Edible and poisonous fungi.

Contributors

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EDIBLE AND POISONOUS FUNGI

BULLETIN No. 23

OF THE MINISTRY OF AGRICULTURE AND FISHERIES

LISHED BY HER MAJESTY'S STATIONERY OFFICE

Edible and Poisonous
FUNGI

From time immemorial certain kinds of the larger fungi have been esteemed as a food delicacy, particularly on the Continent. In Britain, the gastronomic approach has been more cautious—limited for the majority of people to the cultivated mushroom. Provided, however, that one can discriminate between the edible and poisonous sorts, there are many wild kinds of fungi that can be collected from our fields to grace the table and titillate the palate.

This handbook, prepared by the Royal Botanic Gardens, Kew, is a reliable guide to a selection of the more easily recognised forms of edible and poisonous fungi.

Twenty-seven varieties are illustrated in full colour, each with descriptive text and a note when and where they are likely to be found.

Advice on the preparation of edible fungi for the table, with some attractive recipes, is also included.

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MINISTRY OF AGRICULTURE & FISHERIES

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EDIBLE AND POISONOUS FUNGI

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FOREWORD

SOME of the larger fungi have been known and esteemed as articles of food from very early times. The Greeks and Romans have left records showing that they were acquainted with Truffles, Puffballs and various kinds of Mushrooms, and also that the last-named were among the greatest luxuries indulged in by the wealthy Romans. Visitors to the continent of Europe before the war must have seen many kinds of fungi, besides the common mushroom, offered for sale in the markets. Yet in this country, except among a few knowledgeable people, the general attitude has been one of suspicion. For the majority of English-speaking people there has been but one edible fungus, the Mushroom (and that usually the cultivated variety), all others being classed as " toadstools," to be avoided or even destroyed. With the recent influx of refugees and armed forces of all the Allied Nations our country folk have seen the despised " toadstools " being collected eagerly for food, and this, coupled with the desire for variety in the restricted war-time diet, has led to a greatly increased demand for information on the subject of edible fungi.

As far back as 1910 the Ministry (then Board) of Agriculture, in order to assist the public to distinguish some of the more common kinds of edible and poisonous fungi, published a booklet containing 25 coloured plates, with descriptions of the species depicted. There was a steady and continued demand for this work, and up to 1940 five editions and one reprint had been required. In the later editions new plates were substituted for some of the old ones which were not up to modern standards. The stock of the fifth edition of this Bulletin having been destroyed by enemy action, it was decided to publish a sixth completely revised edition. The lifelike illustrations are all from paintings by Miss E. M. Wakefield, the distinguished Mycologist at the Royal Botanic Gardens, Kew. The text also was revised and rewritten by Miss Wakefield, additional matter being incorporated which has made the Bulletin more generally useful.

In a handbook such as this, intended to provide a popular and reliable guide at a reasonable price, it is impracticable to figure more than a selection of the most common forms of edible and poisonous fungi. There are many other edible species which have had to be omitted, and for information as to these the reader must refer to more extensive works*. The selection has been made from among

the best and most easily recognized forms, and also indicates some species where there is possibility of confusion between edible and poisonous kinds.

From time to time there appear in the Press statements such as that poisonous fungi, when being cooked, will blacken a silver spoon, whereas edible ones will not; or that edible fungi always have a skin that will peel. These and other similar "rule of thumb" methods of distinction are merely popular errors, some of which have persisted from the pre-Christian era. The most poisonous fungus known, the Death Cap, peels easily, does not blacken silver and cannot be treated in any way to remove the poisonous principle. It cannot be too strongly emphasized that there is no means of telling whether a fungus is edible or poisonous except learning to recognize the different kinds, just as a gardener learns to distinguish a lily from a rose, and the different kinds of lilies one from another. If the figures and descriptions are carefully studied, it should not be difficult to identify some at least of the most common and striking fungi. The beginner is advised to confine his experiments in eating them at first to a few easily recognized forms, which cannot be confused with any poisonous species, such for instance as the Parasol Mushroom, Blewits, Morels or Puffballs. As his knowledge grows he will gain confidence and if he learns to distinguish the odd half dozen really dangerous species he will not come to much harm.

As this booklet is intended for the general public, purely technical terms have been avoided as much as possible. Where their use has been necessary it is hoped that the explanations given in the text and diagrams will be of assistance.

E. J. SALISBURY
Director
Royal Botanic Gardens
Kew.

August 1945

* A useful small book is the *Handbook of the Larger British Fungi*, by J. Ramsbottom, published by the Trustees of the British Museum, London.

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EDIBLE AND POISONOUS FUNGI

INTRODUCTION

The Nature of Fungi. Fungi, like seaweeds, lichens, mosses and ferns, are flowerless plants; instead of producing seeds, they propagate themselves by means of spores, minute bodies no larger than particles of dust. The spores of a mushroom form the dark powder on the gills; those of a puffball are the cause of the "puff" when a ripe specimen is kicked. Enormous numbers of spores are produced by some fungi and when set free are usually carried about by currents of air. It has been calculated that a single specimen of the Giant Puffball may produce as many as seven billion spores. Probably only a very small proportion of these succeed in germinating and giving rise to new plants. Owing to the peculiar requirements of fungi there must necessarily be very great wastage of spores, which the production of enormous numbers tends to counteract.

From almost all other plants fungi are further distinguished by never possessing any chlorophyll, that is the green colouring matter which gives the characteristic colour to the leaves of flowering plants, mosses and ferns. Since chlorophyll is the agent by means of which green plants are able to utilize, for building up their tissues, the simple substances found in air and water, it follows that fungi must obtain their food by some other method. This they do by living on organic matter, that is, on substances of animal or vegetable origin, either living or dead, from which they can as it were absorb food ready-made. Fungi which get their nourishment from living animals and plants are called *parasites*, and are the cause of disease in their hosts. Those which grow on dead matter, such as leaf-mould, timber, jams, leather and cheese, are *saprophytes*. The majority of the large, fleshy fungi which can be used for food fall into the latter class and are to be found growing on the ground amongst leaf-mould, or attached to dead stumps of trees, fallen trunks, etc.

