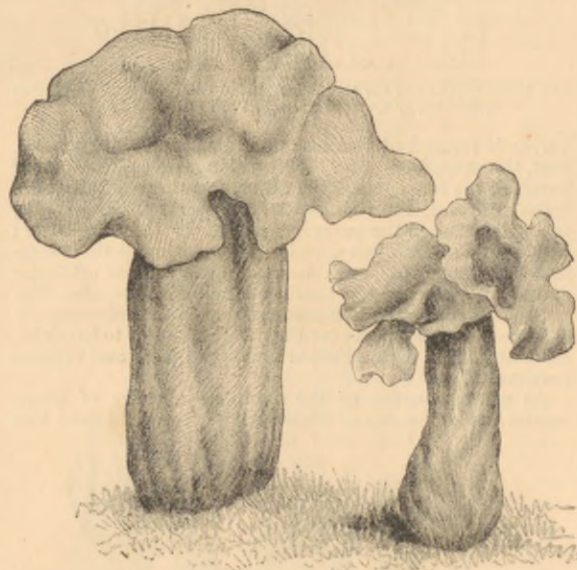


FIG. 1361.—*Helvella*. (F. P. P. after Valmy.)

folded or depressed, free or adherent. The stem is polished or furrowed, or simply hollowed.

Curtis has four edible species.

Morchella.—The fleshy cap, or pileus, is globular, ovoid, or conic, with a stem, relieved externally by anastomosing elevations which form large polygonal cavities, in which the grains are concealed.

They all come from the earth, and are edible (Cordier). Two indigenous edible species.

Hydnum.—These are fleshy, coriaceous, sessile, or pediculated; some are sinuous or scaly. The cap, which is not always distinct, but often twisted, inform, convex and concave, is garnished below, and sometimes above, with cylindrical or conical sharp needles or spines, distinct the one from the other, and which contain the spores at their extremities. The latter resemble the papillæ which cover the tongues of ruminants—hence the name “beef’s tongue.” The sporules are small and round. They possess neither lames, sporules under the cap, volva, bulb, nor collar. *Clavaria*, *helvella*, *morchella*, and *hydnum* contain no poisonous species. Curtis gives five edible species.

Boletus, *Boletes*.—In these there are no lames or leaves; the spore-bearing membrane (hymenium) is formed of tubes reunited together, and separable from the cap. We have here the first complete type, with a regular head, sporules in large quantity collected in bundles under the cap, and prominent stems. These change color if cut, when the species is poisonous. In agarics it is exactly

the reverse, the continued whiteness of the leaves and stems are unfavorable indications.

J. A. Palmer, Jr. (“Mushrooms of America, Edible

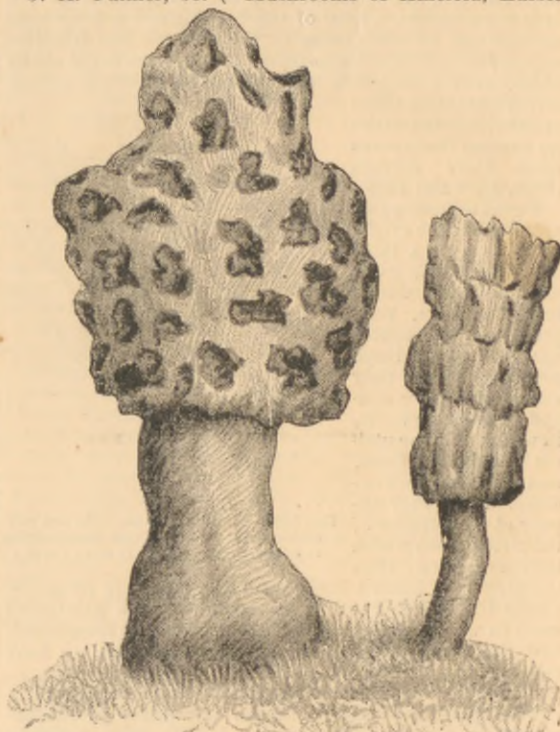


FIG. 1362.—*Morchella*. (F. P. P. after Valmy.)

and Poisonous”), says that a good rule for the inexperienced is to avoid all the lurid boleti, all those which have the slightest shade of red to the tubes. “The mild-colored members of this family, having white, yellow, or greenish tubes, if pleasant to the taste, may be considered safe.”

The boletes dry easily, and are readily preserved. They can be added to any kind of sauce; and are eaten fried,



FIG. 1363.—*Hydnum*. (F. P. P. after Valmy.)

in an omelette, or seasoned and cooked in lard or olive-oil. The membrane should be removed from the cap if the plant is old. In perfume it rivals any other mushroom. Curtis cites eleven edible species found here.

Cantharellus, Chantarelles.—They resemble hydnum, but are allied to agarics. The cap, stem, and leaves are generally of a beautiful golden color. The leaves, or lames, serve specially to distinguish them, as they are thick, in the form of irregular, branching nervures or protuberances, springing from the middle of the stem,



FIG. 1364.—*Boletus*. (F. P. P. after Valmy.)

ascending and bifurcating with it in their course under the head; the stem, at its junction with the head, is swollen, larger at its union with the head than at its base, and scarcely to be distinguished from it. The head is often turned down like an irregular ear, more spread out on one side than the other, sometimes with a border folded above. They are often confounded with *hydnum repandum*, having the same color, size, and habit of growing



FIG. 1365.—*Cantharellus*.—F. P. P. after Valmy.)

in numerous groups; but hydnum has sharp spines under the head.

Agaricus, Agarics.—In these the rooting, slender fibres termed the *mycelium*, or spawn, which is an agglomeration of vegetating spores, traverse the soil; at first the mushroom is only a small, nearly globose budding,

like a grain of mustard-seed, which is subsequently developed into the full-grown plant. The spore-bearing membrane is formed of leaves, plates, or folds, capable of being separated into two layers radiating from a common centre.

The cap is fleshy or membranous, entire or divided, with the gills or leaves on the under surface; these have a sharp border, with a flocculent or cottony layer united with the head.

Agarics differ from the boletes, as the latter have tubes collected in bundles on the under surface of the heads, in place of leaves. In agarics these leaves or lames pass in a transverse direction from the stem directed toward the circumference, like the sticks of an umbrella. They are simple or bifurcated, and they serve to distinguish the poisonous from the edible.

This large family is subdivided into eleven sections; among which are, the Amanitas; the Agaracini, or gill-bearing meadow mushrooms (*Ag. campestris* and *Ag. arcensis*); Russules;



FIG. 1366.—*Agaricus* (*Amanita Muscaria*). (F. P. P. after Valmy.)

milky agarics (*Lactarius*); Coprins, or dung agarics (*Coprinus*); Cortinaires (*Cortinarius*), etc.

The Amanita subdivision of agarics (see Fig. 1366), containing many dangerous species, as well as a few edible, is the most advanced and most complicated of



FIGS. 1367, 1368, and 1369.—Different Stages of Development of *Agaricus*. (F. P. P. after Payer.)

this order. The cap is well formed, the leaves regular, they possess a stem, a collar or veil, a bulb at the bottom,



and a volva. The beautiful "Imperial" orange-colored agaric (*Ag. Caesarius*), which is so greatly prized for its delicious taste and perfume, "never has the remains of the volva upon its brilliant head."

The leaves of the stem serve better to distinguish the species than the color of the head, which varies infinitely in shade, even in identical species. The following are almost positive marks of deleterious amanitas: the presence of a bulb or swelling of the base of the stem, its being surrounded by a volva or white envelope in the shape of an egg-shell, a collar, lastly the cap covered with the (warty) débris of the volva.

FIG. 1370.—*Agaricus* (*Russula*) *Alutaceus*. (F. P. P. after Valmy.)

Lamy asserts that nearly all species of agarics of which the flesh and the leaves do not change color when gathered are poisonous. It is quite the contrary with boleti, as was stated.

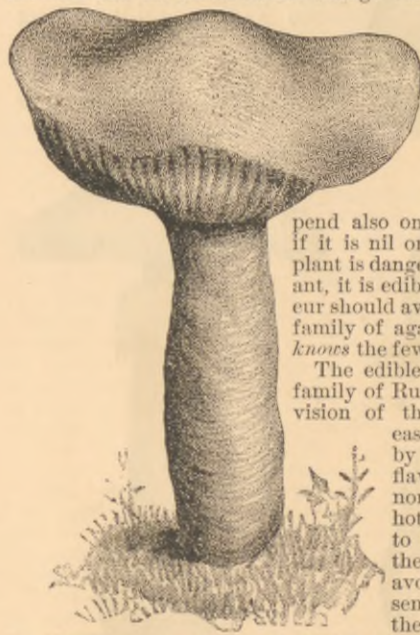


FIG. 1371.—*Lactarius*. (F. P. P. after Valmy.)

In the edible milky agaric (*Lactarius*), one test is the sweet and pleasant taste of the milk, almost identical with the milk of animals. The cap is of a yellow, ochre color,

and, unlike any poisonous species, it is smooth. All the poisonous species have dull, lurid colors, marked with circular, colored bands upon the head, like the rainbow. The edible species have a color like those which are edible in other families (Lamy). This family is most fruitful in number of species.

The Cortinaires (*Cortinarius*) are all edible. They are distinguished by a membrane resembling a spider's web, of a light color and connecting, from the birth of the mushroom, the head to the stem—very much like the collar of the common mushroom.

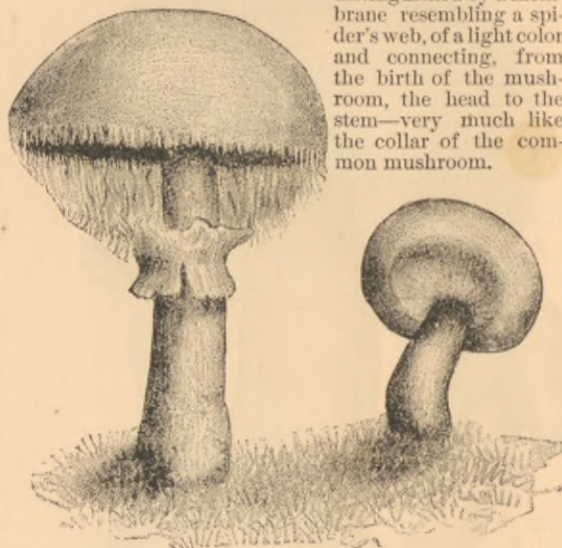


FIG. 1372.—*Cortinarius*. (F. P. P. after Valmy.)

In the Puff-balls (*Lycoperdon*) there is a receptacle (or *peridium*) which envelops the reproductive corpuscles; at first closed in every part, it opens only at the time of maturity. It is filled by a fleshy substance, in the midst of which are hollowed out a number of sinuous cavities lined with spore vessels; at maturity this multilocular structure disappears, and to spongy tissue perforated with

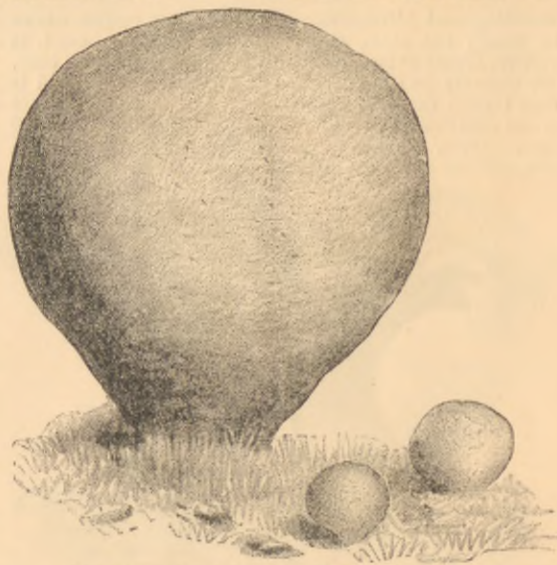


FIG. 1373.—*Lycoperdon Bovista*, Puff-ball. (F. P. P.)

spores succeeds a confused mass of fine, dry, blackish, or brown dust, and stiff and hairy filaments.

All are edible which appear in little balls on the open ground after rains, if fresh, white inside, and hard; if soft and yellowish, or black in the pulp, they are approaching decay, and should be avoided. (See *Lycoperdon, postea*.)

Phallus.—The hymenium is at first enclosed within a

sort of peridium or universal volva, maintaining a somewhat globose or egg shape. When young the spore-producing tissue (hymenium) is fleshy; in the interior of which cavities are hollowed out which are more or less sinuous, and covered with greenish spores disposed in fours or sixes upon the little bodies (*basides*) (see Figs. 1358 and 1359), springing from the receptacle—the plant having the general form of a long, erect, cellular stem bearing a cap.

