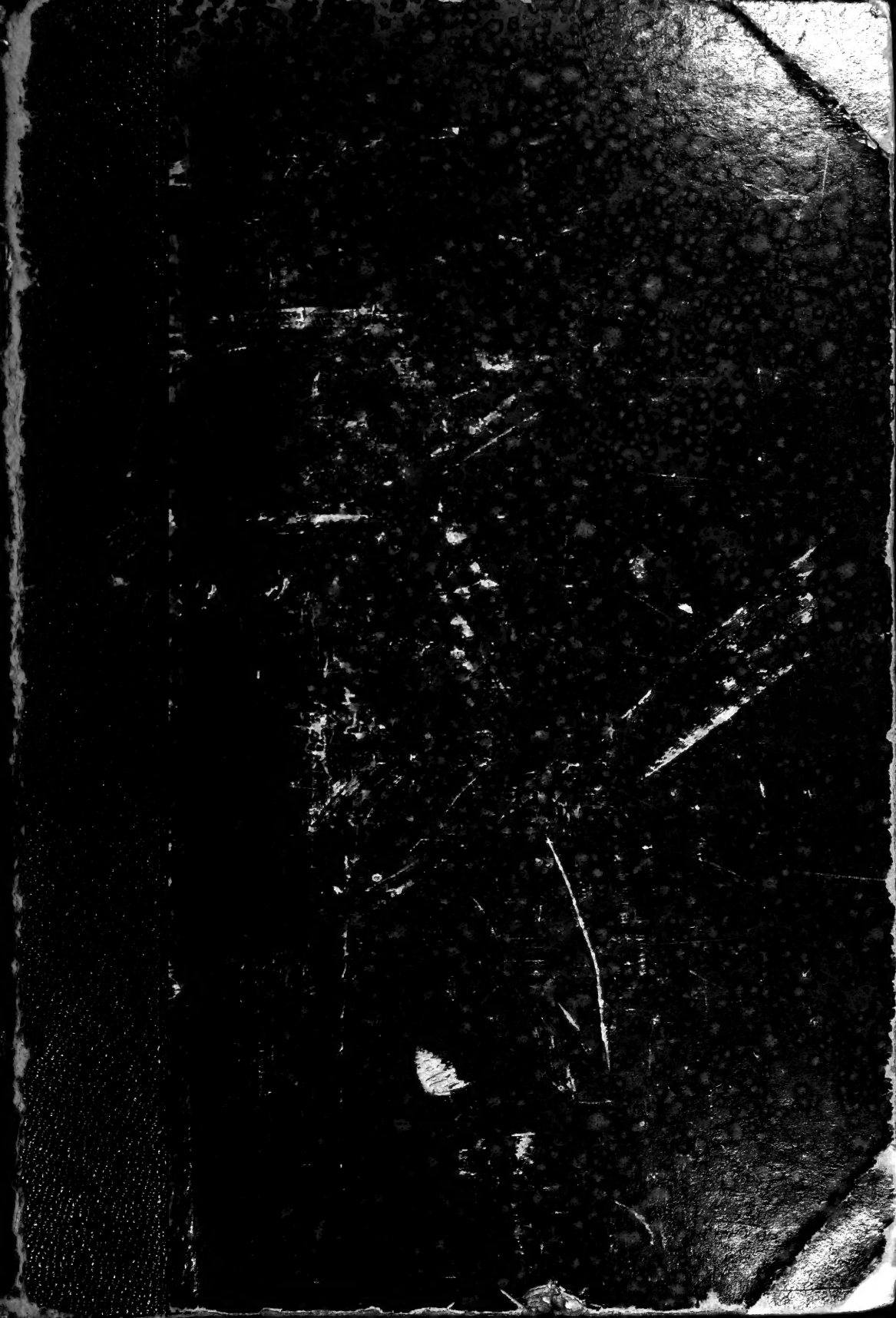

Mycological Bulletin

VOLUMES 1-VI

W. A. KELLERMAN.

CORRECTIONS.

Fig. 42 (p. 37). Pa′-nus dor-sa′-lis should be changed to Clau′-do-pus nid′-u-lans.

Fig. 82 (p. 99). Correct spelling to Bo-try-o-spo′-ri-um pul′-chrum.

Fig. 159 (p. 20). Ge-as′-ter trip′-lex should be Ge-as′-ter min′-i-ma.

Fig. 191 (p. 244). Change Pan-ae′-o-lus cam-pan-u-la′-tus to Stro-pha′-ri-a sem-i-glo-bo′-sa.

Ohio Mycological Bulletin

(Nos. 1 to 12)

VOLUME I

1903

W. A. KELLERMAN, Ph. D.
Ohio State University

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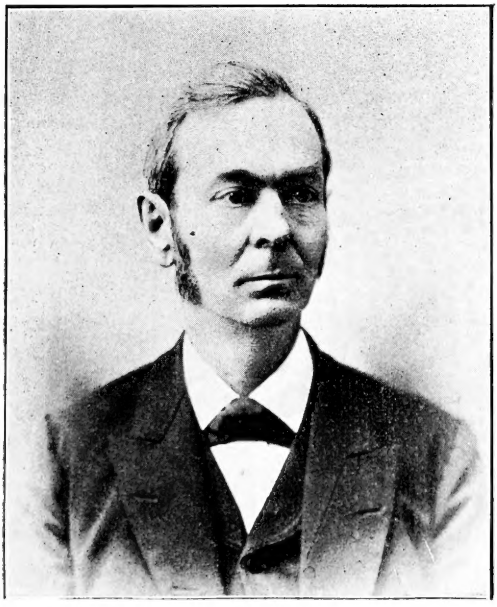

PROFESSOR CHARLES H. PECK,
State Botanist of New York, and eminent American Mycologist.

Ohio Mycological Bulletin No. 1

W. A. Kellerman, Ph.D., Ohio State University,

Columbus, Ohio, March 7, 1903.

INTRODUCTORY. — Many of the Mushrooms, Toadstools, Morels, Puffballs, Coral-fungi, etc., are conspicuous objects. Others are more retiring, often very small, and seen only when search is made. It is not until one heeds the various forms, seeks out and enumerates the kinds, that it is realized what a large number may occur in a small area of favorable country.

Not the least interesting fact in connection with these curious, often beautiful plants, is that they are mostly edible, palatable, even delicious. A few kinds however are poisonous. It is interesting to study these attractive plants; it is really necessary to do so if one wishes to use the edible and avoid the poisonous kinds. To introduce this study and to aid those who have already begun is the purpose of the OHIO MYCOLOGICAL BULLETIN.

Those who are willing to join in this work, who have sufficient interest in the Toadstools and Mushrooms to wish to know more about them, who may desire perhaps now and then to send specimens, or who wish the BULLETIN — which will be issued from time to time — will be enrolled as members of the OHIO MYCOLOGICAL CLUB. Fee, 10 cents.

WORDS EXPLAINED. — The word fun'-gus (pronounce the second syllable as in the word "bo-gus") is used to indicate any of the kinds mentioned above; in fact *fungi* (pronounced fun'-ji, the *i* is long) include all these and other species also, as the Moulds, Mildews, Rusts, Smuts, Peach-curl, Apple-scab, Bacteria, etc. We will generally use the word fun-gus (pl. fun-gi) but the reader may say, if preferred, Mushrooms and Toadstools. Do not imagine that only the kinds good to eat are *Mushrooms*, and the bad species *Toadstools* — though some people try to use the words in this way only; the two words may be used interchangeably and properly signify one and the same thing. The Mushrooms or Toadstools with various other conspicuous species are called the HIGHER FUNGI; this is by way of contrast to the less conspicuous, often microscopic forms, as Moulds, Bacteria, Leaf-spot fungi, etc.

KINDS OR GROUPS OF FUNGI. — Collect some fun-gi (or Mushrooms) and after carefully inspecting them decide to which of the following group each belongs; (take several similar lessons for practice).

1. GILL-FUNGI (the botanical name is A-gar-i-ca'-ce-ae) — having flat plates called la-mel-lae or gills, as in figure 1.
2. PORE-FUNGI (or Pol-y-po-ra'-ce-ae) — with pores in place of gills, as shown in figure 2.
3. SPINE-FUNGI (or Hyd-na'-ce-ae) — having soft spines instead of gills or pores; figure 3.
4. CORAL-FUNGI (Cla-var-i-a'-ce-ae) — branching or shrub-like in form, as shown in figure 4.

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5. CARRION-FUNGI (Phal-la'-ce-ae) — as represented in figure 5 and having a disgusting odor.
6. PUFF-BALLS (Ly-co-per-da'-ce-ae) — globular, oval, or pear-shaped, when old filled with powder (spores); figure 6.

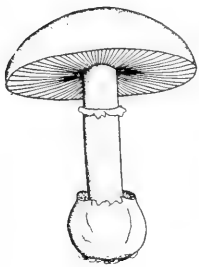

Fig. 1.
Gill-fungus.

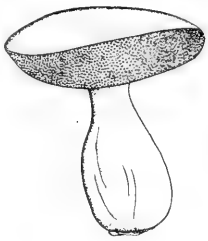

Fig. 2.
Pore-fungus.

Fig. 3.
Spine-fungus.

Fig 4.
Coral-fungus.

7. EARTH-STARS (Ly-co-per-da'-ce-ae) — these are peculiar small Puff-balls called *Ge'-as-ters*, which means Earth-stars, shown in figure 7.
8. CUP-FUNGI (Pe-zi-za'-ce-ae) — more or less cup-like in shape, usually small; shown in figure 8.
9. MO-RELS (Hel-vel-la'-ce-ae) — peculiar shape as shown in figure 9.

USEFUL BOOKS. — Three illustrated Manuals may be recommended to those who are old enough or have experience enough to use them to advantage. Of course everyone can profit by inspecting the excellent pictures even if the text seems too difficult.

The plainest and perhaps most usable Manual for beginners is Nina Marshall's *Mushroom Book*. Price $3.00. The size is 7 x 10 inches and one inch thick. Pages 167. It has an extended and fully illustrated key

Fig 8
Cup-fungus.

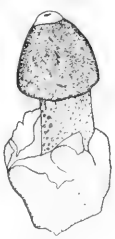

Fig. 5.
Carrion-fungus.

Fig. 9.
Morel.

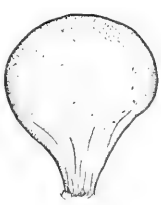

Fig. 6.
Puff-ball.

Fig. 7.
Earth-star.

for determining the families, genera and species. There are many full-page plates; some are half-tones; many colored plates.

Atkinson's *Mushrooms Edible and Poisonous* is an admirable book; written by a specialist yet may be used satisfactorily by the general student. The book is 6¼ x 9¼ inches, 1¼ inch thick. Pages 322. Price $3.00. Only a few of the plates are colored, but the numerous half-tones are fine. Some sample illustrations from this book will be shown in the next BULLETIN.

A larger and more expensive book is McIlvaine & Macadam's *One Thousand American Fungi;* everyone should have access to it. Price

$5.00. It is 7½ x 10½ inches, and 3 inches thick. Pages 729. There are figures of 278 species. Many of the plates are colored. This book especially (and indeed all of the above) should be purchased by your Public Library; and it is hoped too that many books will be ordered by the members of the Club.

It has been arranged to give the MEMBERS of the OHIO MYCOLOGICAL CLUB a considerable rebate on all or any one of the above, provided payment is sent to Mr. L. S. Wells, bookseller, Columbus, Ohio. He will deliver the books, prepaid, as follows: on the *Mushroom Book* ($3.00), a rebate of 20 cents; on *Mushrooms Edible and Poisonous* ($3.00), a rebate of 40 cents; and on *One Thousand American Fungi* ($5.00), a rebate of 20 cents.

SUGGESTIONS TO TEACHERS. — It is urged that every teacher of Botany devote *several lessons* at regular intervals in the course, to the MUSHROOMS. Have the pupils bring in ample quantity of all kinds that can be found — unfortunately they are not so abundant in early spring as later — and in the class room sketch the plants and name the parts; if feasible, use water-colors, and paint the figures true to nature; contrast the several species found, take full and neat notes including the exact habitats, it being desirable to state always the environment of the specimen — woods, grove, roadside, pasture, on wood, stump, rotten logs, in sandy or wet soil, in shade, etc. Then try to use the keys or apply the diagnoses that will be given in successive numbers of the BULLETIN or in available books. Discuss the mode of life. By this plan *real* botany is possible and worth the while! If any good paintings of Mushrooms are kindly sent to the State University, they will be gratefully received, and awarded a permanent place in the Botanical Department.

In case teachers wish to supply pupils with the BULLETINS for regular class work, it might be preferable to send the requisite number of copies in one package to the teacher's address instead of mailing them separately to the several pupils.