Every one of the fungi with which we are concerned here consists of two parts. There is a system of fine branching threads growing in or on the wood, leaf-mould, or other substance on which the fungus is found. These threads constitute the vegetative, feeding part of the plant, and are known collectively as the *mycelium*, or to mushroom growers as the "spawn." The other part of the plant is that which develops above ground and is seen, that is, the "mushroom" or "puffball" as the case may be. This is called by botanists the fruit-body of the plant and is the part which is specially adapted for the production of spores. It is the fruit-body which is all-important for purposes of recognition.

Classification of the Larger Fungi. The large, fleshy fungi, which are the only ones dealt with here, all fall into one or other of two main groups, based on the way in which their spores are developed. In one group, the Sac Fungi or *Ascomycetes*, the spores are found inside tiny sacs called *asci*, which form a closely packed layer, each ascus usually containing eight spores. In the other group, the *Basidiomycetes*, the spores develop at the tips of minute club-shaped bodies, *basidia*, which form a similar layer in or on the fruit-body. Asci and basidia can be seen only with the help of the microscope, but the student soon learns to recognize the chief members of both groups by the distinctive shapes of the fruit-bodies.

In this book only one Sac-fungus is described, namely the Morel. Others of the same group are the pretty red or orange " Elf-Cups " which are often used for decorative purposes, and the true Truffles. The majority of the large, fleshy fungi belong to the *Basidiomycetes*. This latter group is again divided into two. In one the spores are developed *inside* a closed fruit-body and are set free either through a definite mouth or by the breaking up of the whole fruit-body ; the Puffball is an example. In the other group, to which the Mushroom belongs, the spores are formed on surfaces open to the air, so that they are easily blown away by wind as soon as shed from the basidia. This latter group, the *Hymenomycetes*, is divided again into families according to the form of the spore-bearing surface, namely whether this consists of gills, tubes, or spines, or whether it is perfectly smooth.

Of all families of the Hymenomycetes that of the Gill-Fungi (*Agaricaceae*) includes the greatest number of different species, and most of the fungi figured in this book belong to it.

The structure of a gill-fungus is best explained by means of a diagram (p. 8). This shows (top-left) the Death Cap, *Amanita phalloides*. Since this is the most deadly fungus known, its characters should be studied carefully, so that it may be avoided.

In the very young or " button " stage *Amanita* is covered completely by a white, fairly thin skin, known botanically as the *general* or *universal veil*. As the fruit-body grows and the stalk becomes longer it bursts through this skin, fragments of which are sometimes carried up with the cap and remain there as patches, well seen in the Fly Agaric (*Amanita muscaria*). The lower part of the general veil remains at the bottom of the stem, round which it forms more or less of a cup or socket (the *volva*). In the Death Cap this cup is very distinct, with loose edges, but in some species of *Amanita* the presence of a volva may be indicated only by a ridge round the swollen base of the stem, or by a few rows of scales encircling the stem. This volva can usually only be seen when the plant is dug up, since it is more or less buried in the ground.

Besides the general veil there is another thin skin, the *partial veil*, which in the young state is stretched over the gills, from the edge of the cap to the stalk. The same thing is to be seen in young specimens of the Common Mushroom. As the cap expands, this veil is broken through round the edge of the cap, but remains fastened to the stem, round which it forms a spreading or sometimes hanging collar, the *ring*. In some fungi, as *Cortinarius*, the partial veil is cobweb-like and soon disappears, leaving at most only a narrow, coloured zone on the stem, instead of a distinct ring.

Not all gill-fungi show these two veils. While *Amanita* has both, there are other kinds, as the Parasol Mushroom and the ordinary Mushroom, which have only a ring and a few, as the Grisette, which have a volva only and no ring. These points therefore must be looked for, as they are very important in fixing the identity of any particular specimen.

Another character of prime importance is the colour of the spores. This is sometimes obvious from the colour of the powder on the mature gills, but if there is any doubt it is necessary to make what is called a spore-print. To do this, the stalk is cut off and the cap laid gills downward on a sheet of white paper. To keep it moist it should be covered with a tumbler, jam-jar, or other suitable article and it is then left for some hours. A deposit of spores will be made on the paper, which gives not only the colour of the spores but an exact print of the gills, showing how crowded or spaced they are. The colour of spores in the gill-fungi may be white, as in the Death Cap, pink or rose-coloured, some shade of yellow-brown or rusty brown, purplish to purple-brown, or black.

Having ascertained the spore-colour and the presence or absence of a ring or volva, the next points to be considered are the method of attachment of gills to stem, the nature of the stem, whether fleshy and made up of fibres or tougher and quite smooth, and the relation of the flesh of the cap to that of the stem, whether similar or different. The accompanying diagrams on page 8 show the chief forms of gill-attachments. They may be quite *free* from the stem, as in the Parasol Mushroom, or they may just touch it, when they are said to be *adnexed* ; if the gills are attached to the stem by their whole width they are *adnate*, but if there is a curve inwards towards the stem, so that the attachment is somewhat hooked, they are *sinuate* ; finally the gills may run down the stem for some distance, as in the Saffron Milk-Cap, when they are *decurrent*.

Attention to the characters just described should enable a student to place his fungus in the correct genus. Every plant has a scientific name which consists of two words, for instance *Psalliota campestris*,

Lycoperdon giganteum. The first word is the name of the *genus* to which it belongs, and may be compared with the surname of a human family. Thus all fungi which are very closely related to the Common Mushroom belong to the genus *Psalliota*. The different kinds of Mushrooms are distinguished by adding the second word, known as the specific epithet, which may be compared with the Christian name of a man or woman. The two words together indicate the name of a species. The specific epithet is very often, but not always, descriptive. Thus *Psalliota campestris* is a *Psalliota* which grows in meadows or fields (from Latin *campus*, meaning a plain or level ground); *Psalliota sylvicola* is a *Psalliota* which is found in woods (from Latin *silva*, or *sylva*, a wood or forest).

In trying to identify a particular fungus, one first finds the genus to which it belongs. Attention to the characters just described, and comparison with the key given (p. 5), should enable the reader to place any common fleshy gill-fungus in or near the correct genus. In this table rare or unusual genera have been omitted, and also those which include only leathery or corky forms, or species for the most part small or of no importance from the point of view of edibility.