The volvas break at the summit, and form a sheath which surrounds the foot of the spore-bearing membrane (Hymenophore). The head is naked, as well as the tissue which covers it.

Very soon the tissue softens and becomes a viscid matter, like mucilage, which melts and carries off all the spores, becoming so offensive as to be perceptible to the sense of smell at a great distance.

In *P. impudicus*, which is represented in Fig. 1374, from one of our sketches, the spore-bearing membrane is hollow, cellular, cribriform, with the head reticulated, pervious, and naked below. Fibrils or rootlets are seen in this family.

Clathrus belongs to a tribe of the family Phalloides, and is therefore related to it in structure.

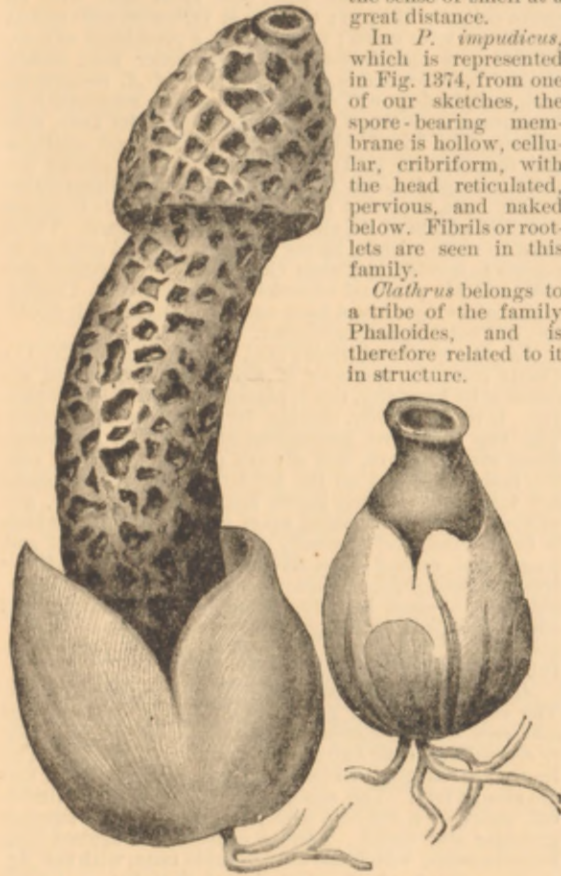


FIG. 1374.—*Phallus impudicus*. (F. P. P.)

We insert *Leotia* only to exhibit another form—though it is in the same tribe with agaricus, clavaria, etc. (*Hymenomycetes*). In this the fleshy and tuberculous receptacle is capitate upon a stem.

We have no indigenous edible leotias (see Fig. 1376).

II. EDIBLE FUNGI.—*Agaricus procerus*, Scop.; *Agaricus colubrinus*, Bull.—Parasol, scaly, or large shaggy agaric; "Gardens, Hedge Banks, Pastures and Woods;" S. C. to Penn.; common; Curtis and Rav. This species is of remarkable beauty, and is known by its long, hollow, bulbous, spotted stem, which is received into a depression of the head; by the ring that is persistent and movable; its cap in the form of a parasol, but more or less mammeloned, imbricated, scaly formed by the epidermis which is raised. The leaves terminate at a certain distance from the stem, are pale, unequal, and much retracted at their base.

This plant was known among the Romans; its taste is sweet and odor pleasant; according to Roques, "forming on the Continent a frequent article of food"—who gives

various processes for serving it up. He intimates no inconvenience from eating the plant. Cordier speaks very



FIG. 1375.—*Leotia geoglossoides*. (F. P. P. after Payer.)

highly of it, and says it can be eaten raw, "et sans aucun apprêt." Curtis cites it among the edible species.

A remarkable set of cases, however, are related by Dr.



FIG. 1376.—*Agaricus procerus*.

Peddie (*Edinb. Med. and Surg. Journal*, vol. xlix., 192), where pure narcotism occurred from eating this fungus:

giddiness, staggering, convulsive spasms, furious delirium, frantic cries, and a state resembling delirium tremens occurred.

The above cases plainly show, if Dr. Peddie was correct in his species—which, however, is quite doubtful—the possession of a narcotic property. In the three cases no pain was felt at any time, nor were the bowels affected.

Dr. W. G. Smith says of it, "Its esculent properties are of a very high order," and in an article illustrated with wood-cuts and recently published in the *Gardeners' Chronicle*, and which has been reproduced in the supplement to the *Scientific American*, he reaffirms the admirable qualities of this species. Mr. Berkeley, Mrs. Hussey, and others declare it to be unsurpassed among the esculent fungi.

Roques, Paulet, and others also launch out into extravagant expressions in its favor—the latter giving recipes for its preparation. As it is impossible for us to enter fully into culinary matters, we introduce in a note instructions from Dr. Bull, and which have been accepted by clubs in England, for the several preparations of this species for the table, which will, doubtless, apply to any other agaric.*

Agaricus rachodes, Vitt.—Base of stumps and trees, N. C.; edible, Curtis. Cordier says it resembles very closely *A. procerus*, some regarding it as only a variety. Fries said that it had a disagreeable taste and was not eatable; M. Hussey, on the contrary, says it is next in value to the *A. procerus*. They are sold in the London markets indiscriminately.

Agaricus rubescens, Pers.; *Agaricus pustulatus*, Schoeff. —*A. rubes.* of Fries; summer and autumn; woods; N. C. to Pa. The cap of this is first convex, then almost flat, eight to ten centimetres in size, of an indistinct, reddish-tawny or vinous-red color, more highly colored in the centre, not streaked or only a little so on the borders, covered with reddish-white scales. The leaves are large, numerous, straight, unequal, the shorter abruptly cut off, but rounded at their extremities, not decurrent, of a pure white. The stem is bulbous at the base, and nearly round the rest of its extent, is eight to twelve centimetres in length, generally hollow, of a vinous-red, darker at the lower part where some débris of the volva scarcely exists, covered throughout its length by little excrescences (*peluchures*), provided with a large ring of the color of the stem, and often preserving the impress of the gills. The flesh is fragile, white, reddish under the skin. Smell strong, like that of mould, taste not pleasant; and according to Roques poisonous; he at least cautions us against confounding it with *A. asper*. Curtis says it is edible. Smith

* The late Dr. Bull, of Hereford, carefully wrote out, from experience, the best modes of cooking *A. procerus*, and for the following methods fungologists are chiefly indebted to him. The modes are approved by the writer, and are adopted by the Woolhope and other clubs:

MODES OF COOKING AGARICUS PRO CERUS.—It may be cooked in any way, and is excellent in all.

Broiled.—Remove the scales and stalks from the agarics, and broil lightly over a clear fire on both sides for a few minutes; arrange them in a dish over fresh made, well-divided toast; sprinkle with pepper and salt, and put a small piece of butter on each; set before a brisk fire to melt the butter, and serve up quickly.

If the cottager would toast his bacon over the broiled mushrooms, the butter would be saved.

Baked.—Remove the scales and stalks from the agarics, and place them in layers in a dish; put a little butter on each, and season with pepper and salt. Cover lightly, and bake for twenty minutes or half an hour, according to the number placed in the dish. Put them on hot toast in a hot dish. Pour the hot sauce on them, and serve up quickly.

Stewed.—Remove the scales and stalks from the freshly gathered agarics, and stew them for twenty minutes in milk and water, which will be improved by a little good gravy; then season with pepper and salt, and add a blade of mace if desired. Thicken the same with a spoonful of flour, a little cream, or the yolk of an egg. Boil for a few minutes, and serve up quickly in a hot, well-covered dish.

Delicately Stewed.—Remove the stalks and scales from the young, half-grown agarics, and throw each one as you do so into a basin of fresh water slightly acidulated with the juice of a lemon or a little good vinegar. When all are prepared, remove them from the water, and put them into a stewpan with a very small piece of fresh butter. Sprinkle with white pepper and salt, and add a little lemon-juice. Cover up closely, and stew for half an hour. Then add a spoonful of flour, with sufficient cream, or cream and milk, until the whole has the thickness of cream. Season to taste, and stew again gently until the agarics are perfectly tender. Remove all the butter from the surface, and serve in a hot dish, garnished with slices of lemon.

A little mace, nutmeg, or ketchup may be added; but there are those who think the spice spoils the mushroom flavor.

asserts that it is one of the most "valuable of all the British agarics," care being taken to select young and fresh specimens. "I well know it to be delicious and perfectly wholesome." Cordier says, "*C'est un manger des plus délicats*," and largely consumed in parts of France. It is excellent in the preparation of ketchups. Cordier cites this with other edible fungi which are unpleasant, acid, or pungent, yet still edible, such as *Fist. hepatica* (which is acid). *Ag. melleus* and this plant are acrid and disagreeable, while *Hydnum* and *Chantarelle* are pungent—all esculent.

Agaricus melleus, Vahl.; *Agaricus annularius*, Bull. and Roques' Hist.—Honey-mushroom, black-scaled agaric; "near or upon old stumps;" September, October; S. C. to Pa. (See colored Pl. XII, Fig. 7.) The stem is yellowish, slightly black at the base, bent upon itself, with an entire collar at the top; the cap is yellowish-red, mixed sometimes with green; convex with a prominent centre, marked with little brown scales, the border thin, feebly striated, odor agreeable, taste like that of *A. campestris*, with a slight degree of acidity; some have supposed it to be poisonous, perhaps only on account of its taste, notwithstanding Trattinick's assertion of its good qualities and frequent use in Austria. Orfila cites it among the poisonous species, and Roques says it has a disagreeable styptic taste, and that administered to animals it causes an inflammation of the alimentary canal and death. There must be some mistake by the above-mentioned authors in regard to species, as Curtis cites it among his edible species, and his personal experience is sufficient. Cordier says that its aspect and taste not being inviting, it is edible, but not much sought after.

Agaricus eburneus, Bull.; D. C.—Ivory agaric; N. C.; Curtis cites *Ag. eburneus* of Fries as eatable. On account of its humidity, this is placed in the tribe Hygrophorus. It is ivory white, shining, very viscid in wet seasons. The cap is at first hemispherical, then flat, and sometimes even concave, but always prominent in the centre, fleshy, polished on the borders, which when young are turned down; the leaves are narrow, unequal, numerous, slightly prolonged upon the naked stem, which is full, round, and generally short, sometimes frail and lengthened, covered upon its summit with little scales or brownish asperities. Roques says that it is not disagreeable, and is eaten in Italy. Cordier places it among the edible species, with an agreeable odor and taste. He remarks upon its viscosity as no evidence of its being hurtful.

Agaricus Russula, Schoeff.—N. C.; edible, Curtis. The cap is fleshy, of good size, at first convex, then flat and even a little depressed in the centre, viscid, granular or covered with little hairy masses, brown, and scaly. The leaves are unequal, white, thin, rounded, sinuated, and are almost free. The stem is naked, generally cylindrical, short, of a red-rose color, full, having the summit granular and viscid. Roques cautions us against confounding this, which has an agreeable taste, with the *Ag. emeticus*, the head of which is red, but has no scales. Cordier says it is eaten in Austria, and that it may be confounded with two poisonous *Russules* (*Ag. emeticus* and *Ag. roseus*), but these have their leaves of equal length, while those of our plant are unequal.

Agaricus albellus, D. C. (von Schaeff), Bull.—N. C.; Curtis, edible. The cap is fleshy, compact, convex, sub-mammelonated, sometimes irregularly rounded, shining, at first white, then of a gray slightly tawny, often covered with non-persistent, squamous spots, with borders thin, shining, and folded down. The leaves are numerous, unequal, white; the longest adherent to the stem, and terminated by a little tooth. The stem is naked, white, fibrillar, full, slightly expanded at the base, and partly stuck in the earth. This is the *Mouceron* of the French—called so because it grows among mosses. This is eaten in the northern provinces of France, and is much sought after by some amateurs. Roques gives a number of modes of preparing them. Cordier ranks it among the most exquisite and everywhere appreciated. Paulet says it is the finest and most delicate of all; and Bosc, "a delicious food which is beyond comparison." The flesh is white

and firm, peels with difficulty, but preserves its agreeable odor when dried.

Agaricus niceus, Schaeff.—White field agaric. Roques cites it as eatable, and a fine mushroom. Curtis has *Coprinus niceus*, Fr. among his N. C. species, not cited as edible. Cordier does not refer to it.