NATURE STUDY. — Those live teachers who are attempting to cultivate and strengthen the child-mind in its sympathy with nature, invoking her aid in their sacred charge, whether working in primary room or grammar grade, are invited to use the Ohio Mycological Bulletin, if perchance it may assist in such important work. The child will gladly study these interesting plants.

"And Nature, the old nurse, took
The child upon her knee,
Saying: 'Here is a story book
Thy Father has written for thee.'"

GILL-FUNGI. — These Mushrooms form an exceedingly large group. They are also called Ag'-ar-ics, an English word formed from A-gar'-i-cus which is the botanical (or Latin) name and the one used long ago for a genus (that is, a group of similar species). These Mushrooms bear "spores" on the surface of the gills. *Spores* might be called microscopic seeds; they are simpler in structure but correspond in function to seeds in the higher plants. Curiously enough when a sufficient quantity of the spores is accumulated so that the mass is visible, it is found that the color may be either *white*, *brown*, *rusty* (*or ochre-like*), *pink*, or *black*. We must determine the color of the spores in order to classify the kinds and to find the correct name in the books on Mushrooms. Therefore the necessary thing to do as soon as a fresh specimen is found, is to make a "spore-print," as the collected mass of spores is called. How to do this will be fully explained and illustrated in BULLETIN No. 2.

THE NEXT BULLETIN. — If prompt and generous support comes it will be possible to issue the second Bulletin soon. Your name in the list of MEMBERS of the OHIO MYCOLOGICAL CLUB will indicate that your fee (10 cents) has been received. Please advise others to join with us in this undertaking. Every one interested in the Mushrooms or other plants, or desirous of receiving the Bulletin, even if not residing in Ohio, is eligible to membership. You are invited to forward your name with accompanying fee of 10 cents. Do not fail to ask questions if any come to mind. Directions for collecting and studying will be given in future numbers, also illustrations and descriptions of various species, perhaps some keys for determining species, notes on cooking mushrooms, and many interesting mycological topics.

OTHER SPECIMENS. — It must not be supposed that, because special attention is called to Mushrooms, we are neglecting other groups of the Ohio plants. We desire to get Herbarium specimens of every species from every County in the State. We have a good representation from a few counties, a fair amount from many, but a very small number of specimens from the majority of Counties — though the State Herbarium now contains over 20,000 mounted sheets of the Vascular Cryptogams and Phanerogams alone. We want more Algae, Fungi, Lichens, Liverworts, and Mosses, as well as other plants.

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Ohio Mycological Bulletin No. 2

W. A. Kellerman, Ph.D., Ohio State University,

Columbus, Ohio, March 25, 1903.

FELICITATION. — The response to the proposition to form a Mycological Club has been most gratifying and several Bulletins can now be promised. Thanks are extended to the many professional botanists and eminent mycologists who have joined the enterprise. But it is noted also with special pleasure that some very young people and some very old people (old in years only, not in spirit and sympathy) are on the membership roll. The third Bulletin will give additional names of members; all can not be recorded in the present issue.

Promise is again renewed that the Bulletin will be true to its original purpose, namely, to try to help beginners, pupils, students, and amateurs; to aid in systematically observing and studying the Mushrooms, both for the pleasure of knowing more about our beautiful world, and for the purpose of enjoying the edible properties of the plants in question. I invite your assistance in still greatly extending the membership. The fee is only 10 cents, and this pays for all the Bulletins to be issued this season.

BOTANICAL NAMES. — Let beginners and those who have not studied botany, observe that in scientific language the principal name, or the name of the ge'-nus, is placed first, followed by the name of the species (kind). For example, we say Mor-chel'-la es-cu-len'-ta, Mor-chel'-la con'-i-ca, Mor-chel'-la an-gus'-ti-ceps, or Quer'-cus al'-ba, Quer'-cus ru'-bra, Quer'-cus vel-u-ti'-na, instead of Edible Morchella (or Edible Morel), Conical Morel, Narrow-head Morel, or White Oak, Red Oak, Black Oak.

They are as simple and as easily learned as the English or common names, and ought to be more generally used. The form of the word is Latin — which is the universal language among educated people. Many plant names in universal use are the Latin, latinized, or scientific names, as Geranium, Hydrangea, Phlox, Deut'-zi-a, Ge-as'-ter, Bo-vis'-ta; and some are the anglicised Latin names, as Rose, Saxifrage, Borage, Thyme, Mint, Ag'-ar-ic.

THE MORELS, HONEY-COMB FUNGI, OR MORCHELLAS.— It is proper to say Mor'-el, Mo-relle', or Mor-chel'-la (pron. mor-kel'-la). These are among the earliest mushrooms of the season and are so peculiar that no one could mistake them. Besides, all of them are delicious; none are injurious — I make this emphatic because some one recently said he thought one kind was poisonous. The figures on the following pages show the general appearance of the plants. They are reproduced by the kind permission of Professor Atkinson from his book on *Mushrooms Edible and Poisonous*, and are a fair sample of the numerous excellent figures in that book which I hope many will be able to get and use.

I propose that we make these fungi our first study of the season, so far as the members can take opportunity to observe them. Some botanists say there are many species (kinds) and call them by names, as given below; arranging them in two groups according to the mode of

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attachment of the top, or cap, to the stem. Cut vertically through the middle of the specimen and its structure will be plainly seen.

1. LOWER MARGIN OF CAP, OR PI'-LE-US, UNITED TO THE STEM.

Mor-chel'-la es-cu-len'-ta — with rounded or oval cap, or pi'-le-us.
Mor-chel'-la con'-i-ca — with conical cap.
Mor-chel'-la cras'-si-pes — like above but stem nearly as wide as cap.
Mor-chel'-la de-li-ci-o'-sa — cap cylindrical or oblong, plants usually small.
Mor-chel'-la an-gus'-ti-ceps — cap narrow, scarcely broader than stem.

2. LOWER MARGIN OF THE CAP FREE FROM THE STEM.

Mor-chel'-la sem-i-lib'-er-a — cap free from the stem to the middle.
Mor-chel'-la bi'-spo-ra — cap free from the stem to the top.
Mor-chel'-la punc'-ti-pes — stem with little scales or conical points.

Fig. 10. Mor-chel'-la es-cu-len'-ta or Common Mo-rel'. Edible. From Atkinson's *Mushrooms Edible and Poisonous.* (Figure copyright.)

Professor Morgan writes as follows in the Journal of Mycology, 8:49-50, June 1902: "With plentiful showers in the springtime the Morels grow abundantly in my vicinity. I have observed them critically for many years and have taken much pains to recognize as many as possible of the species that have been described. I invariably arrive at the same conclusion: that there are but two species. In the same spots the species vary much in form, size and color from year to year in accordance with the difference in warmth, sunshine and shower. . . . .

"My bundles of specimens gathered in different years bear a variety of labels as I look them over, but they are all assembled in my mind under two names: The first is MORCHELLA ESCULENTA, the second MORHELLA PATULA; in the first the pileus is wholly adnate to the apex of the stipe; in the second the lower part of the pileus is separate from the stipe."

As to *cooking,* my best adviser says; "Cook in the various ways in which you cook oysters."

Fig. 11. Mor-chel'-la con'-i-ca or Conical Mo-rel'. Edible. From Atkinson's *Mushrooms Edible and Poisonous.* (Figure copyright.)

HOW TO SEND SPECIMENS.— Pack snugly with abundant tissue paper or cotton in a pasteboard box of suitable size. By following the hint here given on the margin (folding on the dotted lines) a box may be made from stiff pasteboard in case an empty one is not at hand.

It should be filled completely and securely tied. Postage on dried plants is 1 ct. per oz.; on living plants, 1 ct. per 2 oz. Put no writing on the inside, but numbers, names, dates, localities, or the usual data on botanical labels, are permissible. The name of the sender and postoffice should always be written on the cover.

Specimens should always be numbered. If your first package contains specimens 1, 2, 3, then number the specimens in the next sending 4, 5, etc. Never duplicate the former numbers and there will be no confusion in discussing the specimens.

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Ohio Mycological Bulletin No. 3

W. A. Kellerman, Ph.D., Ohio State University,

Columbus, Ohio, April 18, 1903.

EDITOR'S NOTE. — Grateful acknowledgement is again made for the hearty co-operation in extending the membership of the the OHIO MYCOLOGICAL CLUB; for the interest manifested in the BULLETIN; the correspondence already elicited in connection with fungi, interesting, edible or otherwise; and the specimens sent for illustration of observations made, or for inspection. Some of the correspondence and interesting notes will appear from time to time in the Bulletin. This is a phase of the work not particularly mentioned hertofore, yet it is hoped that it will prove very interesting and profitable.

I desire to say that receipt of Bulletins, subsequent to No. 1, indicates that you or some friend has paid the fee of 10 cents. The Bulletins will be mailed to *no one unless this amount has been paid.* From time to time the additions to the membership roll will be printed. Very frequently it will be several days, may be five to ten, before Bulletins can conveniently be sent after the request has been received. It is hoped that the number of mistakes on our part will be reduced to a minimum; please remind us at once if delinquency occurs.

SOME STUDY NECESSARY. — One can not positively know the kinds of mushrooms without some close scrutiny or careful study. There are so many kinds, and often they differ so little from each other, that thorough acquaintance is indispensable to a correct judgment in regard to them. No friend or instructor can enumerate the points for you, so that off-hand you may then certainly know the mushrooms and safely separate the good from the bad. But by carefully noting all the characters of any species that you may find—color, texture, size, shape, and other points of its structure, where it grows, any peculiarities in its mode of development; then studying another kind in the same manner; you will during the season learn really to know quite a number of species. If this plan is continued from year to year you ought to become acquainted with all the conspicuous kinds that occur in your neighborhood, and know them better than many botanists do. If an attempt is made to record observations and make sketches (perhaps using water colors), much more pleasure and profit will be realized. Some hints or directions will be given in the next Bulletin.

PARTS OF A MUSHROOM. — With specimens before you proceed with a methodical inspection, using the accompanying illustration (Fig. 12), to learn the names of the parts.

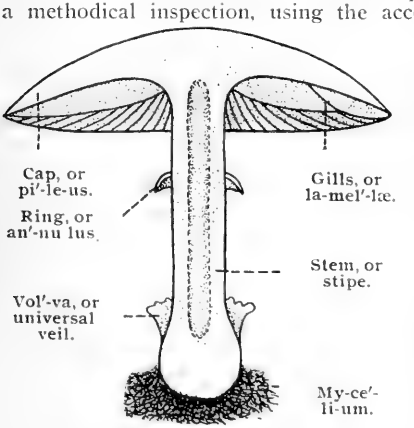

Fig. 12. Diagram showing parts of a Toadstool.

Cap, or pi'-le-us — This is the upper portion, more or less expanded, usually regular in shape, but sometimes various; its purpose is to bear the *spores*, or microscopic bodies for reproducing the species, comparable therefore in function to seeds of our common plants.

Gills, or la-mel'-lae.—These are the thin plates on the under side of the cap, differing in shape, mode of attachment, color and consistency in different species. In the Pore Fungi and in the Spine Fungi they are replaced by pores and soft spines respectively. On the surface of the gills, the tubes, and the spines the spores are produced.

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Stem or Stipe. — This varies in length, shape, diameter, color, etc., in the different species; it may be solid and firm, or the interior may be soft, or almost hollow being occupied by a very loose tissue (when it is said to be "stuffed"). The stem may be attached to the middle of the cap, or near one side; in some species it is entirely absent.

Ring or an'-nu-lus.— When the mushroom is in an early stage of development the gills are close to the stem, and a membrane or veil is continuous over the cap, uniting it with the stem. The remains of this *"partial veil,"* as it is called may be seen in some of the species in the form of a collar around the stem, and it is called the *ring or an'-nu-lus.*

Vol'-va. — In some species, especially the Volvarias and the Amanitas (which include poisonous species), there is a "universal veil," as it is called, or *vol'-va,* that encloses the young stem and cap; but these push up breaking through the top as they develop. The volva may then be found as a cup-like portion at the base when the mushroom is carefully dug up, but it is not always conspicuous.

My-ce'-li um (pron. mi-se'-li-um). — The mass of whitish threads that attach the Mushroom to the soil or rotten wood, etc., is called the my-ce'-li-um. It is the vegetative part of the plant, i. e., these threads take up the nourishment from the decaying organic matter on which this group of plants (the fun-gi) feed.

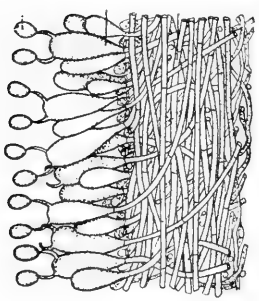

Fig. 14.