The determination of the correct species is a more difficult matter, for which it is necessary to compare descriptions and any available illustrations very carefully. Such characters as colour, taste, smell, presence or absence of hairs, texture, and so on must be noted, and the sum total of all characters considered. The selection of species for figuring in this book has been made from those which are common and sufficiently characteristic to be recognized with no great difficulty.

Fungi as Food. In the past, exaggerated claims have been made as to the food value of edible fungi, some enthusiasts even going so far as to say that they can take the place of meat in the diet. The fact is that the chemical composition of fungi approximates to that of most fresh vegetables. From 80 to 90 per cent of the substance consists of water, and there are small proportions of nitrogenous substances (not all digestible), carbohydrates, fats and mineral matter. Fungi cannot therefore be regarded as a staple food, although in parts of the U.S.S.R. they do seem at certain times of the year to play a large part in the sustenance of the poorer classes. The chief value of edible fungi is as a flavouring; they provide a savoury addition to plainer and more nutritious foods. Of recent years it has been shown that some fungi in the fresh state contain appreciable amounts of certain vitamins, notably vitamins of the B complex, and sometimes vitamin D. In times of scarcity they may therefore have some value as sources of these accessory food-factors.

THE LARGER GILL-FUNGI

KEY to the Genera, especially those containing Edible Species

I. **Cap fragile,** soon becoming dissolved into a black fluid ; spores black .. .. *Coprinus*

II. **Cap fleshy,** decaying but not becoming an inky fluid

A. RING, OR VOLVA, OR BOTH PRESENT ON STEM

(a) *Both ring and volva present,* spores white .. .. *Amanita*

(b) *Volva only present*

Spores white .. .. *Amanitopsis*

Spores pink .. .. *Volvaria*

(c) *Ring only present*

(i) Gills free

Spores white .. .. *Lepiota*

Spores purple-brown .. .. *Psalliota*

Spores black .. .. *Anellaria*

(ii) Gills attached to stem

Spores white .. .. *Armillaria*

Spores brown .. .. *Pholiota*

Spores purple-brown .. .. *Stropharia*

B. NO TRUE RING, AND NO VOLVA PRESENT ON STEM

(a) *Partial veil cobweb-like, sometimes leaving a coloured ring-like band on stem;* spores brown .. .. *Cortinarius*

(b) *No ring-like band on stem*

(i) Gills free, spores pink .. .. *Pluteus*

(ii) Gills typically sinuate

Spores white or nearly white .. .. .. *Tricholoma*

Spores pink .. .. *Entoloma*

Spores yellow-brown .. .. *Hebeloma*

Spores purple-brown .. .. *Hypholoma*

(iii) Gills adnexed or adnate

Gills very brittle ; cap often brightly coloured ; spores white, cream or yellow .. .. *Russula*

Gills not brittle ; spores of various colours .. *Several genera of small fungi, of no importance as esculents*

(iv) Gills more or less decurrent

Gills exuding white or coloured juice when cut ; spores white .. .. *Lactarius*

Gills fold-like ; spores white .. .. .. *Cantharellus*

Gills waxy, rather thick ; cap often brightly coloured ; spores white .. .. .. *Hygrophorus*

Gills thin, not fold-like or waxy

Stem central

Gills easily separated (by rubbing) from flesh of cap .. .. *Paxillus*

Gills not easily separated from flesh

Spores white ; cap fairly large and fleshy .. .. *Clitocybe*

Spores pink ; cap rather fleshy .. *Clitopilus*

Spores of various colours .. .. *Several other genera, of species small or not important as esculents*

Stem not central, sometimes absent

Spores white or nearly white .. .. *Pleurotus*

Spores pink .. .. *Claudopus*

Spores brown .. .. *Crepidotus*

III. **Cap usually thin and rather tough;** can be dried and will revive when moistened .. .. .. *Marasmius*

The number of kinds of fungi which are really poisonous and likely to cause death is very small. There are, however, some which are highly indigestible, others which for some reason are unpalatable, and many which are worthless as food. Even forms which are usually accounted safe may under certain conditions cause unpleasant symptoms. For instance the well-known Ink-Cap, *Coprinus atramentarius*, has been known to produce illness if taken with alcoholic drinks; otherwise it is quite safe and wholesome.

Apart from the definitely poisonous species such as the Death Cap and the Fly Agaric, discomfort after eating fungi may arise from (1) personal idiosyncrasies, such as occur in relation to other perfectly good foods, (2) imprudence in eating excessive quantities, thus causing violent indigestion, (3) the consumption of fungi which are not in a suitable state, being too old and partly decomposed, or too sodden with moisture, or insufficiently cooked. Anyone who wishes to make use of this source of additions to the menu should observe the following general rules :

1. Be quite sure that you know, without any doubt, the particular kind of fungus which you propose to eat. Beginners should confine themselves to a few easily recognized species and avoid all others. Above all, until you can be sure of the safe kinds, avoid any fungus which has its stalk set at the bottom in a sort of cup or socket. To ascertain this the fungus must be dug up carefully, not pulled or cut off.

2. Do not accept any statement as to easy methods of telling edible from poisonous kinds, nor that there is any way of preparation which will destroy poisonous properties.

3. Do not mix different kinds of fungi.

4. Gather only fairly young, dry, and undecayed specimens. Reject any that show signs of attack by maggots.

5. Cook and eat the fungi as soon as possible after gathering.

6. Do not warm up a second time mushrooms which have already been cooked.

Methods of Preparation for the Table. Fungi should not be washed unless it is absolutely necessary, in which case they should be rinsed quickly and dried at once. It is usually sufficient to wipe with a damp cloth in order to remove particles of grit, grass, etc. It is also not necessary to peel unless the skin is tough or very much soiled. Stalks are usually cut off because they are tougher, but the younger and sound stalks can be cut in slices and used, especially for sauces and gravy. Specimens of the genus *Boletus* should have the tubes removed, unless very young, otherwise the dish will have a slimy consistency.

The flavour and digestibility of fungi depend very much on how they are cooked. The simplest methods are usually the best. Fat is necessary, the best results being obtained with butter, but in war-time margarine or other fat must be substituted. The following are simple recipes suitable for most fleshy fungi. Where special methods are required they are mentioned in the description of the particular species.