Agaricus Cæsarius, Scop.; *Amanita aurantiaca*, Pers. Imperial Orange Agaric; common in oak forests; N. C.; Curtis. (See colored Plate XII. Figs. 3 & 5.) This is of a rich and elegant yellow color; the cap is almost flat, orbicular, the borders being striated and often cut and turned under, never being viscid, or marked with holes; the leaves (gills) are large, thick, unequal, yellowish, very adherent to the flesh, but not to the stem, which is yellow externally, white within, polished, full, bulbous, provided with a yellow ring, large and reversed. When young it is wholly enclosed in a white volva, which gives it the appearance of an egg; to give passage to the plant the volva tears and remains complete at the bottom of the stem. (See Fig. 1368.) Roques and Cordier regard it as the finest and most delicate of mushrooms, the perfume and taste being exquisite. It was widely celebrated among the Greeks and Romans. Dr. Curtis praises it very highly in his letter to Mr. Berkeley. It should be carefully distinguished from the *Amanita muscaria*. (See Plate XIII. fig. 1.) The former has a complete volva, while in the latter it is incomplete and exhales a disagreeable odor. The poisonous species is spotted on the top, while this is of a yellow-orange color, without spots.

Agaricus castaneus, Bull.; *Cortinarius*, Fr.—Common in woods; S. C. to Pa. The cap of a chestnut or tawny color, ordinarily paler at the borders, is shining, little fleshy, convex, slightly mammeloned, often concave when old, by the falling of the borders which split. The leaves are unequal, large, adherent to the stem, same color as the cap, paler upon their cut surface. The stem is full, cylindrical, firm, of a white color, shaded with a violet-brown, and bearing the remains of a web collar which is white. It has the taste of a good mushroom, and is eaten in Italy. Curtis marks it edible. Cordier says it is inodorous, agreeable and edible.

Agaricus personatus, Fr.—Blue-stemmed agaric; pastures and near rotten logs; S. C. and N. C.; edible, Curtis. The cap is compact, fleshy, regular, convex, glabrous, polished, moist, of a violet or lilac color, sometimes ashen or pale tawny, with borders slightly recurved under, and tomentose. The lamæ (gills) are close together, of a dull white, or faded violet color, rounded back and free. The stem is thick, pulvulent, or hairy, lilac or violet, slightly swollen at base and hollow. It resembles the Cortinaires. Sold in Covent Garden Market under the name of *Blewits* (Sowerby). W. G. Smith says of this "a substantial and delicious species;" but the plants should be gathered young and in dry weather for they readily absorb moisture. Cordier reports that it is much esteemed in France.

Agaricus amygdalinus, M. A. C.—Peach-kernel agaric, N. C.; edible, Curtis.

Agaricus mastoideus, Fr.—Nut mushroom; woods; N. C.; edible, Curtis. (See colored Plate XII., Figs. 2 and 4.) The cap is a skin white color, slightly fleshy, soft, convex, strongly mammelated, thin skinned, tearing into scales which are thin and scattered; the leaves are widely separated, of a pale white; the stem hollow, weak, slightly villous, scaly, almost round, bulbous at base, with an entire movable ring. Cordier says: "Eatable, but little esteemed."

Agaricus exoriatus, Fr.—Collar mushroom, N. C.; edible, Curtis. This closely resembles *A. procerus*, only that it is smaller, with a stem shorter and rarely bulbous. The cap is large, five to six centimetres, at first convex, then flat, but prominent at the centre, of a tawny-ashen color. The epidermis is thin and raised into little scales. The leaves, of a pale white, very numerous, thin, unequal, large, salient, sometimes divided and not attached to the stem. The stem is round, sometimes bulbous at the base, hollow, smooth, polished, white, or of the color of the cap; it has a large, movable, persistent ring. Cor-

dier says it is eatable—the flesh being white, soft, of a fungous taste and very little odor.

Agaricus cespitosus, M. A. C.—Cluster mushroom; edible, Curtis.

Agaricus castus, M. A. C.—White dough mushroom, N. C., edible, Curtis.

Agaricus frumentaceus.—Red dough mushroom, N. C.; edible, Curtis.

Agaricus consociatus, M. A. C.—Yellow dough, N. C.; edible, Curtis.

Agaricus radicans.—Spindle- or tap-root fungus, N. C.; edible, Curtis.

Mr. Curtis has been the first to declare that the five above are esculent agarics.

Coprinus comatus, Fr.; *Agaricus comatus*.—Maned agaric, N. C.; stable-yards; edible, Curtis. It should be gathered when the gills are white and just changing to pink, for they become vinous and black, dissolving into a black matter. When gathered in rich pastures, it is of snowy whiteness, the top being somewhat fleshy and broken up into scaly, white hairy patches (*peluches*); there is a white, powdery, fragile movable ring around the hollow stem, which is soon broken and falls away. Smith says that "it is singularly rich, tender and delicious," and he would prefer no species before this one. The black matter from this and from *A. atramentarius* is used in designing. To cook, for about twenty mushrooms, put into a saucepan one gill of milk or cream, add salt and pepper to the taste, with a piece of butter the size of the larger specimens; when it boils, put in the stem and small hard mushrooms; after ten minutes' boiling add the larger specimens; keep the dish covered and boiling for ten minutes longer, then pour the stew over dry toast and serve. Very little fluid is needed in cooking this mushroom, as it yields a rich juice of its own. It should be cleaned before cooking, by scraping it smooth until it is white. (J. A. Palmer, Jr.) See also *Ag. campestris* and *Ag. procerus* for methods.

Agaricus violaceus, L.—Woods; autumn; N. C. to Pa.; H. W. R. Fleshy, all over of an obscure violet; head at first convex, then flat, dry, hairy as if scaly, size eight to sixteen centimetres. The leaves distant, large, thick, unequal, almost of a violet-black when young, adherent to the stem which is cylindrical, more or less swollen at the base, slightly downy, eight to ten centimetres in size, of an ashen-violet color in the interior. When young, a membrane, so fine as to resemble a spider's web, binds the borders of the cap to the stem. Roques and Cordier place it among the edible species; and Micheli says it is eaten in Tuscany.

Agaricus deliciosus; *Lactarius*, Fr.—Orange milked agaric; September to October; S. C. to Pa.; edible, Curtis. (See colored Plate XII., Fig. 15.) The stem of a yellow or slightly spotted color, five to six centimetres long, is naked, firm, thick, at first full, then hollow. The cap, fleshy, orbicular, eight to twelve centimetres in size, at first convex, then flat or depressed in the centre, with reflected borders, slightly viscid, at first yellow, afterward tawny and even reddish, is marked sometimes by yellow zones. Lamæ unequal, of a brick or saffron red. The flesh and the gills when wounded take a sombre green color, odor and taste agreeable, like *Cantharellus cibarius*, but slightly acid. Cordier says it is not greatly esteemed in France, but held in high esteem in Sweden, and preserved for winter use by the Germans. It may be confounded with *Ag. torminosus* and other poisonous ones, but is distinguished by its milky juice, of orange-red or saffron color.

Agaricus alutaceus, Pers.; *Agaricus pectinaceus*, Bull.—Buffed gilled agaric; common in woods; July and October; S. C. to Pa. (H. W. R.) *Russula alutacea*, Fr. (see Fig. 1370). It possesses a white flesh, fragile and agreeable to the taste; the cap, eight to ten centimetres in size, rounded, with borders rarely regular, flat in the centre or depressed; of a violet-red, or a slightly tawny-red, even blood-red, more marked in the centre, the border thin, peeling easily, finally becoming striated and slightly downy; the leaves straight, rather close, equal in length, not turned down, of a pale ochre or yellow-white color; the stem four to

seven centimetres long, polished, full or spongy, white, oftener stained of a pale red. Taste mild, pleasant, acrid when old. "By common consent pronounced esculent; but individual specimens occur which prove almost as acrid as *A. emeticus*," ("Crypt. of England"). The edible can easily be distinguished by the possession of gills which are always white, while the poisonous have them yellow. (Roques.) (See our Report to Am. Med. Assoc., vol. vii., for fuller details.) Curtis cites *A. alutaceus*, of Fries, as edible. Cordier includes it among the esculent fungi, and very much sought after in Lorraine.

Agaricus marasmius; *A. oreades*, Fr.—Fairy ringed agaric; false mousseron, Scotch bonnets. Hill-sides; N. C.; Schw. This does not resemble the true "mousseron," except by its color of a pale yellow, tending to red. The stem is naked, round, full, four to five centimetres long, not hairy at its base, weak, tenacious and bent when dry. The cap, at first hemispheric, then conical, and sometimes flat, often mammelated in the centre, little fleshy, is only about three to four centimetres in size. Leaves unequal, not numerous, of a pale white, more colored upon the side (*la tranche*), not adherent to the stem. It has a feeble odor and an agreeable taste; much used as an article of food on the Continent. W. G. Smith says of it: "One of the most exquisitely delicious of all our fungi, is often neglected." Mr. Berkeley says "It is the very best of all our fungi." It may be pickled, used for ketchup, or dried for future use. It may be distinguished by having no downy hairs at the base of the stem; other species are dangerous which possess this hairy down (Smith). *To broil*: Place the tops like oysters on a fine wire gridiron; as soon as they are hot, butter them lightly, and salt and pepper to the taste. Put them back over the coals, and when heated through they are cooked. Butter them, if required, and place in a hot dish (J. A. Palmer, Jr.). When they are dried, swell them in water before using.

Agaricus scoradoneus, Fr.—Small garlic agaric; pastures; N. C.; (Schw.) eatable, Curtis. The head is somewhat fleshy, thin, convex or flat, at first shining, then slightly rough, or in folds, about one to two and a half centimetres in size, color pale-red or earthy. The lamellæ (plates) are contracted, whitish, a little separated, adherent to the stem—which is hollow, round, about two to three centimetres in length, two millimetres in thickness, glabrous, shining, reddish, becoming brown with age. Persone and Trattinick cited it among the edible mushrooms. Cordier says it is eatable, and of frequent use in the Lusace as a seasoning; it exhales a strong odor of garlic.

Agaricus esculentus, Jacq.—Small esculent agaric; N. C. to Pa.; edible, Curtis. The cap is scarcely three centimetres in size, a little fleshy, almost flat, obtuse, smooth, not streaked, of a tawny or yellow earthy color, taste slightly bitter; lames white, rather close, supple, adherent to the stem, about five to eight centimetres long, hollow, slight, very glabrous, tenacious, strongly fixed to the ground, same color with the cap. Much eaten in Austria, though taste is bitter. It is dried and preserved. Cordier says that it is sold in the markets in Vienna.

Agaricus frumentaceus, Bull.—Red dough mushroom; woods; N. C.; eatable, Curtis. Roques placed it among the eatable species. It exhales an odor like the farina of grain.

Agaricus prunulus, Scop.—French or plum mushroom, Mousseron; woods and pastures, June, October; Curtis, edible. Recognized thus: Cap fleshy, thick, compact, at first convex, regular, then depressed with twisted borders, top dry and of a fine prune color, five to eight centimetres in size; lames numerous, narrow, linear, of a white which becomes feebly cherry-rose when growing old, pointed at both extremities, very decurrent, not close; stem two to three centimetres high, thick, striated, naked, swollen and hairy at the base, the color of the cap. It differs from *A. abellus* by the lames, which are slightly rosy, decurrent, and terminated by a point at the two extremities.

It has a firm white flesh, and a delicious taste and odor—like that of fresh meat; much esteemed in Europe as an article of food. It is dried and much used in France—a

large price being paid for those growing near Barèges. Cordier ranks this among the best of mushrooms: "Est très bon à manger." The flesh is firm, juicy, and full of flavor; and whether broiled, stewed, or however prepared, it is a most delicious morsel (W. G. Smith).

Agaricus nebularis, Batsch.—Gray agaric; damp woods; N. C.; edible, Curtis. This fleshy mushroom has a cap eight to ten centimetres in size, convex at first, then flat, rarely regular, with its centre almost always prominent, of an ashen-gray color, darker in the centre, the borders being thin, slightly curved downward, the top sub-farinaceous in young individuals, polished later. The leaves are slightly decurrent, and of a pale white, unequal, numerous, thin, narrow, sharp at the two extremities, upon a stem four to six or eight centimetres in length, white or grayish, a little thick, round, sometimes twisted, full or cottony (*floconneux*), substriated lengthwise, tomentose at the base.

The flesh is white, compact, with a fungous odor and a special taste. When cooked, the firm and fragrant flesh has a particularly agreeable and palatable taste (W. G. Smith). Cordier, who has eaten young plants and suffered therefrom, also another who ate of the same, expresses great doubts of its esculent qualities, notwithstanding the favorable testimony of others. "Il est mal-faisant."