Fig. 13.

Fig. 13. Gill slightly magnified.
Fig. 14. Portion of gill highly magnified.

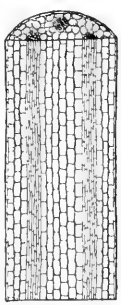

Fig. 15.

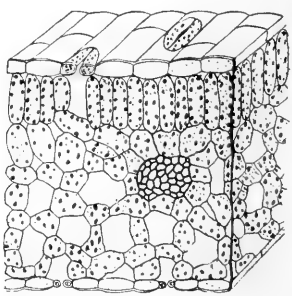

Fig. 16.

Fig. 15. Section of a stem showing cellular structure.
Fig. 16. Section of a leaf showing cellular structure.

Structure of a Mushroom. — For pupils in schools or others who have a large microscope at hand, and to satisfy older people who want to know, let me say that with the aid of figures 13 and 14 some idea of the minute structure of Mushrooms may be obtained. The whole mass is made up of tiny tubes, elongated *cells* the botanist calls them. In these is the clear, slightly granular, semi-fluid *living substance* which is known by the name of *pro'-to-plasm.* The fact that this is the substance in which the life processes are manifest makes its structure and behavior of the most thrilling interest to the real student.

All *plants* have essentially this same minute structure — but usually the *cells* are very slightly elongated or even globular though many sided from mutual pressure. To make this matter clearer two figures are here introduced to show cells from a stem (Fig. 15) and from a leaf (Fig. 16). Within the cell wall (which is made up of a substance that the chemists call cel'-lu-lose) may be seen living, working, growing substance, namely the pro'-to-plasm. Some vegetable cells (and all cells in the animal tissues.), have no cellulose walls.

If you woud know how *spores are borne,* and desire to know the language that botanists use in describing these structures, consult figure 13 which shows a section though a gill moderately magnified, and figue 14 which shows a small portion of the surface layer of the gill highly magnified, showing the spores.

The *spores are thrown* down when ripe — so it is possible to obtain a *"spore print;"* it is desirable to have a quantiy of the spores in order also to determine their *color.* Hence observe the next paragraph.

Spore-Print. — To determine the color of the spores in any of the Gill-Fungi, select a specimen that is not too old; it is best if it has just

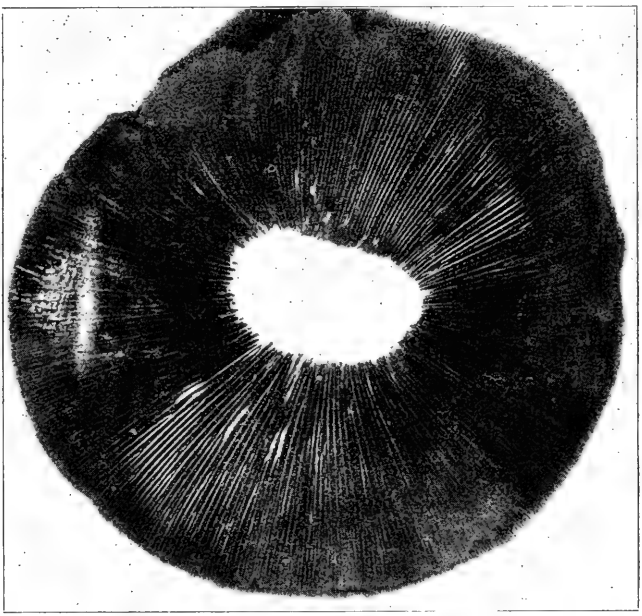

Fig. 17. Spore Print. From Atkinson's Mushrooms Edible and Poisonous.

expanded so as to expose the gills. Remove the stem close to the cap, or umbrella-like top, that bears the gills, and place it gill-side down on a sheet of paper, leaving it several hours or over night. Radiating lines of spores will be thrown down on the paper — having the appearance shown in the adjoining figure (17). It is best to catch spores on both white paper and black or dark-colored paper; spores if they happen to be white can scarcely be seen on white paper.

Fig. 18. Delicious Morel. Mor-chel'-la de-li-ci-o'-sa. Edible. From the Nina Marshall Mushroom Book, by kindness of publishers, Doubleday, Page & Co.

Morels.—Thanks are extended to members who have kindly sent specimens of Morels; they were, all the common kind that may be called Morchel'-la es-cu-len'-ta. It is hoped that some one will find specimens of M. semi-i-lib'-er-a and M. bi'-spo-ra. An additional figure is presented, and credit given under the same.

From Correspondents.—Mr. E. V. Louth reports for Ashtabula: "Morchella conica as a variety, usually in solid soil; M. esculenta in more open places in loose soil; M. semilibera, found quite often has when cooked a somewhat astringent taste and not juicy; M. bispora found twice, also a freak, with button top, smooth and mellow." "Mr. Wm. H. Spencer says fishermen bring to the market in Sandusky, Morels which they collect on Cedar Point, edge of vegetation in sand close to the Lake Erie Beach;" this is an unusual and interesting locality for this species.

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Ohio Mycological Bulletin No. 4

W. A. Kellerman, Ph.D., Ohio State University,

Columbus, Ohio, May 12, 1903.

ACKNOWLEDGEMENTS. — The still growing membership roll is very gratifying, and hearty thanks are extended to all who have taken such kindly interest in the matter. I am indebted to many persons for charming specimens; those sent in by the Helmick boys furnishing the photographs for one of the cuts of Pe-zi'-za re-tic-u-la'-ta, — the other cut of this species being the specimens collected by E. A. Sanders. Prof. Schaffner and Assistant Jennings collected the little Mor-chel'-las shown on this page. Messrs. Jennings and Sanders brought the fine large Helvel'-las, that is to say Gy-ro-mi'-tra brun'-ne-a, from which the cut of reduced figures given on page 16 was prepared.

Fig. 19. Mor-chel'-la sem-i-lib'-er-a. Free-cap Morel. Edible. Plants shown the natural size.

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Mycological Exhibition. — Friday afternoon, May 22, from 2 to 5 o'clock, there will be an Exhibition of Mushrooms in the lecture room of the Botanical Building, Ohio State University, to which the public is cordially invited. A short lecture will be given to amateurs at 4 o'clock. Members of the Ohio Mycological Club living at, or not too distant from Columbus, are cordially invited to attend, but this notice is given to all readers of this Bulletin as a suggestion, which perhaps in some cases might be carried out by members in their own communities. If one or two undertake an exhibition, at some stated time, of what might be found in their region, cordial assistance doubtless would be given by the teachers of the public schools, many pupils and other enthusiasts.

If there is a local Horticultural Society, Farmers' Club, or Floricultural Association, such an organization might lend assistance or even take the initiative in such an exhibition. Increasing the interest in Mycology and disseminating information leading to more extended study and wider use of Mushrooms, would certainly be some of the valuable results of such an undertaking.

It would perhaps also be an opportune time to make the *Bulletin* known to others, "price 10 cents," through the kind efforts of present members. Moreover the request is made that as far as convenient some specimens of Mushrooms be sent for the May 22d exhibition at Columbus, for which the editor extends thanks in advance to any contributing members.

The Free-Cap Mo-rel'.— The Morel shown in fig. 19 is called Mor-chel'-la sem-i-lib'er-a — the second, or specific name suggesting its distinguishing character, namely, that the *lower portion of the cap is free from the stem.*

In the common Morels, those forms called by botanists Mor-chel'-la es-cu-len'-ta, Mor-chel'-la con'-i-ca and Mor-chel'-la de-li-ci-o'-sa, (shown in figs. 10, 11 and 18), also Mor-chel'-la cras'-si-pes (which is much like the foregoing, but the cap is equal in width to, or scarcely broader than the granular irregularly furrowed stem — *cras'-sus* meaning broad), the cap is *ad'-nate*, that is wholly attached to the stem, therefore not having a free margin below; in other words the cap is bell-shaped.

A form from Michigan recently described by Prof. Peck, called Mor-

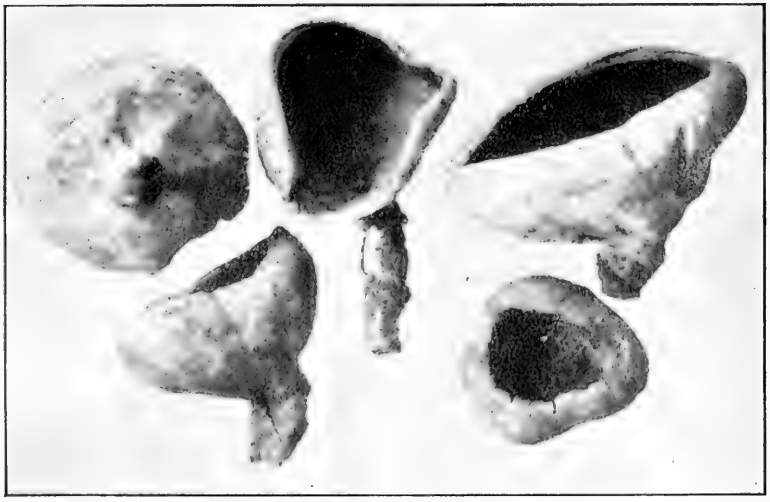

Fig. 20. Pe-zi'-za re-tic-u-la'-ta. Reticulate Peziza. Edible. Nearly the natural size. Same species as shown in Fig. 21.

chel'-la punc'-ti-pes (the Latin word *pes* means foot or stem), much like the Free-cap shown in fig. 19, is said to have a squam'-u-lose stem, *i. e.* covered by little scale-like bodies or points. Then another free-cap form is the Mor-chel'-la bis'-po-ra — which would require the use of a microscope for positive identification, since its spores are two in a sac instead of eight as in all other forms.

The Sem-i-lib'-er-a Morel is small, and while edible is not to be compared with the larger tender forms as the M. esculenta, M. crassipes, and M. conica.

Pe-zi'-za Family. — This group is called Pe-zi-za'-ce-ae by the botanists, and for a distinctive common name we will say Pe-zi'-zas. It is a large group but well illustrated by figs. 20 and 21, which show that the form is in general cup or saucer shaped. The hy-me'-ni-al layer — *i. e.* the layer which bears the spores — is the more or less colored portion lining the cup within.

In Pe-zi'-za re-tic-u-la'-ta the color within is brown and the general form may be as regular as those shown in fig. 20, but often they are not so uniform in size and very irregular in shape; Fig. 21 shows such common forms of the same species. Dr. E. J. Durand says that he received a specimen from Illinois that was 15cm. broad (6 inches).

The Pe-zi'-zas are very satisfactory for table use but can hardly be placed on a par with the Morels and Helvellas. The young fresh specimens only ought to be used.

Hel-vel'-la Family. — This group, called in botanical language Hel-vel-la'-ce-ae, contains such striking forms as the Morels, already figured in Bulletin No. 3, and again on page 13; also other species of which those called Gy-ro-mi'-tra are at once to be recognized from the figure herewith given (Fig. 22). The cap which is covered by the hymenial, or spore-bearing layer, is of peculiar lobed or irregular form, the surface covered with gyrose wrinkles, whereas the Morchellas have pits formed by longitudinal and transverse wrinkles. The Gy-ro-mi'-tra brun'-ne-a shown in Fig. 22 has a cap of red-orange color, 3d shade, of Prang's system. It is quite variable in form as the illustration shows. No edible fungus perhaps is superior to this. It may be searched for in such localities as produce the Morels — where there are decaying logs and stumps, and the soil is rich in such organic matter.

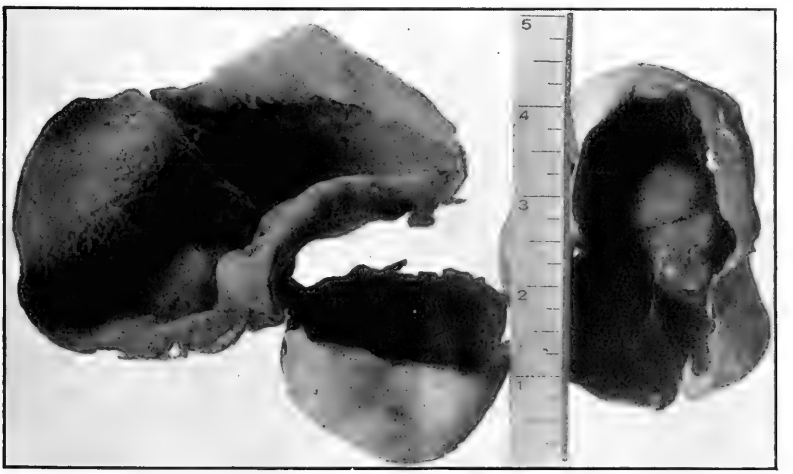

Fig. 21. Pe-zi'-za re-tic-u-la'-ta. Reticulate Peziza. Edible. Typical form of the species; the scale represents inches.