Fried Mushrooms. Make a little fat very hot in a frying-pan and place in it the mushroom caps, gills upwards. Very large specimens may be cut in pieces. Season to taste with salt and pepper,

and baste while
or until tender.
cooked are very

Some fungi,
ball and Boleti a
with batter befor

BAKED MUS
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This recipe
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parsley. Pour t
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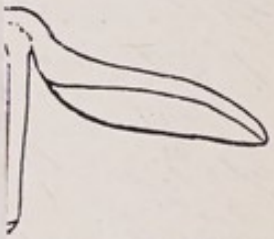
Mushrooms
may be served th

The above
make a good dis
a good cook will
add interest to o
and used as a fla
and cheese. A f

bones give an excellent flavour, and for this purpose dried mushrooms, such as dried Champignons, may be used.

A very good meal is provided by a medium-sized vegetable marrow, peeled, the seeds removed, and stuffed with sausage meat to which a little chopped bacon and a few chopped mushrooms have been added. The stuffed marrow is baked in the oven in a tin with some dripping, and is basted with the hot fat and turned once or twice.

DRIED MUSHROOMS. Certain kinds of mushrooms, which are not easily attacked by maggots, are particularly adapted for drying for winter use. The Parasol Mushroom and the Fairy Ring Mushroom or Champignon are very suitable, but ordinary Mushrooms and Boleti may also be dried provided quite sound specimens are obtained. The fungi should be gathered on a dry day and only sound young caps chosen. The stalks are removed and the caps either spread out on wire trays or strung on thread. They are then left to dry in a warm place, as in an oven which has been in use and left with the door open, or on the plate rack above a stove. When thoroughly dry they are stored in a dry place. Cotton bags hung up in a warm cupboard are preferable to tins, unless it is absolutely certain that there is no moisture likely to affect the caps.



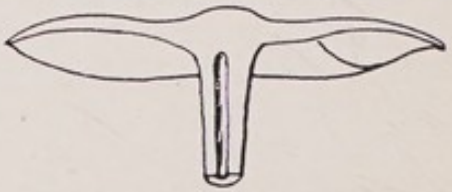
AND DISTANT
M. (LEPIOTA)

VEIL - WHICH MAY
LEAVE ZONE ON STEM
(CORTINARIUS)

GILLS SINUATE (TRICHOLOMA,
ENTOLOMA etc.)

GILLS ADNEXED
(AMANITA RUBESCENS)

GILLS DECURRENT (LACTARIUS)



GILLS ADNATE
(STROPHARIA)

Diagrams Explanatory of Terms Used

ILLUSTRATIONS

EDIBLE AND POISONOUS FUNGI

EDIBLE VARIETIES OF FUNGI

COMMON OR FIELD MUSHROOM

(**Psalliota campestris**)

The Common Mushroom or Field Mushroom may vary considerably in appearance. The typical form found in meadows has a white, rather silky cap. In the " button " stage it is rounded like a small ball but later, as the cap expands, it becomes less rounded and finally nearly flat. The skin is dry and hangs slightly as a ragged edge round the margin of the cap ; it peels easily. The stem is also white, rather short, smooth and solid, with a thin white ring attached towards the middle of the stem or nearer the top. The ring stands out only in the very young, freshly opened, stage ; later it hangs down, and may very soon disappear, especially when the fungus is handled. In the typical wild form the stalk tapers at the bottom where it enters the soil, but in cultivated forms and in some of the varieties it is very often thickened below. The gills are thin and crowded, and free from the stem. In the button stage they are whitish, then as the cap opens become a distinct delicate pink colour, and later dark purplish-brown or nearly black. The spores are very dark brown. The flesh of the cap is white and soft, often changing to reddish or dirty brown when cut or broken.

Varieties of the Field Mushroom occur in which the cap is scaly, the scales being often not pure white but reddish to dark brown. The most characteristic features are the pinkish gills in the young stage, later changing to dark brown, and the thin, rather perishable ring on the stem.

The Field Mushroom is common in meadows and on downs where animals have grazed, from early summer to autumn, and sometimes occurs in great abundance. It also often appears in gardens where horse manure has been applied to the soil. Several varieties are cultivated for market, and the cultivated forms as a rule have a thicker and more solid cap than the typical wild plant, whose flavour is unexcelled.

RAGGED PARASOL
(Lepiota rhacodes)

This fungus, called in previous editions the "Scaly Agaric," is a more sturdy and less graceful plant than the true Parasol Mushroom.

It grows in clusters, and in consequence the stems are often curved, to allow for the spread of the large caps. The cap in the "button" stage is brown and smooth but as it opens it becomes cracked into thick angular, ragged scales, which often turn up slightly. The middle of the cap remains smooth and tan-brown, but is usually blunt, never a prominent boss as in the true Parasol. The cap is usually 4 to 6 inches across and from white to greyish-ochre in colour. The stalk is thicker than in L. procera and is white and smooth, never scaly. It is swollen at the base and becomes hollow within. The ring is white, fringed at the edge, and has one or two zones of brownish, shaggy scales below. The flesh of both cap and stem is white, but reddens when cut - especially in the stem. The gills are white, crowded, and distant from the stem as in L. procera. The spores are white.

The Ragged Parasol grows in autumn in more shady places than the true Parasol Mushroom. It is found amongst leaves in woods and under trees in gardens, and is sometimes abundant on old compost heaps. Young specimens are best for eating. The caps are scraped, but not washed, and may be cooked in the same way as ordinary mushrooms.

EDIBLE

RAGGED PARASOL (*Lepiota rhacodes*)

BLEWITS

(*Tricholoma personatum*)

This fungus, known popularly as " Blewits," " Blue Leg," or " Bluette," was formerly sold in Covent Garden market and is still sometimes offered in the Midlands. It has a smooth, rounded, fleshy cap, from 2½ to 5 inches across, with the edge extending a little beyond the gills and at first incurved and slightly downy. Later the cap becomes more flattened ; in colour it is pale tan or greyish tan, opaque when dry, but moist in rainy weather. The stem is stout, short (2–3 inches long), cylindrical, but often swollen at the base, solid ; it is whitish but covered with bluish-violet evanescent fibrils. The gills are whitish at first but then discoloured, broad and crowded. They can be easily separated from the cap. The spores as seen in a spore-print on white paper are not white but pale pinkish. The flesh of both cap and stem is somewhat greyish when moist, but white when dry. It has a rather pleasant odour.