Agaricus squarrosus, Mull.—Found on oak-stumps, in autumn; N. C.; Curtis, edible. The cap is six to eight centimetres in size, of a clear tawny color, covered, as is the stem, with numerous scales, which are arranged from the circumference to the centre of the cap, a little darker in color toward the centre of the cap, which is at first rounded, circular, then flattened, with borders slightly turned down. The lames are of a pale white, bent, unequal, straight, numerous, reaching the stem, but not decurrent, finely touched with white on their sides. The stem, six to ten centimetres long, is round, twisted, attenuated at the base, full or hollow, with a fixed ring on the upper part, scaly below the ring, not above.

Cordier says he has often eaten it; that the flesh is firm, of a yellowish white, a feeble odor, with a fungous but agreeable taste. It peels with difficulty.

Agaricus strobiliformis, Vitt.—Fir-cone mushroom; common in woods of N. C.; Curtis, edible. Entirely white and of large size: the head is fleshy, at first convex, then level, the surface like satin, the margin not striated, full of scales, or angular excrescences, strongly adherent, gray, formed of the débris of the volva which is torn early and leaves only traces of itself at the base of the stem. The lames are unequal, the shortest rounded at their extremities, the longest free. The foot is thick, solid, cottony, when young with a fugitive ring, swollen into a bulb at its base, where it is marked by a circular furrow. The solid compact flesh, fine ring, bulbous stem and patched top mark this species. The patches on the top are persistent and like the scales of a fir-cone.

Smith says its esculent qualities are of a high order, and regrets that it is scarce. Cordier remarks upon its rarity, its slight odor, and agreeable sharpish taste, and places it among the edible species.

Agaricus bombycinus, Schoeff.—Silky wrapped agaric; inside of trees, on stumps; S. C. and N. C.; edible, Curtis.

Agaricus ulmarius, Sow.—Dead trunks of ash and poplar; N. C. to Pa.; edible, Curtis.

Cordier describes *A. ulmarius* of Bull. The stem is round, always bent so as to keep the head horizontal, naked, of a dirty white or gray color, sub-tomentose, six to nine centimetres long, fleshy, full, firm, continuous with the flesh of the cap in which it is inserted rather laterally. This head is fleshy, compact, glabrous, and can reach fifty centimetres in diameter, but oftener from twelve to eighteen; it is somewhat rounded, of a pale or gray white, but often marked with rounded spots, which are darker-colored. The lames are numerous, large, unequal, cut out (*échancrées*) at their base, adherent to the stem, at first whitish, then a dirty yellow. Rarely attacked by worms.

Cordier says it possesses a firm flesh, of an agreeable taste and odor, that peels with difficulty and is edible.

Agaricus tessellatus, Bull.—Pine trunks; N. C.; Curtis, edible.

The cap is fleshy, flat-convex, glabrous, rounded when young, more developed on one side than on the other when older. In these it resembles *A. ulmarius*; it differs in the cap being smaller, *tawny yellow*, or iron color, with spots or marks of a clearer yellow; almost hexagonal. The lamellae, white or yellowish white, large, unequal, close together, adherent to the stem, are cut at their base. The stem, from six to eight centimetres, is white, naked, full, fleshy, round, slightly eccentric, is always bent back so as to keep the head horizontal.

Cordier says that the flesh, though rather coriaceous, is not disagreeable, like that of fresh flour, and can be eaten.

Agaricus glandulosus, Bull.—Carolina to Pa.; Curtis, edible. Flesh firm and white, and of an agreeable odor and taste (Roques). Cordier includes this as a variety of *A. ostreatus*, Jacq.

Agaricus ostreatus, Jacq.—Carolina to Pa.; dead trunks; edible, Curtis.

It grows in tufts, often imbricated. The head is fleshy, polished, subdivided, in form of a conque, at first blackish, then yellow-ashen, and finally pale, about six to nine centimetres or more in size, with borders bent downward; the lamellae decurrent, straight, unequal in length, of a pale white, not close, anastomosing at base, loaded with glandular expansions (*houppes*) in variety A.; the smallest number of these leaves reach the stem, which is lateral, short, thin at the base.

Grows in large masses on trunks and trees; gills and spores white; flesh white and of good taste. W. G. Smith does not give it a high rank among the esculent mushrooms, but it has been much recommended by others. "A dish of this species stewed before a very hot fire has proved as enjoyable and nourishing as half a pound of fresh meat." Cordier says the taste is not disagreeable, and it is generally eaten in the Vosges.

Agaricus tigrinus, Bull.—S. Carolina (H. W. R.); not in Curtis' catalogue. Agreeable taste and odor, eaten in Europe (Roques). Cordier also says that it possesses a firm flesh and is agreeable and edible. The cap is marked with little excrescences or scales which are brown or grayish-yellow. It is always umbilicated.

Agaricus infundibuliformis, Schoeff.—Autumn; S. C. (H. W. R.); not cited by Curtis as edible. Has a strong odor, but agreeable, and may be eaten (Roques). Cordier says the taste is astringent, but that it has a pleasant flavor and is edible. It is sub-coriaceous, the cap a pale yellow, approaching cinnamon, slightly prominent in the centre, hollowed in cup form; lamellae pale white, decurrent, upon a stem naked and swollen at the base.

Agaricus odoratus, Bull.—N. C. (Schw.) Curtis, edible. Odor penetrating, but agreeable. Cap slightly fleshy, four to eight centimetres in size, glabrous, not viscid, of a clear gray-blue, or dull, bluish green, at first convex, then flat, but lightly mammelated in the centre, with the borders sub-sinuated and sometimes even raised. The lamellae, a third of which reach the stem, are attached (*adnés*), sub-decurrent, not close, of a pale white very slightly rose-color. The stem is weak, round, full, naked, three to five centimetres in length, of the color of the cap, but fainter. It exhales an odor like anise-seed. Cordier says its taste is agreeable, and it can be employed as a condiment. It is suspected by Reviel.

Agaricus cuneifolius, Fr.—N. C. Roques says it has a sweet taste and the smell of farina; and is eaten either fresh or dried. Not on Curtis' list as edible.

Agaricus campestris, L.—Common meadow, or pink gill mushroom, *Boule de neige*; pastures and meadows; S. C. to Pa. and Ohio. (See Plate XII. Figs. 10-12). These are known by their pink gills, which become deep-brown, not reaching the stem, which is round and sometimes swollen at the base, and which carries a well-marked white, persistent ring. It is so well known that only a few characteristics may be mentioned. The cap is fleshy, flat-convex, of a reddish or brown bistre color, sometimes yellowish, or even entirely white; the surface dry, slightly scaly or hairy (*peluchée*), rarely polished. The flesh is firm, thick,

white, more or less stained with reddish-brown, especially when bruised; gills very unequal, at first of a beautiful pink; the edge white and minutely denticulate.

Cows, sheep, squirrels, and birds eat raw mushrooms and other fungi. "The most generally used of all the agarics and the safest." It is extensively cultivated. It was cultivated among the Romans with particular care, and alluded to by Horace and others. "It is excellent whether boiled, pickled, stewed, fried, or prepared in any other way" (Smith).

M. Roques advises us to avoid those which have attained their full development, and Berkeley ("Crypt. of England") uses these words: "Too much caution cannot be used in the eating of dark-gilled agarics."

According to Vauquelin's analysis it consists of adipocere, albumen, a sugary matter, osmazome, an animal substance, insoluble in alcohol, fungin, and the acetate of potash.

We should not confound this with the poisonous *Ag. bulbosus* and *Ag. pantherinus*, which always have white gills and possess a volva.

TO PREPARE FOR THE TABLE.—Cut them just below the cap, don't pull them, they then need no washing or peeling. Stew in milk or cream.

To Serve with Meat.—Chop the mushrooms fine, let them simmer ten minutes in one-half gill of water, with butter, salt, and pepper as for oyster-sauce, thicken with flour or ground rice, pour over the meat and cover quickly.

To Roast in the Oven.—Cut the larger specimens into fine pieces, and place them in a small dish, with salt, pepper, and butter to taste; put in about two tablespoonfuls of water, then fill the dish with the half-open specimens and the buttons; cover tightly and place in the oven, which must not be overheated, for about twenty minutes. The juice of the larger mushrooms will keep them moist, and, if fresh, yield further a most abundant gravy (I. A. Palmer, Jr.).

Agaricus arcensis, Schaeff.—Common horse-mushroom; diffused; pastures. Cordier says it is with difficulty distinguished from the *A. campestris*. It is snowy-white when young. The cap fleshy, at first convex, then a little flattened, eight to ten centimetres in size, the surface at first tomentose or farinaceous, afterward glabrous and dry. The gills, free, unequal, larger toward the circumference, of a tender rose or lilac color, becoming a violet black. The stem, firm, hollow, or spongy, eight to ten centimetres high, is white, provided with a collar which is very large, turning over, generally double, and of which the exterior is sometimes cut into rays. It is distinguished from the *A. campestris* by its purer white, paler gills, white flesh which does not change color when cut, the lamellae remaining pale and not becoming deliquescent by age.

It has an agreeable odor, and is perhaps less delicate than the *A. campestris*, but it should be much more extensively employed as an article of food. W. G. Smith says it is the species exposed for sale in Covent Garden market. He says that the gills have not the pure pink of the meadow-mushroom, "but are dirty and brownish." For cooking, see *A. campestris*.

Agaricus cespitosus, M. A. C.—Common; base of stumps; N. C.; edible, Curtis. This is closely related to *A. dealbatus*, which is highly praised by Smith as a delicacy of the first degree.

Agaricus fabaceus, Berk.—S. C. Mr. Ravenel informs us that it is an alliaceous, edible mushroom. Not found in Curtis' catalogue.

Agaricus atramentarius, Bull.—Inky agaric; fields and gardens; spring and autumn; edible, Curtis. The cap is yellowish or pale tawny; marked on the summit by little reddish or brown stains; the stem is white, smooth, hollow, small above where it preserves a circular mark, the vestige of a ring. It contains a black matter which may be used as ink. The juice will efface writing made with ordinary ink. Cordier says that this and coprins generally are eatable when young. The larger species only are sought after. In England they serve to prepare ketchup.

Agaricus cretaceus, Fr.—Common; earth and wood; N. C.; Curtis, edible. This is chalk-white when young and of middle height. The head is convex, flat, fleshy, generally polished, at other times, hollowed out or sub-scaly, slightly tawny at the summit in the old; it is eight to nine centimetres in diameter; the leaves are numerous, unequal, straight, large at the circumference, not adherent to the stem; they even slightly separate from it; white at first; they become colored later to a feeble red flesh-tint. The stem is round, slightly swollen at base, oftener hollow, five to eight centimetres high, sometimes twisted, white, with a horizontal ring, large. At first view it would be taken for a Lepiota on account of its white leaflets; but later they become flesh-colored and pass to a tawny hue when the mushroom is decomposed.

Cordier says it is eatable and of excellent quality; its odor is feeble, its taste agreeable; the epidermis sufficiently thick is easily detached from the cap. Palmer advises that it be cooked with other mushrooms, with the addition of spices, garlic, or sauces.

Agaricus pratensis, Pers.—Reddish field agaric; pastures; Curtis, edible. Of a reddish tawny color, sometimes ashen or whitish; the head fleshy, at first convex, then flattened, with the centre prominent, smooth, humid, the borders thin; leaves very few, bent, unequal, thick, distant, of the color of the head, or whitish, very decurrent, upon a stem short, full, whitish, shining, attenuated at base.

Cordier says the flesh is slightly coriaceous, with an agreeable flavor which resembles the melon. W. G. Smith refers in strong terms to the excellency and piquancy of flavor of this species. Mrs. Hussey and Berkeley all say it is edible.

Agaricus salignus, Pers.—Stump-mushroom; common on trunks and stumps; Curtis, N. C. This is a large mushroom, the head being six to eight inches in diameter, subimbricated, fleshy, divided or dilated into a fan-shape, convex, flat, smooth, polished, fissured, of a walnut or café au lait color, depressed at the base; the leaves, sufficiently close, are thin, large, of unequal length, white or shaded, of the color of the cap, not glandular, sharp at the two extremities, rather branching, eroded, decurrent. The stem is short, white, downy, full, firm. It resembles the oyster agaric.

Dr. Curtis, in a letter, quoted by Dr. Wood in his sketch of Curtis, writes as follows: "Indeed, I have found several persons who class this among the most palatable species. To such persons, a dish of fresh mushrooms need seldom be wanting, as this one can be had every month of the year in this latitude." It is better flavored when gathered from the mulberry and the hickory; and those of rapid growth are best. Cordier says that when young it is a delicate food and much prized; when old it becomes black and coriaceous.