Fig. 22. Gy-ro-mi'-tra brun'-ne-a. Gyromitra or Helvella. Edible. One-quarter to one-half natural size.

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Ohio Mycological Bulletin No. 5

W. A. Kellerman, Ph.D., Ohio State University,

Columbus, Ohio, June 12, 1903.

SPECIMENS — Many interesting Mushrooms have been brought to our notice and thanks are extended to those who have sent specimens. It must be said, by way of suggestion, that in some cases insufficient care is taken to get complete specimens. They ought never to be broken off leaving half the stem, nor even severed at the surface of the soil or substratum on which they grow; the underground or concealed portion should also be carefully secured. This often affords indispensable characters for correct identification, especially so when the presence or absence of a volva is to be determined. For study a large number of specimens are needed; they should illustrate all the characters that the species shows in its different stages of development of the fruit — fruit I say because the so-called Mushrooms and Toadstools are only the *fruiting* stage of the plant, the vegetative portion being the (whitish and mostly concealed) mass of threads called *my-ce-li-um.*

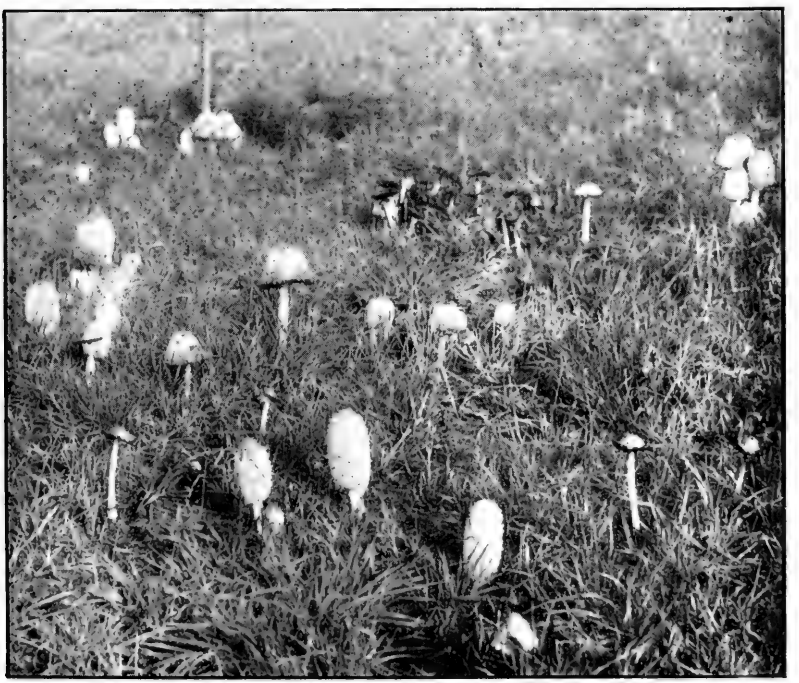
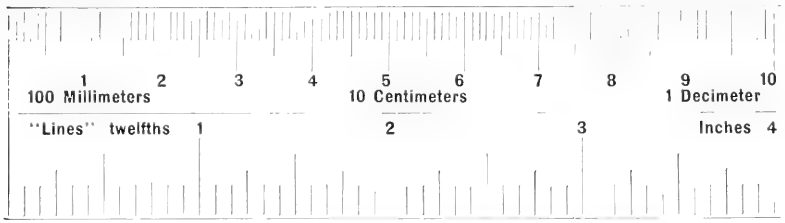


Fig. 23. Co-pri'-nus co-ma'-tus. Shaggy-mane. Edible. Belongs to the black-spored Gill-fungi. The gills and cap dissolve into an inky fluid at maturity. Various stages shown in the illustration. From photo by Prof. Schaffner.

Entered as Second Class Matter, Post-office at Columbus, O.

THE EXPERIMENT SUCCESSFUL — Notwithstanding protracted dry weather a fairly satisfactory Mushroom exhibition was realized May 22 as per previous notice. About sixty species were shown, perhaps half of them fresh; many of these being edible kinds. With the numerous class charts and colored plates used in the regular college work, an exhibit was made that seemed to be very satisfactory to the large crowd of visitors. Repetition when weather is not adverse may be expected.



Scale for convenient measurement.

PUFF-BALL FAMILY — The name for this group is *Ly-co-per-da'-ce-ae;* which is formed from *Ly-co-per'-don*, the name of one of the genera. Puff-balls are familiar objects, and numerous species are to be found in every locality. They are edible when young and fresh, though only the larger kinds would be used. Fig. 24 shows the Giant Puff-Ball growing in a grassy plot, from a photograph taken by Prof. Schaffner. The myriads of spores escape as a cloud when the plant is ready to be stepped on. When slicing the peeled specimen for table use the flesh should be white; if dark or changing from the white color it must be discarded.

Fig. 24. Bo-vis'-ta gi-gan-te'-a. Giant Puff-ball. (By various authors it is also called Ly-co-per'-don, or Cal-va'-ti-a.) Very large, 8 or 10 to even 20 inches in diameter, weighing several pounds, depressed-globose, white or whitish, becoming discolored with age. Edible when young.

A NOTE FOR STUDENTS — Space precludes the possibility of giving here directions for exhaustive study of the fleshy fungi (A-gar-i-cá-ce-ae); therefore a separate slip has been prepared for systematic study and record of the characters of these plants. A package stapled to a stiff back for convenient field use will be sent to those who furnish address, with five cents, or two two-cent stamps. A sample for inspection may be obtained upon request accompanied by a 1-cent stamp.

A GOOD PLACE FOR MUSHROOMS — At Sandusky, Ohio, there is a lot, several acres in extent, the former site of a cooperage plant, largely recovered from Sandusky Bay by filling up with saw-dust and lumber-waste such as small pieces of slabs, sticks and bark. This wooden soil is several feet thick and all the time moist below the surface. Therefore it is an excellent place for the plants in which we are interested. Wm. H. Spencer tells me that last year he collected here "forty-three varieties, mostly Agaricaceae, one Clavariaceae, two Phallaceae, several Lycoperdaceae and Polyporaceae."

Those are fortunate who have such a variety of favorable localities as in the region of Sandusky. Cedar Point is not to be forgotten in this connection. It is a narrow, wooded sand-spit about seven miles long, the famous pleasure resort located near the northwest end, Southeast from this place, one mile, is located the fine Lake Laboratory, just completed, where a summer school in Botany (and Zoology) is carried on by the Ohio State University. It may not be amiss to state that courses of instruction in Mushrooms and other groups of plants are this season offered to the choice of everybody, the work beginning June 29th and continuing six weeks. Anyone interested should write to the Ohio State University for the Circular which gives details of this Biological Laboratory, the courses of study, the charge for tuition, etc.

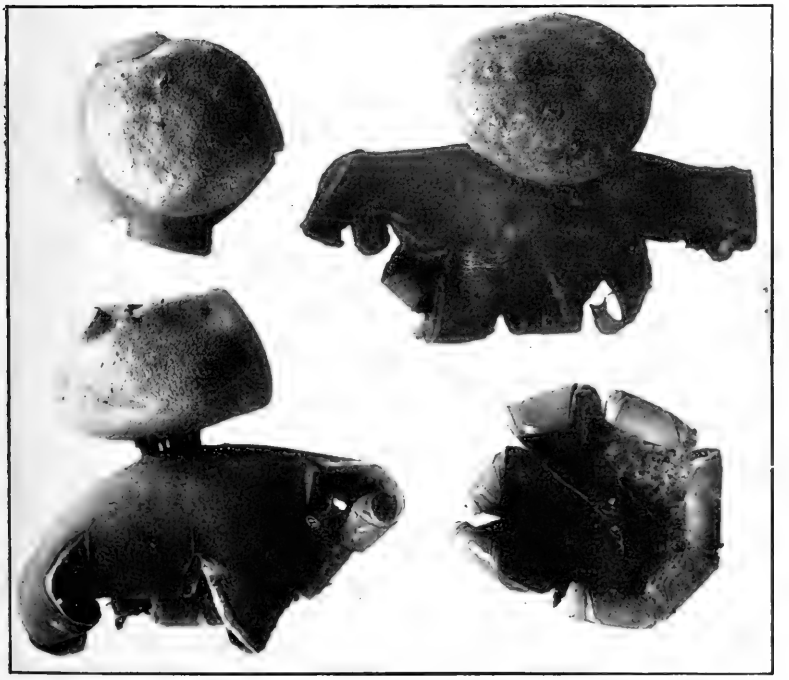


Fig. 25. Myr-i-o-sto'-ma col-i-for'-mis. Pepper-box Earth-star. Differs from the common Earth-star (Ge-as'-ter) in having several openings through the upper portion of the inner wall for the escape of the spores. Rarer than the Geasters; the latter have but one mouth at apex. (Greek words—*Myrioi* means many, and *stoma* signifies mouth.)

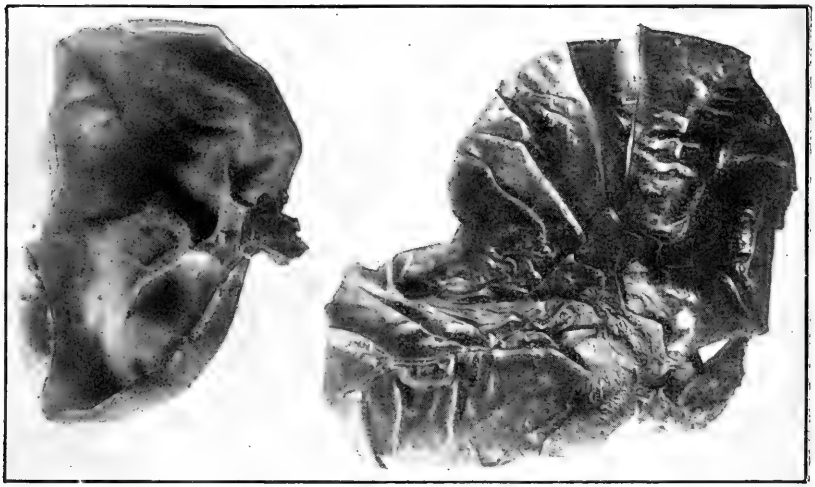


Fig. 26. Hir-ne-o'-la au-ric'-u-la-ju'-dae. Jew's Ear. Belongs to the Trembling Fungi, or *Tre-mel-la'-ce-ae*, so-called because of their gelatinous consistency. They shrivel when dry, reviving when moistened. The Jew's Ear is rather common, brown or blackish, fuzzy-hairy, but not so tender and palatable as several other species of this group.

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Ohio Mycological Bulletin No. 6

W. A. Kellerman, Ph.D., Ohio State University,

Columbus, Ohio, June 24, 1903.

CONFIDENTIAL — Again it must be said that the interest in Mushrooms and the Bulletin is most gratifying. The membership in the club now has passed beyond 600. If advertisement were resorted to, the number joining in the work would doubtless mount immediately to a thousand or more — but I prefer to leave the matter of expansion in the hands of my enthusiastic members.

Fig. 27. Mor-chel'-la an-gus'-ti-ceps. Narrow-head Morel. Edible. From B. O. Longyear's Mich. Exp. Sta. Bulletin on Mushrooms.

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It was thought at first that say one Bulletin a month for a part of the season might be issued; then the matter of expense would cut but a small figure. The cordial sympathy and encouragement of so many persons, eminent mycologists, professors, high-school teachers, amateurs and lovers of nature generally, have seemed to make it desirable to issue the Bulletin oftener and thus bring to the notice and assistance of all parties interested, many illustrations of our abundant and varied Mushroom flora.

Fig. 23. A-gar'-i-cus rod-man'-i. Rodman's Mushrooms. Edible. Photo from specimens collected at Columbus, O. Closely related to the Common Mushroom (A. compestris,; but the stem is very short, and the annulus is very thick and double; the pileus is rounded then convex.

But to do this requires the expenditure of a larger amount of cash than most persons would suppose. Those having experience in matters pertaining to printing and engraving can readily understand that not half the cash expense is covered by subscriptions received for the Bulletin. Yet I have no intention of placing the fee higher than ten cents; this all can pay without embarrassment, and it is entirely satisfactory to me.