Blewits are to be found in pastures and on downs, often growing in large rings. They appear in autumn, earlier than the next species. For use they should be gathered in dry weather, when they will be found to be one of the best edible forms.

WOOD BLEWITS
(Tricholoma nudum.)

This fungus is sometimes confused with the previous species under the name of "Blewits." It differs in having the cap also bluish at first, hence has been called "Blue-Caps."

The colour of this fungus is very clean and delicate; it is often described as amethyst, but there is more of blue in it than of purple. The cap is usually 3 or 4 inches across but large specimens may reach 5 to 6 inches. It is smooth and moist, at first convex but finally flattened or even depressed in the centre and often rather wavy, with the margin remaining incurved. With age the colour of the cap becomes more reddish-brown, and it sometimes appears very sodden in wet weather. The stem is more slender than in the true "Blewits," and is similar in colour to the cap, or slightly paler. The gills are crowded, narrow, rounded behind or sometimes running down the stem a little as the cap expands. They are violet or bluish like the cap, and never develop a rusty-brown colour, a point which serves to distinguish the plant from some less wholesome bluish fungi which are found among the brown-spored series. The spores of T. nudum, like those of T. personatum, are slightly pinkish in a spore-print. The flesh is bluish throughout, whereby it may be distinguished from true "Blewits."

This fungus is common in late autumn, seldom appearing before the middle of October. It grows, often in clusters, amongst leaves in woods, and may also be found on old compost heaps. Like the previous species it should be gathered when dry, and is very good fried.

EDIBLE

WOOD BLEWITS (*Tricholoma nudum*)

EDIBLE

OYSTER MUSHROOM

(**Pleurotus ostreatus**)

The Oyster Mushroom differs from other fungi mentioned in this book in that it grows on wood and not on the ground.

It forms in autumn dense, overlapping clusters on fallen trees and on stumps. The caps are smooth, moist and somewhat clammy to the touch, but not slimy. Each cap is somewhat fan- or shell-shaped, from 2 to 6 inches in diameter, with the edge inrolled and downy at first. The colour varies very much. Young specimens may be almost black, but later they become brownish-grey or bluish-grey, and in one form there is a distinctly blue tinge, like the colouring on a pigeon's breast. As the fungus ages or dries the cap becomes more fawn-coloured. There is a short, stout stalk, attached to the side of the cap instead of in the middle. The stalk is white, often slightly curved upwards, and more or less woolly at the base. The gills are creamy-white, broad, rather crowded, and below are joined by cross ridges to form a raised network running down the stem. The spores are white, but have a faint lilac tinge when seen in the mass, as in a spore-print. The flesh of the cap is thick, white, at first soft but eventually rather tough, and has a pleasant taste.

The Oyster Mushroom requires slow and careful cooking, or it may be rather indigestible. Only the tender, young parts should be used and it is best cut in pieces and stewed, or fried with a coating of egg and crumbs or of batter. It can also be dried for winter use.

EDIBLE

OYSTER MUSHROOM (*Pleurotus ostreatus*)

EDIBLE

FAIRY RING CHAMPIGNON

(**Marasmius oreades**)

Although many kinds of fungi grow in rings, the name " Fairy Ring Champignon " is applied only to this small fungus, which is the usual cause of the well-known rings of partly darker-coloured and partly dead grass so often seen on lawns or downs. The Fairy Ring Champignon, known in France as " Mousseron," is to be found amongst short grass, after rain, in summer and autumn. It is a rather tough fungus and is able to withstand drying for some weeks without being killed. The caps shrivel, but as soon as rain comes they swell up again and continue to develop and shed spores.

The cap is smooth, one or two inches across, rounded at first, then flattened, but always having a rounded protuberance or boss in the middle. The colour when dry is a nearly uniform reddish-buff ; when moist the colour is a little darker, especially in the centre of the cap, and the edge may be marked with fine lines. The stem is more or less of the same buff colour, very straight and slender, and tough, so that it does not break easily when bent. The gills are pale buff-coloured, thick, broad, and rather far apart. They are alternately long and short, the long ones not fastened to the stem. The spores are white. The flesh is whitish to very pale buff and the odour pleasant, especially when the fungus is dried.

Owing to its rather tough nature the Champignon is especially suited to drying for winter use. For this purpose the stems are cut off and the caps threaded on strings and hung up, or spread on wire trays in a warm place. Fresh Champignons are also good first cooked gently in a little fat, and then added to an omelette, or stewed in brown gravy and served with steak.

EDIBLE

FAIRY RING CHAMPIGNON (*Marasmius oreades*)

EDIBLE

THE CHANTERELLE

(**Cantharellus cibarius**)

The Chanterelle is easily recognized by its egg-yellow colour, and pleasant smell like that of apricots, and by the irregular, wavy and lobed cap, and vein-like gills.

The fungus is usually 2 to 3 inches across, and of approximately equal height. The cap is at first convex, then flattened and finally depressed or rather funnel-shaped, with an irregular, wavy margin. The stem is narrowed downwards and not sharply marked off from the cap; it is $1\frac{1}{2}$ to $2\frac{1}{2}$ inches long and yellow like the cap. The gills are not plate-like as in the Mushroom, but are thick, rounded and very shallow, resembling veins; here and there they fork, and they may be connected by cross-veins. Below the gills run down the stem (decurrent). The spores are white. The flesh is thick in the middle, thinner towards the margin, yellowish, but dries whitish.

The Chanterelle grows in woods, in autumn, and is one of the best known edible fungi. It is however rather tough, and requires careful, slow cooking. It is best cut in slices, and may be softened in boiling water or milk before being cooked slowly with margarine or butter. Alternatively, the slices may be first fried lightly, then stewed slowly in stock until tender.