Cortinarius violaceus.—Purple cobweb-mushroom; woods; N. C.; Curtis. When young it looks like a bright purple silk ball in the grass; there is always a cottony web which represents the ring, and which is colored by the red spores. "Broiled with a steak, this is a most exquisitely rich luxury" (Smith).

Lactarius subdulcis, Fr.—Common; N. C.; eatable, Curtis. The juice is white, milky, at first pleasant, then slightly acrid; the flesh, which is reddish, does not change color; the cap fleshy, about two to five inches in size, moderately thick, at first convex, then depressed in the centre, and remaining sub-mammelonated, polished, without zones, dry outside, of a reddish tawny color; the leaves are numerous, fragile, unequal, narrow, of a cherry-rose, or reddish color, sub-decurrent; the stem, full at first, then hollow, cylindrical, one to three inches long, slightly thick, of the same color as the head.

"I have eaten this several times, and was not incommoded, therefore it is esculent" (Cordier).

Lactarius piperatus, Fr.; *Agaricus acris*, Bull.—Pepper agaric; woods; July, August; S. C. to Pa.; common; edible, Curtis. It is wholly white, with a head four to six inches in size, at first convex, then flat, and finally concave, or funnel-shaped, smooth (glabrous), but sometimes farinaceous, not zoned, the borders being undulated and

curved under; the leaves very numerous, narrow, close together, unequal, sometimes bifid, white, but assuming a yellowish tint upon growing old, slightly decurrent, upon a stem naked, thick, round, fleshy, full, which never attains more than three to four centimetres in height. Flesh compact, firm, juice white, milky, excessively acrid (Cordier). Its color is sometimes white as snow, "at others it inclines a little to cream with a white milk which is unchangeable."

Though acrid when raw, it loses its bad qualities by cooking; extensively used in Europe prepared in various ways. It is preserved for winter use by drying or pickling in a mixture of salt and vinegar. W. G. Smith actually places this in his chart among the poisonous species. Cordier says that it is eaten in many countries, especially in Russia. Cows eat it with avidity, but it makes their milk and butter nauseous. This agaric contains a gelatinous principle, and a milky fluid which becomes concrete and dissolves in alcohol; the resulting tincture is of a golden color, and furnishes albumen, adipocere, crystals of sugar and acetate of potash.

Lactarius deliciosus.—Green tint or orange-green mushroom; pine woods; N. C.; edible, Curtis. (See Plate XII. Fig. 15.) It is at once known by the orange-colored milk which it exudes on being bruised, which soon becomes dull green. The plant is solid, and the top richly colored. "When cooked with taste and care, it is one of the greatest delicacies of the vegetable kingdom" (W. G. Smith).

Lactarius volemus, Fr.—Milk red, milky agaric; woods, July; common; eatable, Curtis. W. G. Smith says that its taste, when fried, has been aptly compared to lamb's kidney, and it resembles in flavor *L. deliciosus*. The species is recognized by its rich coloration, mild taste, white milk (changing to a dull dark when plant is bruised), white gills becoming of a yellow buff, and the full sienna top (Smith).

Cordier says of *Ag. volemus* that he eats it raw in the woods, and like *A. procerus* and *Clavaria coraloides*, they can be eaten without preparation or addition.

Russula alutacea, Fr.—Yellow-gilled mushroom; common; woods; N. C.; Curtis, edible. The flesh is white, friable, pleasant to the taste, the cap eight to ten centimetres in size, rounded, the borders rarely regular, flat in the centre or depressed, of a violet red, or slightly tawny red, even blood-red color, darker in the middle, the borders thin, peeling easily, finally becoming striated, or sub-downy; the lamæ straight, not close, equal in length, not decurrent, of a pale ochre color, or yellowish-white; the stem long, four to seven centimetres, polished, full or spongy, white, oftener shaded of a pale red. The surface of the flesh is often reddish when the epidermis is peeled off. The gills distinguish it from the emetic mushroom *R. emeticus*, which are pure white and always remain so.

Cordier says it is edible and very much sought after; and Smith declares that when well prepared few species prove more satisfactory.

Russula lepida, Fr.—Low pine woods, N. C.; edible, Curtis. The cap is eight to ten centimetres in size, of a violet red (cherry red), or slightly tawny, paler at the circumference, fleshy, compact, convex at first, then flat, and depressed in the centre, sub-pulverulent, not shining, not polished, a little or not striated at the margins, cracking when dried; the leaflets are large, thick, straight, not very close together, dull white or feebly yellow color, rounded and larger at the circumference, equal some of them, sometimes bifurcated; the stem, six to eight centimetres, full or with holes, solid, compact, often twisted, round or a little swollen at the top, white, and almost always with a tint of rose or of red.

Cordier says it is eatable, excellent and of a sweet taste; odor feeble, flesh white and friable, spongy, when the pellicle is peeled from the cap; the flesh has a reddish tint. Insects and worms live upon it.

Agaricus ruber, which is poisonous, closely resembles *R. lepida*; but the former is distinguished by its cap, dry, polished, shining.

Russula virescens, Fr.—Woods; N. C.; edible, Curtis.

The cap is first convex and regular, then slightly concave and irregularly rounded, eight to ten centimetres in size, of a verdigris, or eye-green (*vert d'ailet*) color, more pronounced in the centre, the surface always dry, covered with little roughnesses or greenish granulations, sometimes marked with colored circles; the lamæ straight, free, of quite a pure white, not close, sometimes anastomosing, almost reaching the stem, but not decurrent; the stem rarely straight, four to six centimetres, quite thick, round or slightly swollen at the base, full, white.

Cordier says of this agaric, "*est un manger délicieux*;" its perfume is agreeable, taste delicate, flesh white, fragile, the epidermis being with difficulty detached from the centre of the cap.

Cantharellus cibarius, Fr.—Chantarelle, common in woods, summer and autumn, Carolina to Pennsylvania. (See Plate XII. Figs. 9 and 11.) Of a yellow chamois color, more or less dark. The stem is naked, full, fleshy, glabrous, ten to twelve millimetres thick which expands into a cap, always glabrous, at first rounded and convex, then twisted, sometimes lobed, hollowed like a vase, almost always more prolonged on one side than the other, and of which the under surface is covered by veins or bifurcated folds, thick and separated which extend down upon the stem.

"Its smell," says Berkeley, "is like that of ripe apricots." The flesh is white and milky, and of a piquant, but agreeable taste. Cordier says it is an excellent mushroom, and a main article of food in many districts of Europe—though dangerous when eaten raw. It is more tough and less highly flavored than some other mushrooms. It is put up in jars for winter use. W. G. Smith advises that being big and solid, it should be cut up before using, and if stewed, allowed to simmer gently, and be served with pepper, salt and butter.

Boletus granulatus, L., Fr.—S. C. to Pa.; H. W. Ravenel. Pine lands; edible, Curtis. This closely resembles *B. luteus*, and differs only by the absence of a membranous ring. The cap is eight to ten centimetres in size, at first hemispherical, then flat, slightly undulating, tawny, or brown, little fleshy, surface covered with a viscid matter, especially in young individuals. The tubes are narrow, short, granular at their orifice, at first of a pale white, then brownish-yellow, are adherent or slightly decurrent upon a stem round, sometimes attenuated above, short, yellowish, the summit covered with granulations. They often assume the form of a circle; hence Persoon calls it *circinans*. Eatable according to Persoon and Withering. Reveil considered it suspicious, but Cordier ate it with impunity.

Boletus collinitus, Fr.—Pine bolete; N. C.; edible, Curtis. Cordier places it among the edible boletes. I. A. Palmer, Jr., remarks that all lurid boleti should be avoided, *i. e.*, those with the slightest shade of red to the tubes—though he has eaten such. (See Plate XIII. Fig. 2) "The mild colored members, having white, yellow, or greenish tubes if pleasant to the taste, may be considered safe."

Boletus scabes, Bull.—S. C. to Pa.; edible, Curtis. Roques also said that it was safely eatable when young, even in large quantity.

Boletus hepaticus, Schoeff; *Fistulina hepatica*, Witt—Beef's tongue; stumps, common in woods; *F. hepat.* of Fr., S. C. to Pa., H. W. R.; edible, Curtis. (See Plate XII. Figs. 6 and 8.) Roques says highly prized in Europe as an article of food. (See our Report, vol. vii., "Trans. Am. Med. Assoc.") It is filled with a blood-colored fluid, and tastes like a muskmelon. It is truly, states Smith, a "vegetable beefsteak" for the taste resembles meat in a remarkable manner. He advises that it be cut up in thin slices, broiled with a steak and dressed with butter, salt and pepper. Its acid taste gives a zest and piquancy to the dish.

Boletus subtomentosus, L.—Woods, summer and autumn; S. C. to Pa.; edible, Curtis. This varies much in form, color, and dimensions. Its stem, weak, twelve to fourteen centimetres long, generally twisted, oftener round, narrowed, at other times swollen at the base; striated, reticulated, or punctated at the upper portion, color yellow,

often streaked with red, supporting a cap which is orbicular, convex-flat; *sub-tomentose*, reddish-brown, olive-brown, or bronzed, with a diameter of eight or twelve centimetres, subject as it ages to be hollowed out in areas, of which the interstices are a yellowish color. The tubes are yellow inclining to green, irregular, large, lengthened out; those which rise near to the stem are shorter, leaving a sort of vacant space around the stem.

The taste is not unpleasant, eaten in Germany, though Roques considers it hazardous; young specimens safer. Cordier says that its flesh is fragile, soft, yellowish-white, rather changeable, turning bluish upon fracture, of a special taste, agreeable odor and edible.

Boletus bovinus, L.—Woods; common; N. C. to Pa.; Curtis, edible. It grows in tufts in pine forests, the flesh is white, the taste not acrid; the cap flat, undulated, viscid in wet weather, glabrous and brilliant in dry; red iron color, five to eight centimetres in size; the tubes are sub-decurrent, angular, somewhat irregular, quite large, of a red iron gray; the stem round, shining, of one color, somewhat twisted, without a collar, three to four centimetres long, somewhat thick. This species is very similar to *B. luridus* which is poisonous. Cordier says that it is eaten in England.

Boletus luteus, L.—Pine woods, N. C. It is distinguished from most of its congeners quite readily by the presence of a membranous ring, which often disappears quite early, and which is on a stem three to five centimetres long, slightly thick, cylindrical, full, yellowish, punctated with granulations above the ring. The cap is convex, of a tawny yellow, or tawny brownish, sometimes stained with reddish lines, eight to ten centimetres in size, covered in wet seasons by a viscid matter; the tubes are small, round, sometimes sub-decurrent, of a dark yellow. It resembles *B. granulatus*, but the latter has no membranous ring.

Curtis classes it among his edible species, though De Cand. forbids its use—in which Roques coincides. Letellier says it is indigestible; he gave one hundred and fifty grammes to a cat, which caused vomiting. Lenz affirms that it is largely consumed in Bohemia, and Cordier adds, "*Je l'ai mangé, et l'ai trouvé bon.*"

Boletus castaneus,—N. C.; Curtis, edible. This is entirely of a chestnut or brown-red color, with the exception of the tubes which are first milk-white, then yellowish, and the borders of the cap which are sometimes yellowish. The cap is at first convex, then nearly flat, five to seven centimetres in size, with a velvety look. The tubes are short, the orifice of small size. The stem soft, spongy, then hollow, cylindrical, often scollen and fissured at the base, rarely straight. Cordier says that the flesh is soft, like cotton, of an agreeable taste, does not change color, and is edible.

Boletus edulis, Bull.—Esculent bolete, *ceps*; woods and pastures, under oaks, summer and autumn; Carolina to Pa.; H. W. R. It rises to a height of fifteen to twenty centimetres. The stem is thick, full, cylindrical, sometimes swollen at the base, and then shorter, whitish, yellow or clear tawny, reticulated. The cap is thick, convex, glabrous, moist in wet weather, fifteen centimetres and more in size, of a dull yellow, brown, reddish or ashen-brown, or even whitish, with tubes lengthened, small, at first white, then of a pale or greenish-yellow. The flesh is thick, of a white or yellowish color, sometimes with a wine tint under the skin, not changing when the plant is broken.