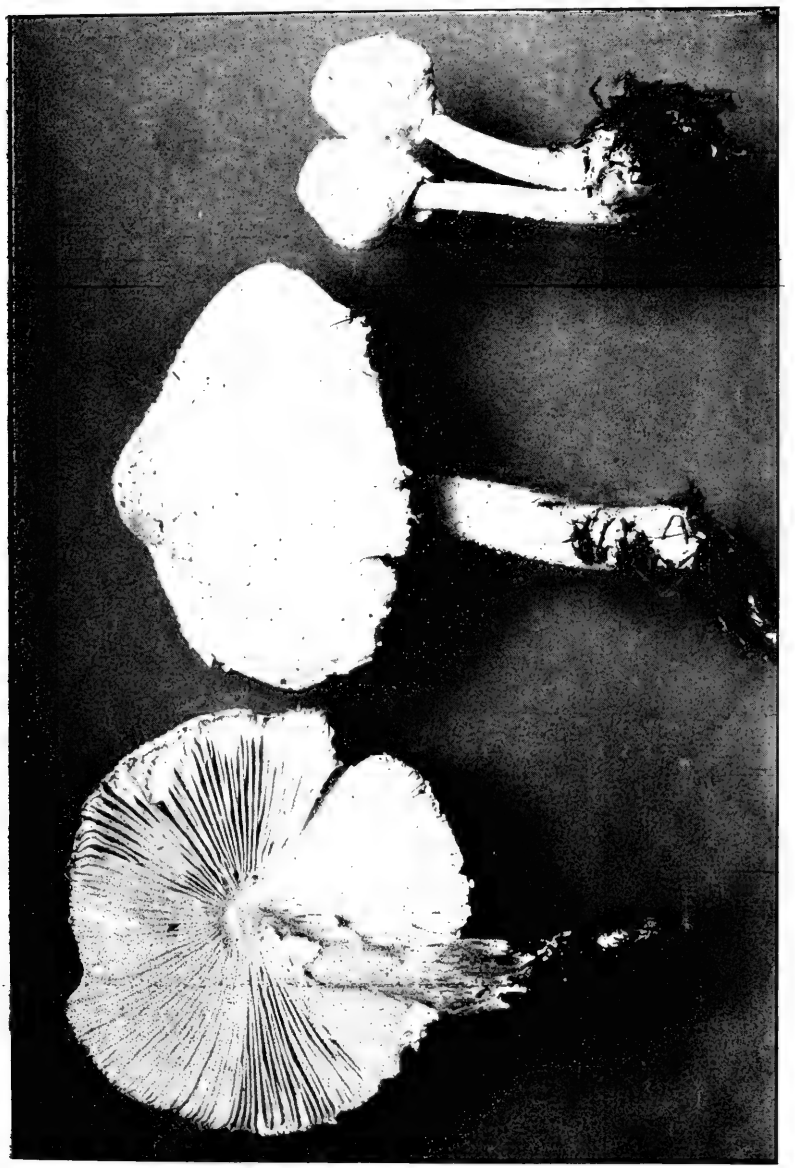

Fig. 29. Lep-i-o'ta cepes'ti-pes. Onion-stemmed Agaric. Edible. Photo by Professor Beardslee who says: "it was made from plates collected in Cleveland, where it is rather common. It seemed to be partial to refuse-heaps, growing in great profusion on piles of sawdust which had been left in the woods." Occurs in greenhouses also, where (as Peck) says one form has a white and the other a yellow pileus.

However, if upon this mere hint (not solicitation), a number of persons who are interested and financially able, desire to lend a helping hand, their substantial contribution will be duly used in extending the work. Such donors will receive the cordial thanks of the editor and of every member of the Club. That we may justly render credit to whom credit is due, a list of those contributing large or considerable amounts will be printed in the Bulletin.

VACATION ADDRESS — During July and August the address of the Editor of the Bulletin will be Lake Laboratory, Sandusky, Ohio.

Fig. 30. Hel-vel'-la e-las'-ti-ca. Helvella Edible. Photo from specimens in woods growing on leaf-mould, Columbus, Ohio. Belongs to same family as Gy-ro-mi'-tra brun'-ne-a, p. 16 (Hel-vel-la'-ce-ae).

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Ohio Mycological Bulletin No. 7

W. A. Kellerman, Ph.D., Ohio State University,

Columbus, Ohio, July 31, 1903.

THE ILLUSTRATIONS. — We are under obligations to Mr. Fred. J. Braendle, Washington, D. C., for cuts Nos. 31 and 32. Others by the same artist will be awaited with pleasure. The handsome Morel, cut No. 33, is taken from B. O. Longyear's Experiment Station Bulletin on Michigan Mushrooms.

PRONUNCIATION OF NAMES. — Many names will doubtless be new to readers of the Bulletin; but really they are not at all difficult—no more so than *Ge-ra'-ni-um*, or *Rhi-noc'-e-ros*. I regret that English usage

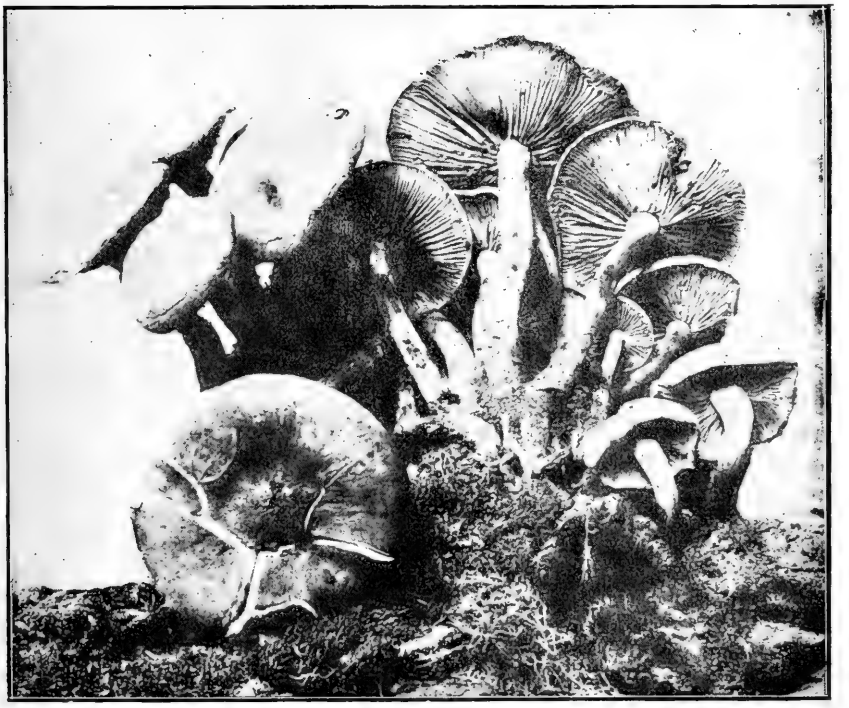

Fig. 31. Hy-pho-lo'-ma sub-lat-er-i'-ti-um. Edible. The spores are purple brown and there is no annulus in this genus. Cut from photo by Fred J. Braendle, Washington, D. C. The specific name alludes to the color of the cap which is nearly a brick red, sometimes tawny. The margin is lighter in color. The plant grows on old stumps or appears to come from the ground, being from buried portions of stumps or roots. Plants represented one-half natural size.

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will not always allow them to be pronounced according to their etymology or meaning. For example, it would be fortunate if we could say *Myr-i-o-sto'-ma* — which means many mouths — instead of *Myr-i-os'-to-ma* which is misleading (but I should have pronounced it so on p. 19, Fig. 25!). *Bi'-spo-ra* would better tell us *two-spores* than *bis'-po-ra; Pol-y-po'-rus,* many pores, than *Pol-yp'-o-rus;* but the laws of evolution of language like Nature's other laws, are inexorable.

Fig. 32. Am-an-i'-ta stro-bil-i-for'-mis. Pine-cone Am-an-i'-ta. Edible. White or cinerous, sometimes yellow on the disc, rough with angular, mostly persistent warts. Many species of this genus are poisonous, but McIlvaine says it is among the best of species; it has a strong, pungent, unmistakable odor, like chloride of lime, which entirely disappears in cooking. The species of this genus (Amanita) have a conspicuous vol'-va, or universal veil, completely enveloping the young plant. Cut from photo by Fred J. Braendle, Washington, D. C.

Fig. 33. **Mor-chel'-la bis'-po-ra.** Two-spored Morel amid its natural surroundings. The cut kindly furnished by B. O. Longyear, Agricultural College, Mich., who says this is one of our earliest Morels, often appearing with the opening of the pussy willows and the advent of the early warbler. It is the rarest and most delicate member of its tribe. The pileus or cap is thimble-shaped, with the ridges running mostly from top to bottom, and it is fastened to the stem only at the very apex. Color buff or brownish yellow, white underneath. The smooth white stem is usually three or four inches tall, hollow, and often a little swollen near the base. The whole fungus is tender and fragile.

Fig. 34. Ma-ras'-mi-us co-hæ'-rens. Edible. Cuts from specimens collected at Columbus, Ohio. Color chestnut, light leather color or tawny. Gills and stem reddish brown, shining, due to colored *cys-tid'-i-a*, or spicules which can be distinguished by a lens. This elegant species grows on the ground or very rotten wood. Name used by Peck is Col-lyb-'-i-a co-hæ'-rens, or C. spin-u-lif'-er-a.

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Ohio Mycological Bulletin No. 8

W. A. Kellerman, Ph.D., Ohio State University,

Columbus, Ohio, August 31, 1903.

LOOKING FORWARD. — The warm rains of late summer and early fall will bring hosts of interesting and curious Mushrooms, and all those who search in the woods and fields for these striking forms of vegetation will doubtless be rewarded with a bountiful harvest. Hoping that the BULLETIN may aid in the study of these plants, I may say that the subscriptions (and donations) so far warrant the promise of a Number each of the remaining months of the growing season. If the members will tell all their interested neighbors and friends the "price 10 cents," and both teachers of nature-study in the grades and teachers of science in the High Schools would take active interest in the matter, perhaps the treasury of the publication company would soon be overflowing, and in

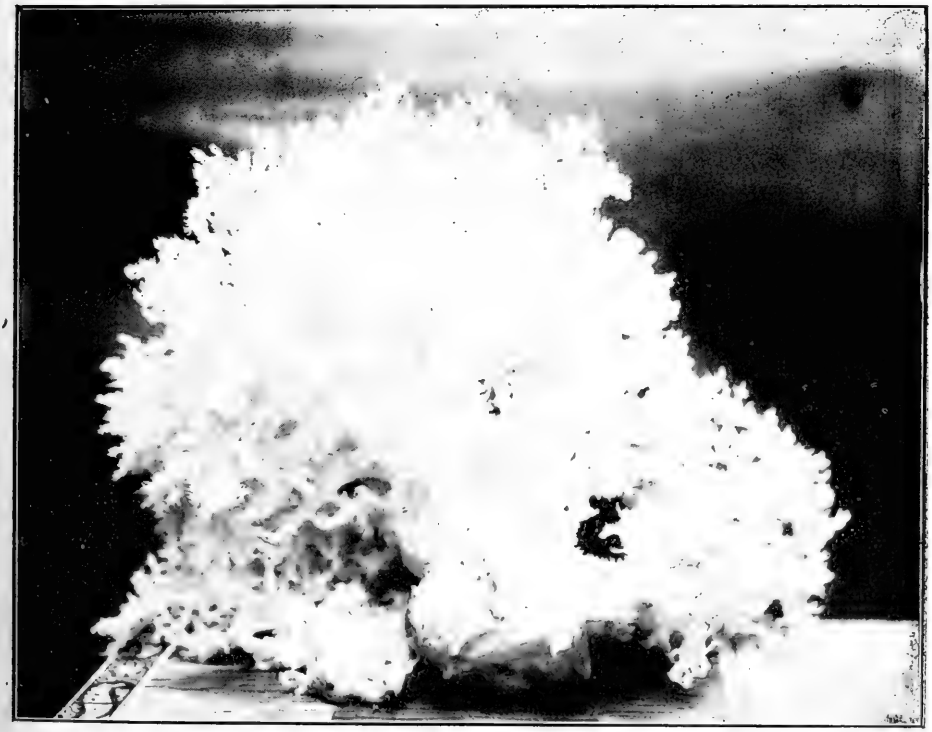

Fig. 35. Hyd'-num cor-al-loi'-des. Coral Fungus. Edible. Pure white; growing in woods on rotten logs, etc. Rather common and often quite large. Cut from a photograph taken by T. Otto Williams, Circleville, Ohio.

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that case two Numbers could be issued each month. It will be the aim to figure the commoner, more interesting and striking forms, thus it is hoped rendering much service to beginners and amateurs. Photographs are solicited from members of the Club. These should show the plants natural size, or if the specimens are large the photos should be at least four inches wide in case it is desirable to use them in making cuts for the Bulletin. Thanks are extended for photographs already kindly sent.