EDIBLE

THE CHANTERELLE (*Cantharellus cibarius*)

EDIBLE

SAFFRON MILK CAP

(**Lactarius deliciosus**)

The Saffron Milk Cap belongs to a genus, *Lactarius*, which is characterized by the exudation of a milky juice when the cap is cut or broken. In the majority of species of *Lactarius* this juice is white, like milk, but in a few it is coloured, and in *L. deliciosus* it is reddish-orange, or saffron-coloured. The cap is about 4 or 5 inches across, at first convex with the margin inrolled, but when fully grown somewhat funnel-shaped. The colour is orange, usually described as "orange brick-colour," with concentric zones of darker, more tan-coloured, markings. With age, or on handling, the cap becomes stained with green. The stem is also orange-coloured but a little paler, and similarly stains verdigris-green when bruised. It soon becomes hollow. The gills are reddish-orange or saffron-coloured, also becoming green with age or when bruised. They are narrow and rather crowded, sometimes forked at the base, and run down the stem a little (decurrent). The spores are slightly pinkish when seen in a mass. The flesh is whitish but becomes orange when broken, then green. All parts of the fungus, but especially the gills, exude drops of a bright saffron-coloured juice when broken. The juice eventually turns green on exposure to the air.

The Saffron Milk Cap is found in early autumn under pines, firs, and other coniferous trees, and is one of the best of edible fungi, as its name (*deliciosus*) implies. Unfortunately the caps are readily attacked by insects, and care should be taken to collect only sound specimens. The stems should be cut off and the caps wiped clean and dry. They are good baked in a covered dish, with fat and seasoning, or fried, or they may be added to various meat dishes. They are not suitable for drying.

EDIBLE

SAFFRON MILK CAP (*Lactarius deliciosus*)

EDIBLE

GIANT PUFFBALL

(Lycoperdon giganteum)

The Giant Puffball is a fungus no one can fail to recognize. It is the largest of British Puffballs, varying in size from that of a large turnip to specimens a foot or more across; some huge specimens have been reported. Young specimens may be ball-shaped, but the full-grown plant is usually more or less flattened oval or pumpkin-shaped, that is, wider than it is high, and a little grooved or folded at the bottom, where it is rooted in the soil by a cluster of thick, cord-like strands of mycelium.

The outer skin of the Puffball is creamy-white, and smooth like white kid. At first the interior also is white and rather firm (of a soft cheese-like consistency), and only in that condition is it fit for food. Later, as the spores ripen, it becomes a powdery mass, first yellowish then olive-brown, while at the same time the upper part of the outer skin breaks away in pieces, thus setting free the spores.

The Giant Puffball is found amongst grass in meadows and woods, and especially where there is an accumulation of decaying vegetable matter, as on old compost heaps. It is at its best in summer or early autumn, for by September it has usually developed the powdery state. For cooking, the Puffball should be peeled, the flesh cut in slices about half-inch thick, and fried, preferably with a coating of egg and crumbs, like cutlets.

There are smaller kinds of Puffballs which are also edible when young, but many of them are so small as to be not worth cooking. The smaller kinds are, however, quite good if cut up and eaten raw in salads.

EDIBLE

GIANT PUFFBALL (*Lycoperdon giganteum*)

EDIBLE

CEPS OR EDIBLE BOLETUS

(**Boletus edulis**)

Fungi of the genus *Boletus* are fleshy, but the under surface of the cap instead of having gills is covered with a layer of tubes, whose openings appear as fine pores.

Boletus edulis is well-known on the Continent and is used both fresh and dried, under the names of Cèpe (in France) or Steinpilz (in Germany). It and the species of *Boletus* described on the following pages are much sought after by our Continental visitors.

It is a large fungus, commonly described as having a top like a penny bun. In the young state the rounded cap is small compared with the large, swollen stem, but later the cap may expand to 6 or 8 inches across. It is usually warm brown in colour, paler towards the edge, and often white at the extreme edge, smooth, moist and rounded, at first quite firm but later becoming soft to the touch. The tubes are very narrow and do not reach the stem. They are at first white, then greenish-yellow, and the pores are similarly coloured, small, and rounded. The stem is very stout, sometimes cylindrical but more often swollen and rather bulbous, whitish to fawn in colour and covered, especially towards the top, with a net-work of fine, white raised lines. The flesh is white, thick and does not change colour when broken.

Boletus edulis is to be found in woods, especially beechwoods, during late summer and autumn. Before cooking the tubes should be removed—they come away from the flesh very easily. The stem may be used if sound, and both cap and stem are best cut in slices. The fungus may be cooked in any of the usual ways, or the slices may be dried for use in winter.

EDIBLE

CEPS OR EDIBLE BOLETUS (*Boletus edulis*)

EDIBLE

ROUGH-STALKED BOLETUS

(**Boletus scaber** and **Boletus versipellis**)

There are several species which have stems roughened with brown, greyish, or black dots or warts, sometimes arranged in lines or in a network. The most easily recognized species, *B. versipellis*, has a cap which varies from dull orange to brick-red in colour, hence it is often called the " Orange Cap Boletus." The characters of the stem, however, seem more distinctive, and for practical purposes all these closely allied species may be grouped under the name " Rough-stalked Boletus." In the other species of this group the colour of the cap varies from soft-greyish to deep brown. In all the cap is rounded, usually smooth and dry, but slimy in *B. scaber*. At the margin the skin often extends beyond the tubes. The stem is tall, slender compared with that of *B. edulis*, thicker and harder below than above, and white or greyish-white, with numerous rough brown or black fibrils arranged more or less in long lines. The flesh is white, in some forms remaining unchanged, in others, as *B. versipellis*, becoming pinkish or greenish, especially towards the bottom of the stem.

The tubes and spores are at first white, then dingy brownish-olive. They are free from the stem.

The rough-stalked Boleti are to be found principally in birch and pine woods, in early autumn. They are prepared and used in the same way as Ceps. Young, firm specimens are best.

EDIBLE

ROUGH-STALKED BOLETUS
(*Boletus scaber* and *Boletus versipellis*)

EDIBLE

COMMON MOREL

(**Morchella esculenta**)

The species illustrated is representative of a genus all the members of which are edible. The structure is entirely different from that of the mushroom; it belongs to the Ascomycetes, having its spores formed inside little sacs.

The cap is more or less rounded or conical, and covered with prominent ridges, which form a network enclosing fairly deep pits, like a sponge or honeycomb. The colour varies from pale ochraceous-yellow to brown or blackish-grey. The stem is stout, whitish, grooved towards the bottom, mealy, and very brittle. Both stem and cap are hollow.

Morels are found in spring, in clearings in woods, and especially on chalky or clayey soil. They are not among the most common of fungi, but may occur locally with some frequency.