The taste is agreeable; no smell. This plant was well known among the Romans; is one of the most valuable articles of food, much eaten in Europe, and undeservedly neglected in this country, as it abounds in seasons when others are scarce. It resembles closely in taste the common mushroom, and is quite as delicate. Roques, W. G. Smith, and authors generally, give full directions for its preparation. "Whether boiled, stewed with salt, pepper and butter, fried or roasted with onions and butter, this species proves itself one of the most delicious and tender objects of food ever submitted to the operation of cooking" (Smith). Cordier says it can be eaten raw, and is of frequent use as a food and as a seasoning in the

south of France. Dr. Thore advised that this species be cultivated like the meadow agaric: An oak wood is watered with water in which a large quantity of this species is boiled; taking care to keep out horses, hogs, and horned animals, which are fond of this fungus.

Polyporus suavecolens, L.—Sweet-scented polyporus; New York (H. W. Ravenel). It is an oak fungus, rather soft, downy, at first snow-white changing to a bistre tint, and zoned, with the cap convex, sessile, attached laterally; it can reach as high as thirty to forty centimetres in diameter and three to five in thickness. The pores are lengthened, large, irregular, rounded, sometimes unequally prominent, at first white, then of a white slightly reddish color. The flesh is white.

Roques regarded it as of great value as an article of food. A powder with honey has been much used against excessive sweating in phthisis. The odor is like vanilla and anise, and Cordier says that it is sufficiently persistent and delicious to be used as a perfume.

Polyporus sulphureus, Bull.—Sulphur-colored polyporus; on trunks of trees; common in summer; S. C. to Pa.; Curtis, edible. The top is of a yellow citron inclined to reddish, under surface sulphur-yellow, chamois color when growing old, glabrous, undulated, irregular sessile, attached by its side; it may reach thirty to forty centimetres in size. The pores, very short, with orifices extremely small and difficult to be seen, emitting at maturity a very abundant, white seminal powder. It is sometimes imbricated and forms tufts. The flesh is yellowish, slightly raw and acrid to the taste. It becomes friable and discolored when old.

It is employed to stain in yellow. Paulet ate it without inconvenience and found it good. It soon becomes too leathery. Cordier says a specimen was found perfectly luminous on an old oak in the Bois de Boulogne.

Polyporus frondosus, Fr.—Turnip polypore; on roots of oaks; September and October; S. C. to Pa.; H. W. R. (See Plate XII, Fig. 13.) This enormous mushroom is formed by the reunion of a large number of heads, imbricated, divided, from four to six centimetres in size, lobed, reddish, slightly fissured or tuberculous on the upper surface, of a grayish brown. The pores are very minute, irregular, whitish, same as the trunk from which springs the cap.

"Smell like that of wine, esculent." The flesh is nearly white. It sometimes attains a weight of thirty pounds or more; and Woodward found a mass two feet broad. Its good qualities have been much lauded. Curtis does not cite it as edible; but Cordier says that the flesh though coriaceous has an agreeable taste and odor, and that the people in the country regard it as a happy accident to encounter it, for one suffices as a repast for a numerous family.

Polyporus giganteus, Pers.—Giant polyporus; on logs; October to January; Curtis, edible. Attains an extraordinary size. Should be cooked a long time. Cordier makes little mention of it.

Polyporus ocinus, Schoeff.—N. C.; Curtis, edible. This is fleshy, compact, but fragile. The cap is of a pale white, oftener irregular, sometimes covered with little scales, cracks in dry seasons. Stem short, unequal, white. Pores small, round, equal, of a citron white. It grows among pines and is of medium size, variable in form and color, and at a distance would be taken for an agaric.

These are eaten in Germany (Roques). Cordier says it possesses an agreeable, almond odor; and that Fries and his companions, in their mycological excursions, ate it even raw.

Polyporus confluens, Pers.—Lobster polypore; N. C.; edible, Curtis. Not cited by Cordier.

Polyporus poripes, Fr.—Nut polypore; N. C.; edible, Curtis. Not cited by Cordier.

Polyporus Berkeleyi, Fr.—Pepper polypore; N. C.; Curtis. In his letter to Berkeley (published in the Monograph by Dr. Th. F. Wood, of North Carolina, on Mr. Curtis) the edible qualities of this species is referred to. No reference by Cordier.

Hydnum imbricatum, L.—Scaly hydnum; barbe de

bouc; N. C.; edible, Curtis. Cap fleshy, at first rounded and convex, then flat and sub-umbilicated, often difform, eight to ten centimetres large, dark earth color, covered with thick scales upright, cottony, spines polished, decurrent, of an ashen white; stem, short and polished. Cordier says the flesh is firm, pale white and edible.

Hydnum coralloides, Fr.—Moss mushroom; N. C.; edible, Curtis. Sessile on old trunks of living trees, at first white, then yellowish, resembling when young the chou-fleur. From its base, which is tender and fleshy, spring a large number of flexible branches, interlaced, and assembled in tufts, bearing upon the summit of each of their divisions an expansion of long points or projections, at first straight, then pendent, and even curved under and terminating in layers. Cordier says it is a delicate food.

Hydnum repandum, L.—Doe-skin mushroom; common hydnum; woods; H. W. R. has seen specimens from Ga. to Penn. It is scattered, or grows together, in a series, long or even circular, and entirely of a chamois leather, or pale flesh color, of middle height. The cap is fleshy, compact, irregular, sinuous, not zoned; the spines unequal, tubular, fragile, some advancing even to the top of a stem, full, irregular, and almost always eccentric. The flesh is firm, fragile; taste slightly bitter and a little acid.

The awl-shaped spines on the under surface are a characteristic feature of the genus, so Smith states, and there is little fear of mistake, and it "affords a charming addition to the table." Much used for food on the Continent, and often dried for winter use. *H. coralloides*, *cyathiforme* and *caput medusae*, all grow in the Atlantic States and are edible (Curtis). See our Report, "Trans. Am. Med. Association," vol. vii.

Clavaria formosa, Pers.—Coral mushroom, N. C.; Curtis, edible. (See Plate XII, Fig. 1.) The elegant clavaria, as it is entitled, has a trunk thick, fleshy, white, divided into thick branches, round, lengthened out, close, orange yellow, or orange rose color, subdivided into little branches, obtuse, yellowish, collected in bundles, and ending in two or three teeth either pointed or obtuse.

Cordier says it is found in the markets at Nice, the flesh being eatable, very white, and of a delicate taste.

Clavaria fastigiata, L.—N. C.; Curtis, edible. This clavaria, of a yellow color, is very branching and scarcely three centimetres in height. The branches spring from a very short stem which is thin, divaricate, glabrous, disposed in obtuse bundles and terminate at the same height.

Cordier places it among the edible mushrooms. Much used in Europe. *C. botrytis* also grows in South Carolina and is commonly used as an article of food in Germany.

Clavaria coralloides, L., *Hydnum coralloides* Scop.—Goat's beard; N. C.; edible, Curtis. (See Fig. 1360.) This is of a white color, inclining to gray, sub-fragile, having a stem hollow within, quite thick, irregularly branched; the branches very numerous, forming bundles which are unequal, close together, sharp.

Cordier says it is eatable, even raw. The flesh is white, coriaceous and nourishing; all the varieties are used as articles of food; the plant bears no resemblance to the poisonous fungi. Dr. Curtis cites thirteen edible native species.

Clavaria rugosa, Bull.—Damp wood; N. C.; Curtis, edible. W. G. Smith recommends this, and adds, "all the white-spored species are believed to be esculent." Cordier cites it as edible.

Morchella esculenta, L.—Common morel; earth in woods, S. C.; H. W. R. The stem is often cylindrical, almost always hollow within, four to five centimetres long, of a pale white, polished, quite thick; the cap of a rounded shape, ovoid, and even conical, hollowed out at the top by irregular polygonal cellules, of which the borders are adherent to the stem. The cap, white or grayish in its young state, becomes of a dirty white, then a dark bistre, afterward blackish, which make many varieties.

Esteemed everywhere as a valuable article of food, fresh or dried; dried it will keep for many years. W. G. Smith speaks of the truly exquisite flavor which it imparts to gravies, and being readily dried it can be kept

for immediate use. "It yields a delicious ketchup." Cordier says "C'est un aliment délicat, et généralement recherché." *M. caroliniana* is also edible (Curtis).

Helvella crispa, Fr.—Pallid Helvella; S. C.; woods; edible, Curtis. This species, one of the largest, has the cap free, that is not adherent to the stem by its borders, bent on different sides, lobed, and sometimes even contracted, the color pale white above, becoming reddish upon drying, and very slightly brown below. The stem is glabrous, white, fistulous, hollowed or channelled, the lacunes being deep and complicated.

Smith says that if stewed slowly and with care, it will exude a delicious gravy; and that it is often dried and threaded on strings for future use. The flesh is firm and white, and resembles the morel. Cordier places it among the edible fungi. Curtis cites four other native *Helvelas* as eatable.

Lycoperdon borista, L.; *Bovista gigantea*, Nees.—Common puff ball; pastures; S. C. to Pa. (See Fig. 1373.) This species which acquires enormous dimensions, is always rounded and sub-sessile. Its receptacle or peridium is white, fragile, often polished, but oftener hairy or cottony, whitish when young, then pale ochre, and finally brown-gray. Its flesh, at first white, passes little by little to a greenish-yellow, then to a gray-brown, and ends by being converted into a mass of brown fuliginous powder; after which the peridium opens and expands at its summit into irregular colored circles, and soon only the base remains, of which the consistence and the lightness recalls that of sponge. The root, springing from the ground, is extremely small.

It possesses the odor and taste of the meadow-mushroom when young, but becomes disagreeable when old. Cordier says it furnishes an excellent food, much sought after in Italy; and that when the flesh is gray an excellent amadou can be made from it. In Finland they give the dust, mixed with milk, to cattle suffering from diarrhoea; and by the aid of precipitates different shades of brown color useful in staining are prepared. The puff-balls were formerly used as styptics to arrest hæmorrhage—sometimes inhaled. They possess also a narcotic quality; and hence the smoke was used for stupefying bees.

The *Bovista nigrescens*, Pers., and *B. plumbea*, Pers., common in grassy fields, are cited by Curtis as edible. Cordier says that Hussey and Bolton both declared them eatable when young. He says they differ very slightly.

Dr. Curtis also states that *L. giganteum* is a great favorite with him. "It has not the high aroma of some others, but it has a delicacy of flavor that makes it superior to any omelette I have ever eaten. It seems, furthermore, to be so digestible as to adapt it to the most delicate stomach. This is the Southdown of mushrooms." W. G. Smith says it should be cut up in slices, dipped into yolk of egg, and fried in fresh butter. The *L. proteus* offers itself under a variety of aspects, and is probably to be classed with *L. pyriforme*, which is a native. Cordier says it is edible.

The powder of *B. nigrescens* is used in England to stanch blood. Dr. B. W. Richardson, of London, experimented on dogs, cats and rabbits with the powder of *L. proteus* which acted as an anæsthetic when inhaled—a tumor being removed from the dog which remained insensible (*London Medical Times and Gazette*, June, 1853). Mr. T. Herepath thinks the anæsthesia due to the carbonic oxide gas generated. Dr. Adinel Hewson, of Philadelphia, used a tincture in doses of a teaspoonful in nervous diseases ("U. S. Disp."). The "Nat. Dispensatory," second edition, 1879, quotes as follows, p. 882: In 1869 Dr. Porcher stated, concerning *L. giganteum*, that it is found in abundance near Charleston, particularly where the cattle are driven to graze. It is used sliced and fried in butter, or stewed in milk, like the common mushroom. A correspondent (Mr. H. W. Ravenel) wrote to him: "I, and a number of others have made several meals on *Lycoperdon*, and I think I have discovered in myself well-marked evidences of its narcotic influence, and two other experimenters have described similar sensations to me." A case also is referred to in which a person "had been

seriously affected in this way by too large a meal of *Lycoperdon*."

Lycoperdon colatum, Bull.—N. C.; earth and stumps; Curtis. Dr. Curtis does not mention this as edible, but Cordier says it has the same properties, and may serve the same purposes as *L. giganteum*.

Lycoperdon gemmatum, Batsch.—Common; woods and fields; N. C. Dr. Curtis does not cite this as edible. Cordier says that it is probable that the greater number of these plants (vesseloups) properly speaking, are edible when young; Micheli indicated eleven species which were eaten in Florence. We should distrust them, he adds, when old, for it is certain that their powder thrown into the eye, occasions grave ophthalmias; and that, breathed through the nose, they provoke violent sneezing and even hæmorrhage.

Pachyma cocos, Schwein.; *Lycoperdon* (?).—Tuckahoe; Indian bread; underground; S. C. and N. C.; edible, Curtis. It resembles bread when broken. The Indians used it as food, and according to Clayton it was employed as such in Virginia. (See report of the writer in "Am. Med. Assoc. Trans.," vol. vii.) Dr. McBride, of S. C., made a communication on this curious plant to the New York Philosoph. Soc.; for other references, see, also, our volume of "Resources of the Southern Fields and Forests," p. 699, Charleston, 1869.