THE HYD'-NUMS. — These curious forms are usually abundant in the woods in late summer and fall and their conspicuous spines (always pointed downwards) will reveal their character at once. This is the fruiting (spore-bearing) surface, peculiar to the family Hyd-na'-ce-ae. They are excellent for the table if taken when young and fresh. The striking photo, kindly sent by Mr. T. Otto Williams, teacher of Sciences in the Circleville High School, of the Coral Hedgehog Mushroom has been used in making Fig. No. 35. From the main stem successive branches appear and terminate in graceful shoots; from the under side of these the short spines hang. It can thus be easily distinguished from the Bear's-head Hyd'-num (H. cap'-ut-ur'-si) in which the spines are clustered at the ends of the thick branches. Medusa's Head (Hyd'-num cap'ut-me-du'-sae), and Satyr's Beard (Hyd'-num er-i-na'-ce-us), differ but slightly from the preceding and will doubtless be found by all the Hydnum hunters.

THE OYSTER MUSHROOM. — This name has been given to the Agaric called Pleu-ro'-tus os-tre-a'-tus, because "the form of the plant sometimes suggests the outline of an oyster shell." It is a very common edible Mushroom belonging to a white-spored genus [Pleu-ro'-tus] of the Agarics, easily recognized by the eccentric or lateral stem; the pi'-le-us, or cap, may in some cases be attached at one side, i. e., more or less shelving, or in some species it may be *re-su'-pi-nate*, that is to say, the upper side lying directly against the wood on which the plant is growing. The species figured in this Number of the Bulletin (Fig. 38) is supposed to be Pleu-ro'-tus sap'-i-dus — a form so nearly like the one named above that even so eminent authority as Professor Peck suggests that it may be only a variety of the Oyster Agaric. I think it also may as well be called the "Oyster" Mushroom—because beginners and amateurs, and botanists generally, would not likely separate the two. Specific limits (if there are any here) can also just as safely be ignored by the mycophagists. The spores are tinged with lilac when seen in

Fig. 36. Sar-co-scy'-pha oc-ci-den-ta'-le. Western Peziza. On rotten twigs on the ground. Cup red orange within. Photograph from specimen collected at Sandusky, Ohio.

mass — but the color "seems to be the only distinguishing character and this may not be constant."

One may expect to find in our region also the Elm Pleu-ro'-tus (P. ul-ma'-ri-us), so called because often found growing on the dead branches or trunks, or from wounds in living trees, of the Elm. It is not, however, confined wholly to the Elm. "It is a large species," as Atkinson says, "easily distinguished from the Oyster Agaric and the other related species by its long stem attached usually near the center of the cap, and by the gills being rounded or notched at their inner extremity."

Another interesting Pleurotus is the Petal-like Agaric (Pleu-ro'-tus pet-a-loi'-des), fine specimens of which were found at Columbus in the spring, growing by the sidewalk, apparently from the ground but in reality from rotten wood underground. It grows also on fallen branches and trunks and on stumps. The plant is usually ascending or nearly upright in position, somewhat spatulate in form or broad above and tapering downward into a short stem. The margin is at first turned inward. The color may be white, but is also sometimes pale reddish or brown. A peculiar character serving well to make the identification of this small species quite certain, is the *fuzzy* appearance of the gills when looked at with a pocket lens, or even with sharp eyes. It is due to the presence of numerous enlarged cells of peculiar form, called the cystid'-i-a.

PE-ZI-ZA'-CE-AE. — The interesting Pe-zi'-za Family has already been referred to (p. 15) and some figures given. We include in this Number two cuts of charming forms that botanists place in this group. While they are too small to be favorably regarded from the esculent point of view, they could not go unheeded by those who notice the peculiar growths and beautiful colors in nature. These and other species may be found in shady woods that have not been despoiled by the demands of agriculture and other destructive industries of civilization. The brilliant cups of Pezizas Fig. 36 and 37, nestled in bright green moss and delicate fern, might form a center-piece for the dining table that would complement the pleasure of the delicious viands. Their aesthetic use justifies the encroachment we make on the space of the Bulletin pages, though of course half-tones illy show them—expensive colored figures might almost do them justice. The Pezizas retain their shape and bright color equally long, even longer than the best boquets of flowers—proper moistening or protection from excessive evaporation enhancing their period of usefulness.

Fig. 37. Sar-co-scy'-pha floc-co'sa. Floccose Peziza. On rotten branches on the ground. Cup bright red within and surrounded by long, white hairs. Stem and outside of cup whitish. Photograph from specimens collected at Sandusky, Ohio.

Fig. 38. Pleu-ro'-tus sap'-i-dus. Oyster Agaric. Edible. On dead trunks and branches, or dead portions of living trees. White, but the color may vary to yellowish, gray, brownish, or lilac. Spores white or tinged with lilac, as seen in mass when caught on paper. Photo from specimens at Cedar Point (Sandusky), Ohio.

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Ohio Mycological Bulletin No. 9

W. A. Kellerman, Ph.D., Ohio State University,

Columbus, Ohio, September 30, 1903.

NOTES. — The Jack-my-Lantern fungus or as the learned call it, Cli-toc'-y-be il-lu'-dens, has been sent oftener than any other species, and the belief is often expressed that it would be good to eat. Unfortunately

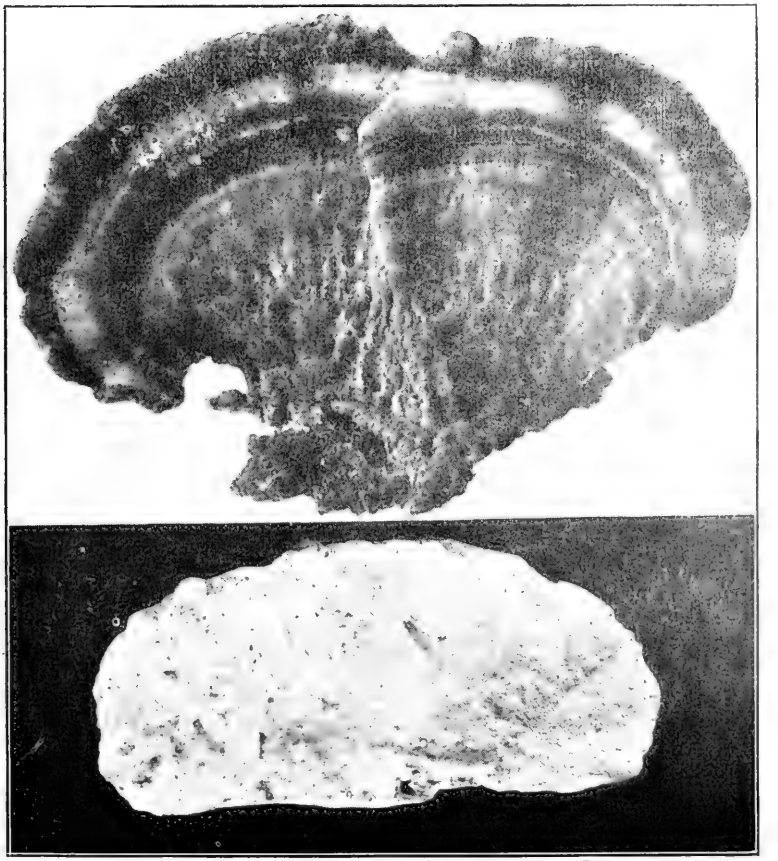

Fig. 39. Hairy Poly'porus. Po-ly-stic'-tus hir-su'-tus. A very common but tough species, easily recognized by the dense coating of hairs on upper surface. Both upper and lower surfaces are shown in figure; from photograph of specimens collected at Columbus.

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this attractive species is *not edible.* It is a conspicuous yellow Toadstool, a gill-fungus that grows most commonly about old stumps or dead trees or rotting gate-posts. The color throughout in young specimens is a rich saffron yellow, but in old plants the color becomes sordid or brownish. The stems may be three-fourths inch in diameter or thicker, and the plants eight or ten inches high. This interesting point can be easily verified, namely, that the gill-portion (or under side of the cap) is phosphorescent, *i. e.* luminous after dark; take a fresh young specimen to the house and in a dark room the experiment can be tried. This species is abundant in the summer and early fall.

Supt. J. N. Baker reports a Puff-ball at Bowling Green 14 inches in diameter. The dimensions of a Po-ly'-po-rus sul-fu'-re-us, the Sulphur-colored Pol'-ypore, "27 inches across the top, 16 inches deep and 7 or 8 inches thick, weight about 16 lbs.," are reported by Miss Myrtle Leighley, Hartville, Ohio.

Mr. Willis H. Ropes, member of the Boston Mycological Club, says "last Monday we had eighty-eight varieties on the plates" at Salem, Mass., where Mushroom exhibitions and lectures are being held.

Two unusual specimens of the Col-lyb'-i-a rad-i-ca'-ta were found in a woods near Sandusky during the summer. They were growing on a rotten log — an unusual habitat. The "root," *i. e.* lower tapering end of the stem, could not penetrate the rather firm though very rotten wood and therefore had not at all developed; it was a "root-less" rad-i-ca'-ta. The other specimen had developed its "root" — but it was turned at a right angle following the surface of the matrix on which it rested. This neat edible species is a very common one, its root-like stem below being very characteristic; we hope to have a half-tone of it in the BULLETIN later.

NEXT YEAR. — Thanks are extended to all who have taken interest in the BULLETIN and mycological matters in general, and now also especially to those who have kindly sent the subscription for 1904! I have lately persuaded myself to say that the BULLETIN will be issued on the same basis next year, "price 10 cents." This amount pays but a portion of the cash expense, but the generosity of interested "persons with means" will doubtless enable me to defray all costs. Some friends in foreign countries have requested the copies as issued, and for them I am obliged to fix the price at 25 cents, to cover postage. Those sending 10 cents now will receive all the 1903 Numbers issued — as long as copies are available. The above announcement has been called forth prematurely — though the contribution box is already open; other numbers of the BULLETIN will appear this year.

THE POL'-Y-PORES, or PORE-FUNGI. — This large group is called Pol-y'-po-ra-ce-ae (sound the "y" like short "i"), because there is a honey-combed fruiting surface on the lower side of the plants; in other words, there are *many pores,* which is the real meaning of the name of the group. They are also called Bracket-fungi or Shelf-fungi, alluding to the general form and method of attachment to trees, logs and stumps, where most of the species are to be found. They are the commonest of all fungi and everyone who ever went to the woods has seen them. The cuts shown will give a fair idea of some of the striking forms — but the subject will be taken up in a later BULLETIN.

It should perhaps be explained at once that the name of the group is formed from the name *Po-ly'-po-rus* which was given to these characteristic plants by the early botanists. In 1851 Fries broke up the group (ge'-nus) into three gen'-er-a (this is the plural for ge'-nus), using the names for them as follows: *Fo'-mes, Pol-y-stic'-tus and Po'-ri-a.*

Now other ge-ner-ic names are coming into use as Gan-o-der'-ma, Py-ro-po-ly'-po-rus, Scu'-ti-ger, Po-ro-dis'-cus and goodness knows how many others. However, we will leave all these to the refined botanist, and use Po-ly'-po-rus as a common name for the whole lot.

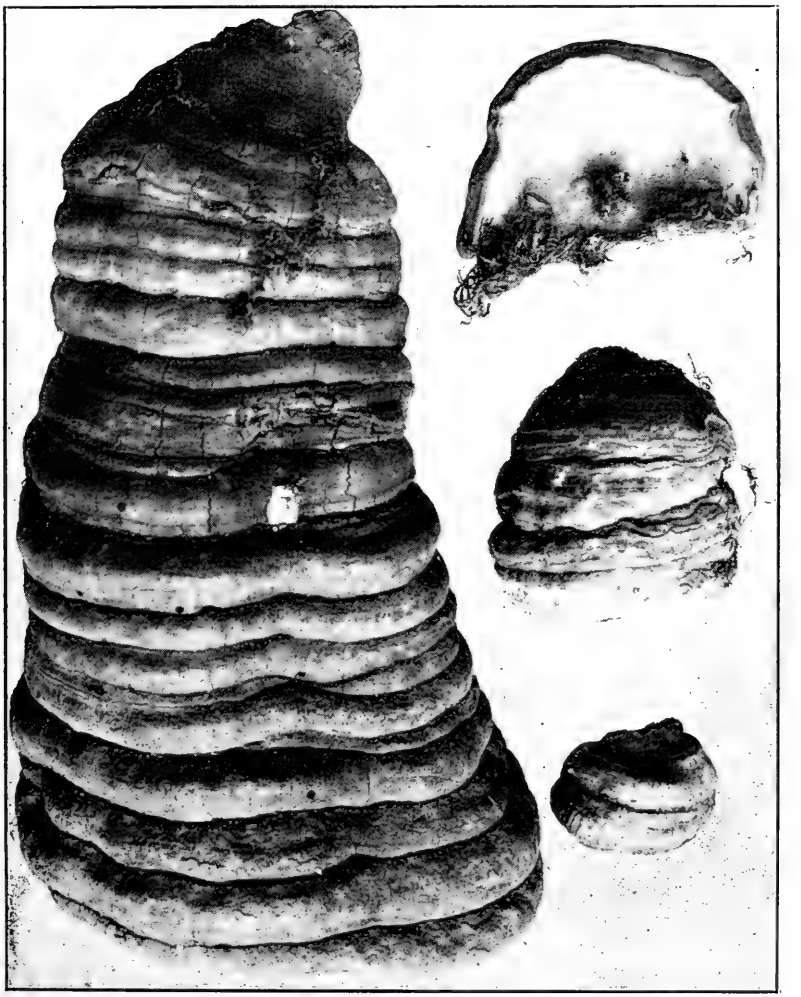

Fig. 40. Beech and Birch Poly'-porus. Fo'-mes fo-men-ta'-ri-us. A woody species very abundant on old trunks of Birch and Beech trees — sometimes on other hosts. The plant is perennial — the annual layers showing very plainly in the large specimen. The cut was made from photographs of specimens collected in the mountains of West Virginia, where it is one of the commonest species on the Yellow Birch. Being a hardy, woody species, it is of course not edible. It is a conspicuous and easily recognizable *saprophyte* (*i. e.* living on dead organic matter). It is not known to grow on living trees — in other words, it is never a *parasite* as a few of the Polypori are now known to be.