They are used chiefly to flavour soups and stews, and may be dried for winter use by being threaded on a string and hung in a current of air. While drying they should not be allowed to touch one another. They should be washed or wiped to remove any grit, etc., sticking to them. Fresh Morels may be stuffed with any savoury mixture of minced meat, and baked in a covered dish. They may also be simply fried.

DEATH CAP
(Amanita phalloides)

This fungus well deserves its name, since it is the cause of perhaps 90 per cent of the deaths by fungus poisoning. It is the most dangerous fungus known, and the consumption of only a very small quantity will cause intense suffering, followed often by death. Yet it should not be difficult to learn the characteristics of the genus Amanita, and so to avoid all species until able to distinguish those which are safe. The gills in Amanita are always white or creamy-white, never pink or purple-brown as in the mushroom and they are free from the stem. There is a ring on the stem, easily seen in young specimens, though it may disappear in old ones. Further, at the bottom of the stem there is a volva, either a distinct cup as in A. phalloides, or represented by a groove round the top of a bulb-like swelling, as in A. citrina and A. muscaria.

The cap in Amanita phalloides is at first oval then as it expands convex or finally flat, and from 2-4 inches across. The colour in the typical form is yellowish olive, streaked with darker fibrils, especially towards the middle; but there are also more yellow forms and a pure white one which is often regarded as a distinct species. On the top of the cap there may be a few whitish patches, the remnants of the torn general veil, but these soon disappear, leaving the cap smooth and when moist rather slimy. The stem is white or sometimes tinged with pale yellow or green, and usually smooth, with a few closely adherent scales beneath the ring. It is narrower above

than below, where the base is swollen, but not so abruptly so as in A. citrina. With age the stem becomes hollow. The ring is thin, white above and yellowish below, is attached to the upper part of the stem and hangs downwards like a frill. It is very easily rubbed off.

The most characteristic feature of this fungus is the cup-like volva, with loose edges, at the bottom of the stem, but since this is usually buried in the soil it is necessary to dig up the whole fungus carefully in order to see it.

The gills are white at first, then cream-coloured, or even with a greenish tint, free from the stem, crowded, and varying in length. The spores are white. The flesh is soft, white, but greenish under the skin of the cap, which can be peeled easily. The whole fungus has a rather sweet, sickly odour.

The Death Cap is common in woods, especially of beech and oak, and sometimes comes up also in adjoining grassland, in late summer and autumn.

POISONOUS

DEATH CAP (*Amanita phalloides*)

BULBOUS AMANITA OR FALSE DEATH CAP

(**Amanita citrina** (= *A. mappa*))

This fungus closely resembles yellow and white forms of the Death Cap (*A. phalloides*), but may be distinguished by the volva, which has only a short thick margin, instead of a loose free edge, and therefore does not appear cup-like.

The cap is rounded at first, then convex, 2½ to 3 inches across, white or pale yellow, smooth, not sticky, with adhering patches of the torn general veil.

The stem is slender, white, smooth, 2 to 4 inches high, with a strongly bulbous base. The volva is indicated merely by a deep groove at the top of the bulb. In the upper part is a thin ring, white above and yellowish below.

The gills are crowded, narrow, free from or just touching the stem, and are white, sometimes with a yellowish edge. The spores are white.

A. citrina is very common in autumn, on the ground in woods. It has long been said to be poisonous, but is now reported to have no ill effects. Experiments, however, are inadvisable owing to the ease with which it may be confused with *A. phalloides*.

POISONOUS

BULBOUS AMANITA OR FALSE DEATH CAP
(*Amanita citrina*)

POISONOUS

FLY AGARIC

(**Amanita muscaria**)

The name of this fungus alludes to the fact that a decoction of the fungus was at one time used as a fly poison. It is perhaps less likely to be eaten by adults than *A. phalloides*, on account of its colour and bitter taste.

The fungus is large, up to 8 or 9 inches high and the cap 6 to 8 inches across. When young the cap is rounded like a ball, but later it opens out and becomes flat or even slightly upturned. The cap is scarlet or orange-red, slimy, with a striate edge and is covered at first with whitish or yellowish raised patches or warts, the fragments of the volva. The stem is white or yellowish, firm, straight, often a little scaly. It is narrower at the top than below and at the bottom is a bulb-like swelling, encircled by a series of ridges which indicate the presence of a volva. The ring is white above and somewhat striate, yellowish underneath, soft, torn and hanging. The gills are white or cream, free from but just reaching the stem, crowded and rather thick. The spores are white. The flesh is white, but yellowish under the skin of the cap.

This brilliantly coloured and very decorative fungus is common in autumn under birches and pines, and in woods containing these trees. Eaten in small quantities it has an intoxicating effect, but larger doses are fatal.

POISONOUS

FLY AGARIC (*Amanita muscaria*)

PANTHER CAP OR FALSE BLUSHER

(**Amanita pantherina**)

This fungus is less common than other species of *Amanita* depicted. It is shown, however, because it may easily be mistaken for the harmless Blusher (*Amanita rubescens*). In general appearance it is similar, but it never shows any reddish colour in the flesh of either cap or stem.

The cap of *A. pantherina* is 3 or 4 inches across, and flattened when fully expanded. It is dull brown or brownish-grey in colour with fine lines or grooves all round the edge, is slimy when moist and is covered with small white patches, the fragments of the torn general veil. The stem is white, swollen at the bottom, and the volva is represented only by two or three encircling ridges at the top of the swelling. The ring is found towards the middle of the stem, not in the upper part as in the Blusher; it is white, thin, and soon hangs downwards. The gills are white, rather crowded, and in the young state touch the stem, but soon become free from it and sometimes leave an imprint of fine lines at the top of the stem. The ring also may be marked with similar lines. The spores are white. The flesh is white and does not change colour when cut. It may have an unpleasant, sickly smell, like that of the Death Cap.

The Panther Cap is to be found in autumn, growing in woods and on heaths.

POISONOUS

PANTHER CAP OR FALSE BLUSHER
(*Amanita pantherina*)

POISONOUS

CRESTED LEPIOTA

(**Lepiota cristata**)

This is a small, fragile fungus, usually not more than 2 inches across.