Tuber cibarium, Sibth.; *Lycoperdon tuber*, L.—Truffle; subterranean. Mr. Ravenel has not seen this celebrated plant in S. C.; though in a letter to us, he states that Schweinitz inserts it in his *Syn. U. S. Fungorum*, upon the authority of Dr. Muhlenberg: "He says he was told there was an old hunter who had a dog trained to find them in the neighborhood of Narraganset, Pa." It is not cited in Curtis' catalogue.

III. POISONOUS FUNGI.—*Agaricus phalloides*, Fr.; *A. bulbosus*, Bull.—Phallus-like agaric; common in woods; August to November; Carolina to Pa.; Curtis and Ravenel. (See Plate XIII., Fig. 4.) Very handsome, all parts nearly white, except the top, which may be a pale shade of yellow or green. When fresh it has a powerful, but not disagreeable smell; when past maturity, its odor becomes almost insupportable.

Accounted highly poisonous, especially the yellow variety. Orfila administered portions of *A. bulbosus*, of Bull. to a dog. In six hours, it made efforts to vomit, became extremely weak, lay down and died with convulsive movements. Upon post-mortem examination the stomach and duodenum had livid spots on their coats. The tincture made by placing one plant in $\frac{3}{4}$ jss. of alcohol was likewise equally destructive. Exposed to intense heat the plant did not give out oxygen, as other vegetables do, but azote and hydrogen; "thus confirming the almost animal nature of this species of production" (M. and de L., "Dict. de Mat. Méd.," ii., 204). Smith represents it in his chart, and says that it is known to be highly dangerous.

Agaricus muscarius, L. Fl. Suec.; *Amanita muscaria*, Grev.—Fly agaric, *Fausse orange*, *Amanita*; N. C.; Curtis. Sent to us from St. Johns, S. C., by Mr. Ravenel. (See Plate XIII., Figs. 1 and 5.) The top of this handsome species is more or less covered with white warts or excrescences, the débris of the volva, and on the under side with white lamellate gills; it is of a deep yellow, or orange, but usually brilliant scarlet. If the skin of the top is stripped off, the flesh just beneath is seen to be a bright yellow, and the rest of the flesh white. The volva is incomplete, stem full, scaly, bulbous, white, with a collar; leaflets white. It has a burning acrid taste, and a disagreeable odor ("Nat. Disp."), but this has been denied (Merat, in *Dict. de Mat. Méd.*). The flesh of the edible, red-fleshed mushroom (*Agaricus rubescens*), turns reddish when bruised (Smith).

This species derives its name from its killing flies when dissolved in milk; dogs and cats also are destroyed in two or three hours by large doses.

It is highly narcotic, producing in small doses intoxication and delirium, for which purpose it is used in Kam-schatka; and in larger death. For a detailed account of its poisonous effects, see Roques, "Hist. des Champ.

Comest. et Vénéneux," and for some curious particulars a paper by Dr. Greville, in the fourth volume *Wernerian Trans.* From the account of Dr. Langsdorff, it appears that the inhabitants of the northeastern part of Asia use this species in the same manner as wine, arrack, brandy, opium, etc., are by other nations. They are collected in the hottest months, and hung up in the air by a string to dry; some dry of themselves on the ground, and are far more narcotic. The usual mode of taking the fungus is to roll it up like a bolus, and swallow it without chewing; which the natives say would disorder the stomach. It is sometimes eaten fresh in soups and sauces, and then loses much of its intoxicating property. One large or two small fungi is a common dose, to produce a pleasant intoxication for a whole day, particularly if water be drunk after it, which augments the narcotic principle. The desired effect comes on from one or two hours after taking the fungus. Giddiness and drunkenness result in the same manner as from wine or spirits; cheerful emotions of the mind are first produced, involuntary words and actions follow, and sometimes at last, an entire loss of consciousness. It renders some remarkably active, and proves highly stimulant to muscular exertion; by too large a dose, violent spasmodic effects are produced. So very exciting to the nervous system, in many individuals is this fungus, that the effects are often very ludicrous: a person under its influence wishing to step over a straw, takes a stride or a jump sufficient to clear the trunk of a tree; a talkative person cannot keep silence or secrets; and one fond of music is perpetually singing. The most singular effect of the amanita, is the influence it possesses over the urine. It is said that from time immemorial the inhabitants have known that the fungus imparts an intoxicating quality to that secretion, which continues for a considerable time after taking it. For instance, a man moderately intoxicated to-day, will, by the next morning, have slept himself sober; but (as is the custom) by taking a teacupful of his urine, he will be more powerfully intoxicated than he was the preceding day. It is, therefore, not uncommon for confirmed drunkards to preserve their urine as a precious liquor, against a scarcity of the fungus. This intoxicating property of the urine is capable of being propagated; for every one who partakes of it has his urine similarly affected. Thus with a very few amanita, a party of drunkards may keep up their debauch for a week. Dr. Langsdorff mentions, that by means of the second person taking the urine of the first, the third that of the second, and so on, the intoxication may be propagated through five individuals. Merat states that in a certain dose it is not fatal, since Bulliard said that he had eaten more than two ounces without injury. Dogs and cats, however, died after taking a quantity very little larger.

Dr. Pouchet, of Rouen, seems to have clearly proved that the poisonous property of this and the *A. venenata* "may be entirely removed by boiling them in water." A quart of water in which five plants had been boiled for fifteen minutes, killed a dog in eight hours; but the boiled fungi had no effect on two other dogs; and a third which had been fed for two months on little else than boiled amanita, sustained no harm (*Journ. de Chem. Méd.*, 322, 1839).

See our paper in vol. vii. of "Trans. of Am. Med. Assoc.," where we have quoted from several authorities, experiments more in detail regarding the poisonous properties of these plants.

Bulliard says he ate two ounces without accident; but M. Roques states distinctly that this plant has not its poisonous properties modified by any climate. The Czar Alexis lost his life by eating this mushroom, and numerous examples of its poisonous effects on man could be adduced. The acetate of ammonia presents the best means of relief.

This plant possesses properties allied to those of opium—causing stupor and prostration. The tincture, in doses of forty drops, has been employed in diseases of the skin, and the powdered plant for dressing cancerous ulcers (see our Report on the Medic. and Toxicol. Properties of the Cryptog. Plants, *cit. sup.*). Amanitine, the active

principle, was obtained by Letellier. It is stated in the recent work of I. Mitchell Bruce ("Mat. Med. and Therap.," 1884) that the nitrate of muscarin, the liquid alkaloid, may be given in doses of one-thirtieth to one-third of a grain. Schmiedeberg and Koppe (1869) separated a poisonous alkaloid, *muscarina*, and examined it carefully. J. Lauder Brunton ("Pharmac., Therap. and Mat. Med.," Philadelphia, 1885), Sidney Ringer ("Handbook of Therap.," sixth edition, 1878), and others, have also investigated its action. Great interest attaches to its action, says Ringer, on account of its close similarity with pilocarpine, and its almost complete antagonism to atropia; it is a myotic and contracts the pupil; it excites copious emesis, perspiration, salivation and a flow of tears; it increases the intestinal mucus and the biliary and pancreatic secretions. Brunton found that applied to the heart, it would stop its pulsations completely. Atropine antagonizes muscarine. "When the heart has been stopped by digitalin, muscarin and aconite will restore its movements." It diminishes the activity of the respiratory centre by an action on the medulla, like chloral, physostigmin, gelsemin, and veratrine. "When atropine is applied to the heart, it completely removes the effects of muscarine" (Brunton). There seems to be some discordance in the opinions of Ringer and Brunton as to its local action on the eye.

Agaricus pantherinus, De C.—Panther agaric; borders of woods; S. C. to Pa. (See Plate XIII., Fig. 6.) Christison reports from the "Annali Univ. de Med.," 1842, a singular form of the narcotic effects of this fungus. A boy, near Bologna, having eaten it, was seized with delirium, a maniacal disposition to rave, and convulsive movements. These were succeeded by a state resembling coma, in every way, except that he looked as if he understood what was going on; and in point of fact really did so. He recovered under the use of emetics.

Agaricus asper, Pers.—Rough-warted agaric; woods; June to October (*A. asper* of Fries); N. C. Odor strong; taste not unpleasant, though saltish; poisonous according to Roques ("Hist. des Champ. Ven.," 319).

Agaricus purus, Pers.; *Agaricus roseus*, Bull.—Rose agaric; N. and S. C. According to Krapf it is extremely dangerous. It is distinguishable by its taste and odor which is like that of radishes. ("Crypt. of England.") Paulet did not discover any sensible effect when experimenting with it.

Agaricus vernus, D. C., Fr.; *Agaricus bulbosus vernus*, Bull.—Spring Agaric, *Orange ciguë*; August and September; N. C.; common in woods; Curtis. Its resemblance to the edible mushrooms has been the cause of the most unfortunate results. It is white in every part. Instead of having a simple collar extending from the borders of the cap to the upper part of the stem, when young it has a complete volva, of the same color, which envelops it from the root and covering the cap. The trace of the volva also distinguishes it from the edible species. The stem is swollen and hollow; not so in the edible. The poisonous plant exhales a disagreeable odor, and has an acrid taste, which is not observed in the edible. The lamæ or leaflets of the poisonous plant are always white, while those of the other are slightly rose, or violet colored. The skin peels with difficulty, while in the edible (*Boletus edulis*) it peels easily. All the varieties of the bulbous agaric of Bulliard contain a very deleterious fatty matter.

Paulet administered to a vigorous dog a paté of this plant in doses of three drachms. In six hours he made efforts to vomit, his limbs became feeble, lay down, and after some convulsive movements, died. The stomach and duodenum exhibited livid spots, and the whole intestinal canal was filled with yellow mucus. The œsophagus and kidneys were in a natural state. Roques quotes from Paulet, his report of the case of M. Benoit, his wife, her daughter and infant, which we think interesting enough to insert. At six o'clock in the evening they ate of this plant (*Amanita printanier*), which was gathered in the woods near Boulogne. On the next day they suffered from nausea, anxiety, and frequent faintings. On giving to the father and the child milk, ether, and a strong

dose of an emetic, abundant vomiting was induced. They were upon the point of giving the same to the mother, when she suffered from a flow of blood and continued prostration. The child was nearly dead when Dr. Paulet arrived. The father was found in a state of permanent anxiety and stupor; his stomach was tense, extremities cold, and pulse weak and intermitting. His whole body was livid, and he died a few minutes after. The mother vomited abundantly; her complexion was pale and cadaverous, and there was constant weakness and anxiety. Upon giving an ordinary purgative, after two or three hours she evacuated portions of the plant, and an abundance of yellow mucus. She took the milk with orange-flower water and a few drops of ether, which gave much relief. The next day she was purged and the uterine flow was arrested. There was weakness and oppression existing for some time, and she suffered from pains in the head for six months. Other cases we have translated from Roques and inserted in the "Report to the Am. Med. Assoc.," vol. vii.

Cases related by Paulet, in which there was stupor and dilatation of pupil, were much benefited by the purgative treatment. Roques thinks the indication is to relieve the gastro-intestinal inflammation by leeching, mucilaginous and oily drinks, and topical demulcents. Smith represents it in his chart.

Agaricus aruginosus.—Verdigris mushroom; earth and wood; middle N. C.; Curtis. Represented in Smith's chart as doubtless poisonous. It is a handsome fungus, and the green slime is easily washed off.

Agaricus pusillus, D. C., Fr.—N. C. Roques says of this beautiful little mushroom, which grows in woods and gardens, that it approaches too near the poisonous species to be edible.

Agaricus semiglobatus, Pers.—Slimy-dung mushroom, rich meadows and dung-hills; rich meadow; S. C. to Pa. De Candolle places all the coprins among the poisonous fungi. Their characteristics, tenuity, and rapid alteration are sufficient to proscribe them. Smith figures it in his chart among the poisonous species.

Agaricus fascicularis.—Bundled stump-mushroom; common in N. C.; Curtis. Occurs in groups around old stumps; stem hollow, gills greenish; taste bitter. Smith's chart.

Agaricus emeticus, Schoeff; *Agaricus pectinaceus*, Bull.—Common gilled agaric; very common; woods; H. W. R.; S. C. All the varieties are poisonous.

Agaricus sanguineus, Fr.—Common; damp woods; Curtis. It is even more poisonous than the *A. emeticus*, hence requires attention so as not to confound it with the eatable russules.