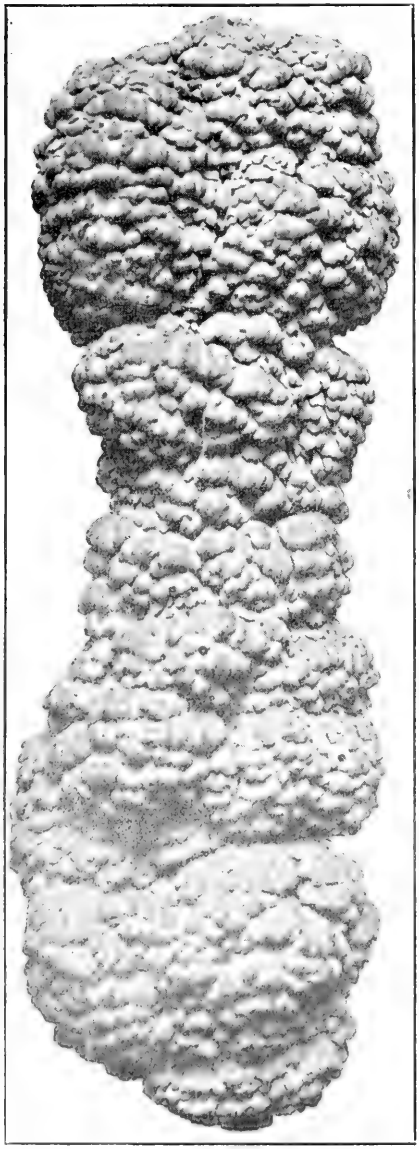

Fig. 11 Thatched Poly'porus, or Thatched Pol'-y-pore. Fo'-mes grav-e-ō-lens. A remarkable woody species, mostly subglobose or polycephalous; elongated on standing trunks. When fresh, has a strong, disagreeable odor, hence the specific name. It was formerly called P. con-glo-ba'-tus. From photograph of specimen collected by L. F. Cheney, at Pricetown, Ohio.

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Ohio Mycological Bulletin No. 10

W. A. Kellerman, Ph.D., Ohio State University,

Columbus, Ohio, October 30, 1903.

NOTES.— One more Bulletin will be issued this season, some time in November. At that time or later a Title-page and Index will be furnished, closing Volume I. Only a few copies of this set or Volume (for 1903) are left and therefore you should not ask your friends to become subscribers for the *current year*, but I will be pleased to have their names for the 1904 list. The Bulletin will be issued next year and sent to all members for the same price as heretofore, namely, *10 cents*.

But I wish to issue twice as many Numbers next year — and therefore the expense will be greatly increased. Besides, the cash cost of the Bulletin for this year has not been fully met by the fee — and it was not expected that it would be wholly met. Some friends have assisted and I take pleasure in donating a mite now and then to the cause myself.

I am prompted to keep (privately) a regular Cash Donation List — to the end that those *who are able and interested may enjoy* additional pleasure with me. Such a list is now begun, and $20.00 is the first amount put down! But a child's penny, or nickel from the school boy, or larger amounts from others, will be gratefully accepted, and all that is received

Fig. 42. Pa'-nus dor-sal'-is. Dorsal Pa'-nus. An elegant species but somewhat tough and leathery. It grows on stumps and trunks — conspicuous by reason of its tawny-orange color. Photograph from specimens collected at Columbus, Ohio.

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will be devoted to the cash expense involved in making the Bulletin as useful as possible. The membership fee will be in 1904, as now, 10 cents, and all members will receive the Bulletin as issued. A new list of members will be prepared for 1904. The books are open now.

PAMPHLET.— Attention should be called to the fact that certain Reports of the New York State Museum are offered for sale. For example, the interesting and valuable "Report of the State Botanist for 1901," by Charles H. Peck, contains (besides technical matter) popular descriptions of eleven species of Edible Fungi accompanied by plates. This report can be obtained for forty cents. (Report for 1902, fifty cents.) Address, Director New York State Museum, Albany, N. Y.

GALL.— A gall on a Mushroom is something out of the ordinary, apparently never reported heretofore in mycological literature,— and yet this is what is described and figured by Charles Thom in the September No. of the Botanical Gazette. The gall was on the pileus of the common little Om-pha-li-a cam-pan-el-la. The pileus is ordinarily less than one millimeter in thickness, or together with the gills less than three millimeters. The white mass of the gall, homogeneous in section, was about eight millimeters in radial diameter, six millimeters in thickness, and twelve to fifteen millimeters in length.

ACCENTUATION OF NAMES (A PARAGRAPH FOR STUDENTS).—In the October No. of the Journal of Mycology, Miss Ivy Kellerman explains the "apparent dogmatism" in the matter of accentuation of compound names, and possibly brief instructive transcripts may not be "all Greek" to every one. She says: "There are certain Indo-European laws of accentuation which are seen to be distinct from changes occurring in the individual languages. One of the most general of the laws pertaining to nouns and adjectives may be stated as follows: Compounds, consisting of one word dependant upon another in a grammatical relation, keep the accent of the dependant word for the accent of the compound as a whole. The survival of the law to the present time is shown by such examples from the Teutonic branch as English púff-ball, ápple-tree, bláck-berry, or German âpfel-wein, sónnen-blume, blaú-beere. From the Balto-Slavic branch may be adduced Lithuanian vasarâ-sziltis "summer warmth," and sáulzhole "heliotrope," and Russian né-vidko "*not* to be seen." A moment's consideration will show how logical this law is. The dependant word, usually an adjective, or a noun in a case relation, brings a new idea or broadens the one already present in the word to which it is united, and so it naturally receives the greater amount of stress. The rule holds whether the dependant element precedes or follows the foundation word. . . . . In Greek, however, which is of especial interest to the botanist, certain changes took place. A law developed that no accent might recede farther from the end of a word, either simple or compound, than the third syllable from the end. This is the case if the quantity of the last syllable be short; if it is long, the accent may recede only as far as the second syllable from the end. It will at once be recognized that this secondary law often shifts the accent of the emphatic word in a compound to a different syllable from the one upon which it originally rested. For instance, myrío-stóma would in prehistoric Greek have become myrío-stoma, like the Sanskrit sáhasra-mukha of almost the same meaning quoted above. But, in the earliest records we have, Greek had already completed the shifting due to the law of recessive accent, and therefore we find myrió-stoma. So also cary'o-sporà, if it had occurred in early Greek, would have been cary'o-spora. . . . . When the foundation word is more than three syllables in length, or has a long final syllable, it is evident that the law of recessive accent must withdraw the emphasis completely from the preceding dependant word. An example of this is poly-céphalum, which would have been poly'-cephalum in prehistoric Greek, from the elements "poly'" and "cephalé," which naturally had to undergo such a compromise when they became united into one word."

Fig. 43. Po-lyp'-o-rus bet-u-li'nus. [More recently written Pip-to-po'-rus sub-e-ro'-sus.] Birch Pol'-ypore. Leathery or rather woody. Photograph from a herbarium specimen collected by C. F. Baker in Wisconsin in 1897. The fungus measured six and a fourth by nine inches. The cut has been reduced to about five ninths of these measurements, and therefore the pores on the lower surface are not distinct; even the peculiar conspicuous elongated hair-like scales attached to the pore-surface are not clearly represented in the half-tone.

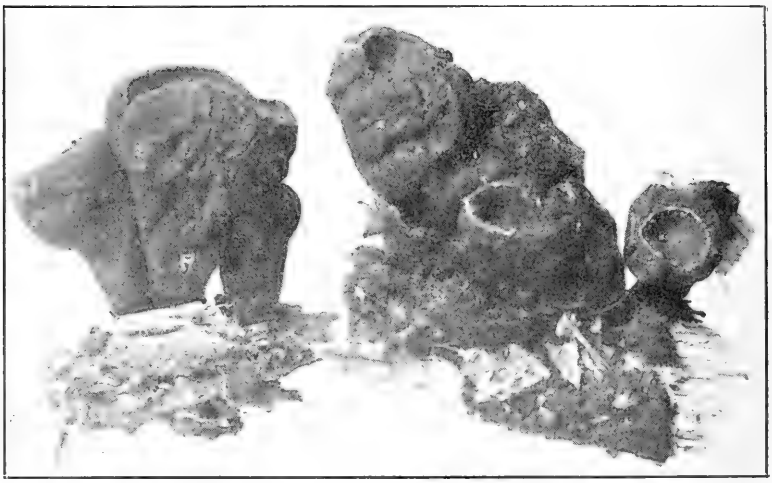

Fig. 41. Bul-ga'-ri-a in-qui'-nans. Black Pe-zi'-za. A tough-fleshy dull-black species growing on rotten sticks in leaf-mould in shady woods. Perhaps scarcely palatable — though the fragile Pe-zi'-zas are excellent food. Photograph from specimens collected at Sandusky, Ohio.

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Ohio Mycological Bulletin No. 11

W. A. Kellerman, Ph.D., Ohio State University,

Columbus, Ohio, November 20, 1903.

End of Volume I.— With the current issue, accompanied by title-page and index (Bulletin No. 12), the first year of publication of the *Ohio Mycological Bulletin* is brought to a close. Started as a mere ex-

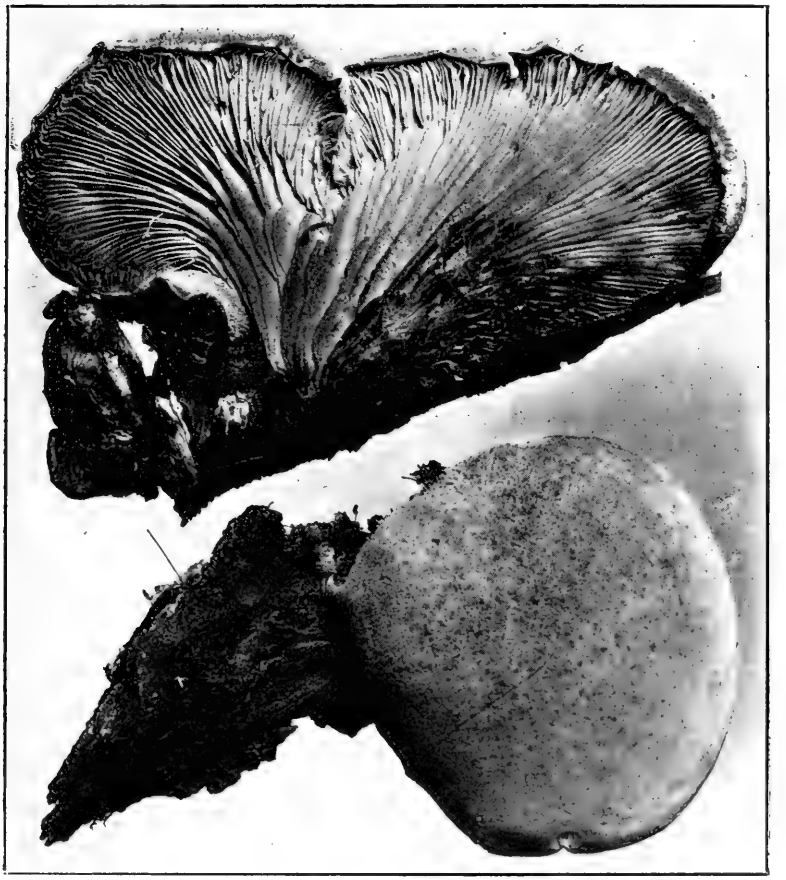

Fig. 45. Len-ti'-nus vul-pi'-nus. This was kindly identified by Professor Morgan, who calls attention to the inaccuracies in descriptions by botanists and remarks that it is an "uncertain species anyway." All of the species belonging to Len-ti'-nus are leathery or tough, or if fleshy, hardened when mature. The elegant specimens from which the cut was made were found on a log in moist woods near Columbus, Ohio.