The cap is first rounded, then more or less parasol-shaped, with a slight boss in the middle. It is creamy-white and covered with numerous small, reddish-brown scales, especially towards the centre ; the boss is smooth and brown. The stem is slender, 1–2 inches high and about $\frac{1}{4}$-inch thick, fairly even or slightly wider at the bottom, smooth and silky, at first white but eventually tinged with pale reddish-brown below the ring. The ring is white, thin, narrow, and soon disappears. The gills are white or cream, very crowded, and free from the stem. The spores are white. The flesh of the cap is very thin and white ; in the stem it is also white, but may become reddish-brown below with age. There is often a strong smell of radish.

Lepiota cristata is very common in late summer and autumn, growing in grassy places in woods and sometimes on garden beds. This and other small species of *Lepiota* are regarded with suspicion and should be avoided. The large and easily recognized Lepiotas already described (*L. procera* and *L. rhacodes*) are the only safe forms for experiment by beginners.

POISONOUS

CRESTED LEPIOTA (*Lepiota cristata*)

POISONOUS

LIVID ENTOLOMA

(**Entoloma lividum**)

This fungus also is not very common, but it is figured here because it is one of the most poisonous species, and also because it serves to represent the pink-spored group of Agarics. The name refers to the colour of the cap, which is of a dull, rather dirty yellow (" sallow," or perhaps " jaundiced," might describe it).

The cap is thick and fleshy, from 2 to 5 inches across, or sometimes more. At first it is rounded, but later opens out and becomes more flattened, with a slightly conical boss in the middle and a wavy, uneven, and at first inrolled edge. The skin is smooth, but with fine radiating fibrils when examined with a magnifying glass, and it cannot be easily peeled off. The stem is white and rather stout, often thicker below than above ; it is smooth and becomes more or less hollow and brittle ; there is neither ring nor volva. The gills are at first white but of a dirty pink shade when mature ; they are broad, somewhat crowded, and though at first touching the stem at length become almost free. The spores are pinkish and give a dull pink spore-print. The flesh is white, and when young the fungus has an odour which is described as like that of new meal.

Entoloma lividum is to be found in woods, under trees such as beech, oak, etc., in summer and early autumn, sometimes in large groups or forming rings. The distinctly pink gills serve to distinguish it from Blewits or St. George's Mushroom, with which it might be confused, and the absence of a ring on the stem, as well as the colour, from young specimens of the common mushroom or its allies.

POISONOUS

LIVID ENTOLOMA (*Entoloma lividum*)

POISONOUS

RED-STAINING INOCYBE

(Inocybe Patouillardii)

Though not usually very common, this fungus appears to be abundant in the South in some seasons. It is difficult to know for what edible species it is mistaken, but it has been eaten both in this country and abroad, with fatal results.

The fungus is pure white and silky at first, but with age or on handling it becomes stained with bright, sealing-wax red, a character which should at once distinguish it from any of the good, edible species. The cap is fleshy, from 1 to 2½ inches across, conical at first, then flattened but with a more or less prominent boss in the middle. The edge of the cap is often folded or lobed, giving a very irregular shape, and as the cap expands it may crack from the edge inwards. The surface is covered with radiating silky fibrils, is white at first, then cream or yellowish, and finally stained red.

The stem is fairly stout and usually narrower at the top and swollen below, somewhat mealy at the top, under the cap, white but eventually stained red, and solid. The gills are crowded, narrow, almost free from the stem, at first white, then brownish with an olive tinge, the extreme edge remaining white. The spores are yellow-brown, a spore-print being of the shade known to artists as "raw sienna."

The flesh is white, firm, and has a not unpleasant smell. When cut it does not change colour immediately, but slowly becomes red.

This fungus grows amongst grass in parks or woods, and is to be found in summer, especially after heavy rain.

POISONOUS

RED-STAINING INOCYBE (*Inocybe Patouillardii*)

POISONOUS

YELLOW-STAINING MUSHROOM

(**Psalliota xanthoderma**)

This fungus is similar in appearance to the Horse Mushroom, though somewhat smaller—very often not larger than the Field Mushroom. It should be carefully distinguished, because although not fatal, it is known to cause discomfort and illness in some persons. The essential character is the bright yellow stain which shows immediately when the skin of the cap is scratched or bruised, and in the flesh at the bottom of the stem when this is cut through.

The cap is at first shaped like a ball, but usually with a rather flattened top, and is pure white in colour and rather silky. Later, as it expands, it becomes more cream-coloured, and there are varieties in which the centre of the cap is covered with small dark-brown scales. The skin stains bright yellow when bruised, especially in moist weather. The stem is white, smooth, with a rather delicate ring in the upper part, and usually a swollen base. The gills are white at first, then slightly pinkish, though never bright pink as in the Common Mushroom, and finally with a greyish or violet tinge. The spores are purplish-brown. The flesh is white and unchangeable except in the swollen base of the stem, where it turns immediately bright yellow when cut. Both the smell and taste of this fungus are rather strong and unpleasant.

The Yellow-staining Mushroom is not uncommon in woods, pastures and hedgerows, in summer and autumn. In some seasons it may occur in large numbers. There are varieties occurring especially in woods, in which the cap is more or less covered with dark scales and dark brown in the centre. The white flesh with yellow tints at the base of the stem and complete absence of any red colour distinguishes these from other brownish species.

POISONOUS

YELLOW-STAINING MUSHROOM (*Psalliota xanthoderma*)

POISONOUS

VERDIGRIS AGARIC

(**Stropharia aeruginosa**)

This fungus when young is of a beautiful bluish-green colour, owing to a covering of azure-blue slime, and has scattered white scales round the edge of the cap. Later, as the slime is washed away, the colour changes to a pale yellow.

The cap is at first rounded or bell-shaped, then more flattened, but with a boss in the middle ; it is from 1 to 3 inches across. The stem is slender, 1½ to 4 inches long, of the same verdigris colour, and has a small ring near the upper part ; below the ring it is covered with whitish, quickly-disappearing scales, while above the ring it is smooth and paler in colour. The gills are blackish-purple, with white edge, and adnate to the stem. The spores are purple-brown. The flesh is soft and whitish, with a slight smell of radish.

This fungus is common in autumn on the ground in damp woods or in grassy places. In wet seasons it may occur as early as July. It has usually been regarded as poisonous by English writers, though one Continental writer states that it is edible. It is not recommended.

POISONOUS

VERDIGRIS AGARIC (*Stropharia aeruginoso*)

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