Agaricus sulphureus, Bull.—Brimstone agaric; woods; N. C. Included in Smith's chart. Has a disagreeable, penetrating smell like "gas tar." Poisonous.

Agaricus voteaceus, Bull.—N. C.; Schw. Braconnot found in this, gelatine, albumen, a large quantity of phosphate of potash, and adipocire, which show something of an animal nature.

Polyporus fomentarius and *ignarius*, L.—Amadou-tinder; N. C., S. C., and elsewhere; H. W. R. These plants grow on oak, birch, willow, cherry, and plum trees, and both are used to make amadou. See our Report, vol. vii., Am. Med. Assoc.

Agaricus sublateralis.—Olive-gilled mushroom; common on and around stumps; N. C.; Curtis. W. G. Smith includes this in his chart of poisonous species, but only charges it with having a disagreeable smell.

Russula fetens.—Fetid mushroom; N. C.; Curtis. Smith says it is much eaten by slugs, and has an insufferable odor, and must be deleterious.

Russula emetica.—Emetic mushroom; common in all parts of N. C.; woods; Curtis. Included in Smith's chart. He describes the skin as scarlet, and easily peeled off, the pink flesh displayed beneath is its great characteristic; the gills are pure white and do not reach the stem; the top is highly polished, and varies from scarlet and crimson to a faint rose color, and may be shaded with purple; supposed to be very dangerous.

Cantharellus aurantiacus.—False chantarelle; woods; N. C.; Curtis. Smith includes this in his chart, and

says it is known by its smaller size, its gills being far thinner and more crowded than in the true chantarelle; the stem frequently deep amber at the base, and the gills, or veins, darker than the top.

Hygrophorus conicus.—Red-juice mushroom; grassy lands; N. C.; Curtis. It turns purple-black when bruised, broken or old, with a strong and forbidding odor. It is not infrequently a brilliant yellow or deep orange, in place of crimson or scarlet (Smith's chart).

Clathrus cancellatus.—Trellised clathrus, stink horn; common on refuse heaps; N. C.; Curtis. A very beautiful species, but exhaling in its mature state a most offensive fetor (Smith's chart).

Panus stypticus.—Common on stumps; N. C.; Curtis. Smith thinks it "had better be avoided."

Lactarius torminosus.—Gripping milk-mushroom; in woods; N. C.; Curtis. Known by the hairy margin of the top, which is rolled inward. The milk which exudes when the plant is broken is acrid, and does not change color as does the edible lactarius (*L. deliciosus*).

Lactarius acris.—Pungent milk-mushroom; woods; N. C.; Curtis. An acrid and dangerous species. When cut or broken the flesh and white milk change to a dull-sienna red; this distinguishes it from all other mushrooms; the change is very slow.

Boletus luridus, Schoeff; *Boletus perniciosus*, Roques.—Poisonous boletus; woods; common, N. C. to Pa.; Curtis and Ravenel. (See Plate XIII., Fig. 2.) Very deleterious. *B. perniciosus* of Roques is highly poisonous to cats. The dog suffers, but seems endowed with a power of overcoming the activity of these poisons. In cases where men were poisoned, Roques found opium useful. (See our Report "Trans. Am. Med. Assoc.," vol. vii., for fuller details.) Smith considers it probably poisonous, but has known it to be eaten without fatal effects. It is a very handsome species, the prevailing tint being amber, relieved on the under surface by bright red, sometimes approaching to crimson, or even vermilion; when bruised, it changes color to blue (Smith).

Boletus satanas.—N. C.; H. W. R. Smith represents it in his chart, and as the most splendid of all the boleti. The top is nearly white, very fleshy; the stem is firm, exquisitely colored, and reticulated; the under surface, brilliant crimson. It attains a large size, and if bruised changes to blue. It derived its name, as Mr. Ravenel informs us, to "brand its diabolical attempt on the life of the botanist who first tried its eatable qualities."

Boletus felleus.—Bitter tube mushroom; banks and thickets, N. C.; Curtis. The bitter taste, flesh-colored tubes, flesh color of tops when broken, the reticulated stem and pink spores distinguish it.

Phallus impudicus, L.—N. C. to Pa.; H. W. R. (See Fig. 1374.) Dried on an iron plate to take out the nauseous odor it has great remedial powers to allay pain, especially in renal diseases; given in the form of powder or tincture; notwithstanding its indescribably loathsome odor, it has been eaten.

We have thought that it would add materially to the value of this paper to introduce the names of all the species cited by Curtis in his "Catalogue," as edible; many of which, as was stated, he had tested. He also gives the localities where found; lower, middle, and upper counties, etc.

- Agaricus casarius*, Scop.: Common; in oak forests.
- A. strobiliformis*, Vitt.: Common; in woods.
- A. rubescens*, Pers.: Lower; damp woods. These three belong to the "Ananita" family.
- A. procerus*, Scop.: Common; woods and fields.
- A. rachodes*, Vitt.: Middle; base of stumps and trees.
- A. excoriatus*, Fr.: Middle; grassy lands.
- A. mastoideus*, Fr.: Common; woods.
- A. melleus*, Vahl.: Common; about stumps and logs.
- A. Russula*, Schaeff.: Lower; among leaves in woods.
- A. frumentaceus*, Bull.: Middle; pine woods.
- A. hypopithyus*, M. A. C.: Middle; pine logs.
- A. Columbetta*, Fr.: Middle (Schw.); woods.
- A. castus*, M. A. C.: Middle; grassy old fields.
- A. albellus*, D. C.: Middle; damp woods.

A. consociatus, M. A. C.: Middle; pine woods.
A. personatus, Fr.: Lower and middle; near rotten logs.
A. nebularis, Batsch.: Middle (Schw.); damp woods.
A. odorus, Bull.: Middle (Schw.); woods.
A. giganteus, Sow.: Middle (Schw.); borders of pine woods.
A. cespitosus, M. A. C.: Common; base of stumps.
A. radicans, Bull.: Common; woods.
A. esculentus, Jacq.: Middle (Schw.); dense woods.
A. ulmarius, Sow.: Middle (Schw.); dead trunks.
A. tessellatus, Bull.: Middle (Schw.); pine trunks.
A. Pometi, Fr.: Middle; carious wood.
A. glandulosus, Bull.: Middle (Schw.); dead trunks.
A. ostreatus, Jacq.: Middle (Schw.); dead trunks.
A. salignus, Pers.: Common; on trunks and stumps.
A. bombycinus, Schaeff.: Lower and middle; earth, and carious wood.
A. speciosus, Fr.: Lower; grassy land.
Prunulus, Scop.: Lower and middle; damp woods.
A. squarrosus, Mull.: Middle (Schw.); oak stumps.
A. mutabilis, Schaeff.: Middle (Schw.); trunks.
A. campestris, L.: Common; fields and pastures.
A. arcensis, Schaeff.: Common; fields and pastures.
A. amygdalinus, M. A. C.: Common; rich grounds, woods and lanes.
A. cretaceus, Fr.: Common; earth and wood.
A. sylvaticus, Schaeff.: Lower and middle; woods.
Coprinus comatus, Fr.: Lower and middle; in stable yards.
C. atramentarius, Bull.: Middle; manured ground.
Cortinariu violaceus, Fr.: Middle (Schw.); woods.
C. cinnamomeus, Fr.: Common; earth and wood.
C. castaneus, Fr.: Common; earth in woods.
Pezizus involutus, Fr.: Lower and middle; sandy woods.
Hygrophorus eburneus, Fr.: Middle (Schw.); woods.
H. pratensis, Fr.: Middle (Schw.); hill-sides.
Lactarius insulsus, Fr.: Middle; woods.
L. piperatus, Fr.: Common; dry woods.
L. deliciosus, Fr.: Lower and middle; pine woods.
L. volemus, Fr.: Common; woods.
L. subdulcis, Fr.: Common; damp grounds.
L. angustissimus, Lasch.: Common; thin woods.
Russula lepida, Fr.: Lower; pine woods.
R. virescens, Fr.: Middle (Schw.); woods.
R. abutacea, Fr.: Common; woods.
Cantharellus cibarius, Fr.: Common; woods.
Marasmius oreades, Fr.: Middle (Schw.); hill-sides.
M. scorodoneus, Fr.: Middle (Schw.); decaying vegetation.
Boletus luteus, L.: Middle (Schw.); pine woods.
B. elegans, Fr.: Lower; earth in woods.
B. flavidus, Fr.: Common; damp woods.
B. collinitus, Fr.: Middle and upper; pine woods.
B. granulatus, L.: Common; woods and fields.
B. bovinus, L.: Common; pine woods.
B. submentosus, L.: Common; earth in woods.
B. edulis, Bull.: Middle (Schw.); woods.
B. versipellis, Fr.: Middle; woods.
B. scaber, Bull.: Middle and lower; sandy woods.
B. castaneus, Bull.: Middle (Schw.); woods.
Polyporus leucomelas, Fr.: Middle; woods.
P. ovinus, Schaeff.: Lower and middle; earth in woods.
P. poripes, Fr.: Middle and upper; wooded ravines.
P. frondosus, Fr.: Common; earth and base of stumps.
P. cristatus, Fr.: Middle (Schw.); pine woods.
P. confusus, Fr.: Lower and middle; pine woods.
P. giganteus, Fr.: Lower and middle; base of stumps.
P. sulphureus, Fr.: Common; trunks and logs.
P. Berkeleyi, Fr.: Middle and upper; woods.
Pistilina hepatica, Fr.: Upper; base of trunks and stumps.
Hydnum imbricatum, L.: Middle and upper; earth in woods.
H. subsquamosum, Batsch.: Common; damp woods.
H. laevigatum, Swartz.: Lower; pine woods.
H. repandum, L.: Common; woods.
H. rufescens, Schaeff.: Middle (Schw.); woods.

H. coralloides, Scop.: Common; side of trunks.
H. Caput-Medusa, Bull.: Common; trunks and logs.
Sparassis crispa, Fr.: Upper; earth.
S. laminosa, Fr.: Lower; oak log.
Clavaria flava, Fr.: Common; earth in woods.
C. botrytis, Pers.: Common; earth in woods.
C. fastigiata, L.: Middle (Schw.); grassy places.
C. muscoides, L.: Middle (Schw.); grassy places.
C. tetragona, Schw.: Middle (Schw.); damp woods.
C. cristata, Holmsk.: Middle and upper; damp woods.
C. rugosa, Bull.: Middle (Schw.); damp woods.
C. fuliginosa, Pers.: Lower and middle; shady woods.
C. macropus, Pers.: Middle (Schw.); earth.
C. subtilis, Pers.: Middle (Schw.); shaded banks.
C. pyridata, Pers.: Common; rotten wood.
C. aurea, Schaeff.: Common; earth in woods.
C. formosa, Pers.: Common; earth in woods.
Tremella mesenterica, Retz.: Common; on bark.
Lycoperdon Bovista, L.: Common; grassy lands.
Bovista nigrescens, Pers.: Common; grassy fields.
B. plumbea, Pers.: Common; grassy fields.
Morchella esculenta, Pers.: (Morel.) Common; earth in woods.
M. Caroliniana, Bosc.: Middle; earth in woods.
Helvella crispa, Fr.: Lower; pine woods.
H. lacunosa, Afz.: Lower; near rotten logs.
H. sulcata, Afz.: Middle (Schw.); shady woods.
H. Infula, Schaeff.: Middle (Schw.); earth and pine logs.
Puchyma cocos, Fr. (Tuckahoe): Lower and middle; under ground.

BIBLIOGRAPHY.

We insert references to a few only of the many books and pamphlets which may prove useful to the reader. In the catalogue of the library of the Surgeon-General, Washington, can be found numerous references.
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F. Peyre Porcher.

FUNGUS FOOT OF INDIA. This name has been given to a peculiar endemic disease, called also "Madras Foot," "Podelcoma," "Mycetoma," etc., which prevails to a considerable extent in India, and of which cases have been reported as occurring in Mexico and in the United States. It appears to be unknown in Europe.

The disease is characterized by a tumor-like swelling, occurring usually in one foot, more rarely in the hand or arm, and in one case in the shoulder, together with the formation of blebs or tubercles upon the surface, which become the point of exit of sinuses penetrating to the



EDIBLE FUNGI.

(FROM ORIGINAL DRAWINGS MADE BY THE REV. CHARLES I. CURTIS OF NORTH CAROLINA.)



POISONOUS FUNGI.

(FROM ORIGINAL DRAWINGS MADE BY THE REV. CHARLES I. CURTIS OF NORTH CAROLINA.)