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periment and for the pleasure and benefit of a few persons, it has grown into a periodical of considerable popular interest — the large, mostly unsolicited membership, perhaps, warranting such a statement. The text offered, no less than the syl-lab-i-fi-ca'-tion and ac-cen-tu-a'-tion used, has undoubtedly justified the claim that this Leaflet is primarily intended for children in years and children in knowledge. It is hoped that the numerous pictures of mushrooms have afforded both pleasure and profit. Hearty thanks are extended to all who have taken interest in this matter, and special obligations are again expressed for the numerous specimens, notes, sketches, and photographs kindly sent to the editor. A special request is made that all subscribers forward at once the fee, ten cents, for the *Bulletin* for 1904. No. 13 (first number for 1904), will be sent out during January or early in February. It would be much appreciated if members would kindly send subscriptions for some of their friends, or take opportunity to call attention to the *Bulletin*. The frequency of issue during the year will depend on the financial receipts — and let us hope that two copies a month may appear during the Spring and Fall, when mushrooms more conspicuously abound.

Membership of the Ohio Mycological Club.— The list of members the current year reached the surprising number of *seven hundred sixty-five*. An inspection of the published lists reveals the fact that equal interest in mushrooms is to be credited to children, pupils, teachers, students, amateurs, professional botanists and mycologists. It will be a reciprocal benefit if the roll of members is largely increased for next year. The experience of some of the high school teachers warrants a special suggestion that classes in botany can advantageously devote a portion of time to the higher fungi and that the *Bulletin* would be a material aid.

Back Numbers of The Bulletin.— It is most unfortunate that a considerable demand for this Leaflet could not have been foreseen. Practically all of the first Numbers are exhausted. The price of the few complete copies of Volume I must be placed at 50 cents — the proceeds to apply on Bulletins for next year. A larger edition will be issued hereafter.

Portrait of an Eminent Mycologist.— It is with special pleasure that I print as a worthy frontispiece to Volume I, a portrait of Professor Charles H. Peck, of Albany, New York, to whom, far above all others, we owe our extensive knowledge of the Mushrooms of the United States. His numerous illustrated reports as State Botanist of New York are as admirable as useful. It is fortunate that some of them are now placed on sale by Mr. Fred. J. H. Merrill, Director of the New York State Museum, Albany, N. Y.

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Fig. 46. Po-lyp'-o-rus rad-i-ca'-tus. Root Polypore. This is a fleshy-tough plant, with a stem (called stipe) *ec-cen-tric*, that is, not attached to the center of the cap. The majority of the commoner Polypores are "shelf-fungi" — not having a stem, but attached directly to sides of tree trunks, stumps and logs. Figs. 39, 40, 41 and 43 are illustrations of such forms: they are hard leathery or woody plants. The Po-lyp'-o-rus rad-i-ca'-tus has a long, tapering rootlike stem, black below. Morgan says: "I find this plant, as Berkeley says, of various sizes, from the small plant which Schweinitz describes, to five inches or more across with the stipe six inches or more in length; the long, tapering stipe penetrates the earth to a depth of several inches, the tip being always attached to some portion of an old root. The pileus is brown or blackish." The cut, original with Prof. H. Garman, was used first in Bulletin No. 96, Kentucky Agricultural Experiment Station.

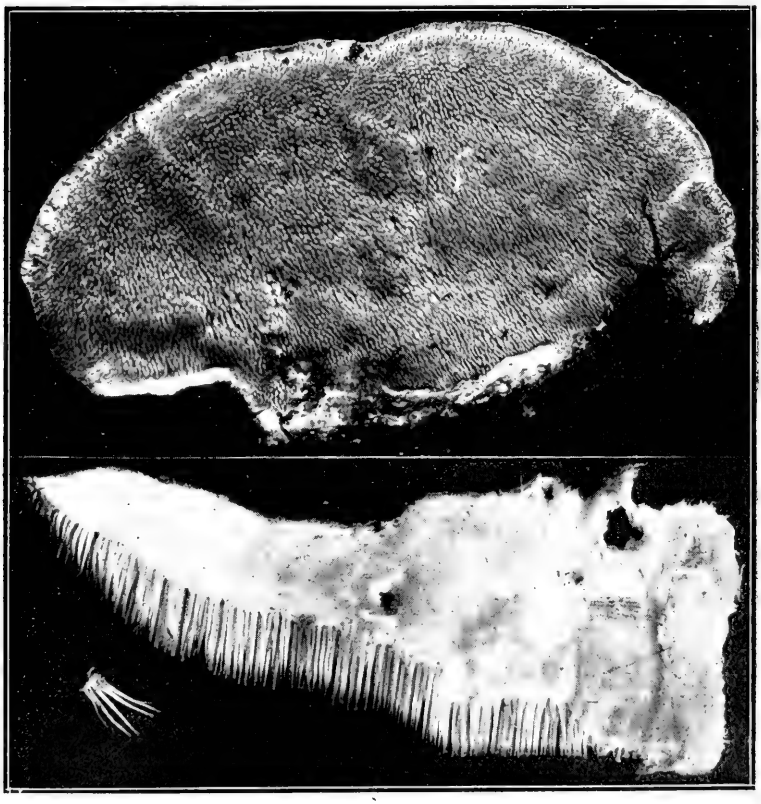

Fig. 47. Hyd'-num pul-cher'-ri-mum. Professor Morgan, to whom a sample was sent, says: "It is a very fine specimen! It is usually quite irregular and mostly resupinate." The Latin specific name means *most beautiful*. The descriptive word *re-su'-pi-nate* means applied directly to the log or sub-stratum, the spine-surface only showing. The upper figure showing the lower surface of the fungus is considerably reduced; the lower is a section from same specimen. Photograph from specimens collected at Columbus, Ohio.

(CONTINUED FROM PAGE 42.)

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Ohio Mycological Bulletin No. 12

W. A. Kellerman, Ph. D., Ohio State University.

Columbus, Ohio, November 21, 1903.

INDEX TO VOLUME I.

SUBJECTS.

ILLUSTRATIONS.

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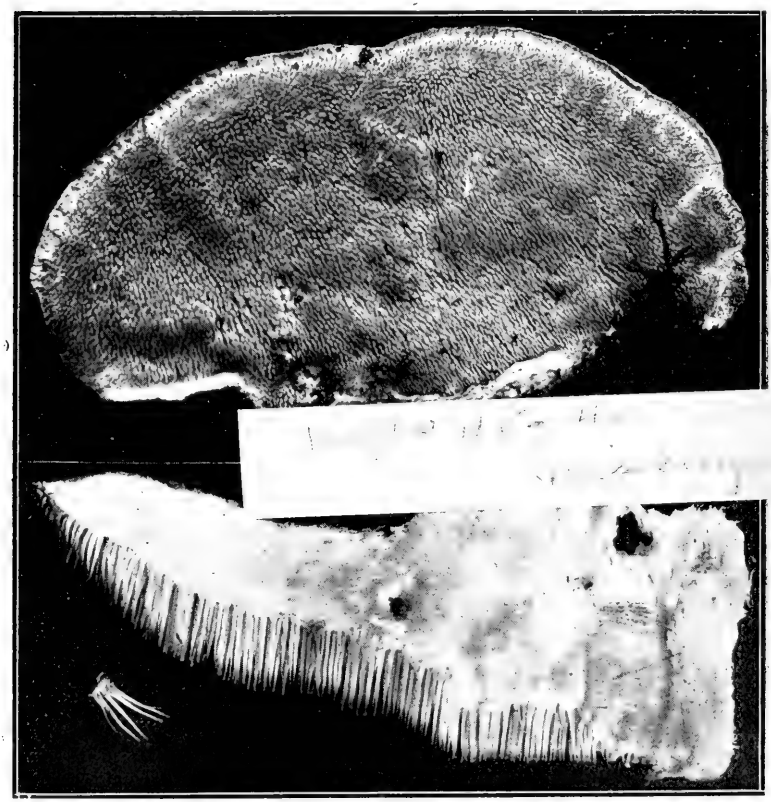

Fig. 47. Hyd'-num pul-cher'-ri-mum. Professor Morgan, to whom a sample was sent, says: "It is a very fine specimen! It is usually quite irregular and mostly resupinate." The Latin specific name means *most beautiful*. The descriptive word *re-su'-pi-nate* means applied directly to the log or sub-stratum, the spine-surface only showing. The upper figure showing the lower surface of the fungus is considerably reduced; the lower is a section from same specimen. Photograph from specimens collected at Columbus, Ohio.

(CONTINUED FROM PAGE 42.)

E. G. Pagham, (Cincinnati.)
E. E. Parker, (Cincinnati.)
H. E. Price, (Cincinnati.)
C. E. Putnam, (Boston, Mass.)
A. T. Rank, (Covett.)
D. E. Rausch, (Cincinnati.)
K. P. Reefy, (Cincinnati.)
Vance T. Reynolds, (Port Union.)
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Miss Caroline Roberts, (Baltimore, Md.)
Willis H. Ropes, (Salem, Mass.)
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J. Saxton, (Cincinnati.)
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J. N. Thiel, (Cincinnati.)
F. W. Vance, (Cincinnati.)
Byron Van Horn, (Cincinnati.)
H. E. Warner, (U. S. Dept. Interior, Bureau of Pensions.)
Harry R. Werner, (Thomas, W. Va.)
Geo. D. Whitacre, (Springfield.)
Alex E. Wright, (Wellesley Hills, Mass.)
Gardner W. Wood, (New York, N. Y.)
G. F. C. Yost, (Cincinnati.)

The Ohio Mycological Bulletin is issued from time to time and sent to all members of the Ohio Mycological Club. All eligible to membership who are interested in Nature or the Bulletin. Fee, 10 cents.

Ohio Mycological Bulletin No. 12

W. A. Kellerman, Ph. D., Ohio State University.

Columbus, Ohio, November 21, 1903.

INDEX TO VOLUME I.

SUBJECTS.

ILLUSTRATIONS.

Entered as Second Class Matter, Postoffice, Columbus, Ohio.

Unless otherwise stated in connection with the figures, the photographs were made in the Botanical Department of the Ohio State University. Mr. O. E. Jennings, Assistant in Botany, deserves equal credit with the editor, in case any of the work is meritorious.

Mycological Bulletin

(Nos. 13 to 24.)

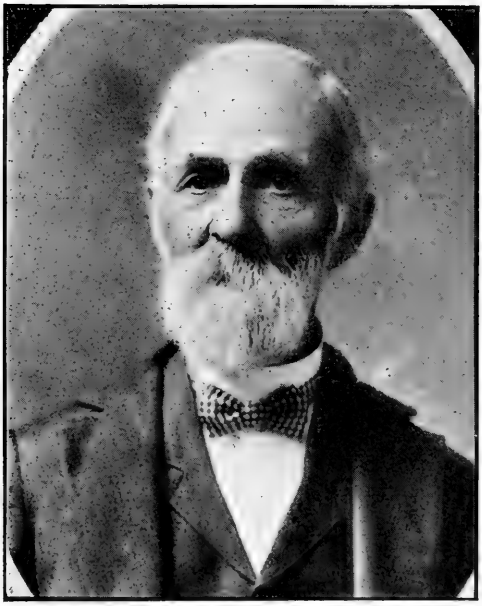
VOLUME II

1904

W. A. KELLERMAN, Ph. D.

Ohio State University

Columbus, Ohio:
1904



J. B. ELLIS, Newfield, New Jersey,
An Eminent Mycologist.

Mycological Bulletin No. 13

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio, February 27, 1904

THANKS ARE EXTENDED—to all who expressed their interest by joining the Club last year and who are still with us, also to the new members, and may their tribe increase! You may also enjoy this pleasant excerpt from an interesting letter by Professor Peck, our leader in American Mycology.

"In renewing my subscription to the Mycological Bulletin, I wish to congratulate you on the manifest success that has attended your efforts in this direction. To one who can remember the time when there were scarcely a half dozen men in this country interested in Mycology, your list of 765 subscribers to your interesting and useful little publication shows that the world does move"

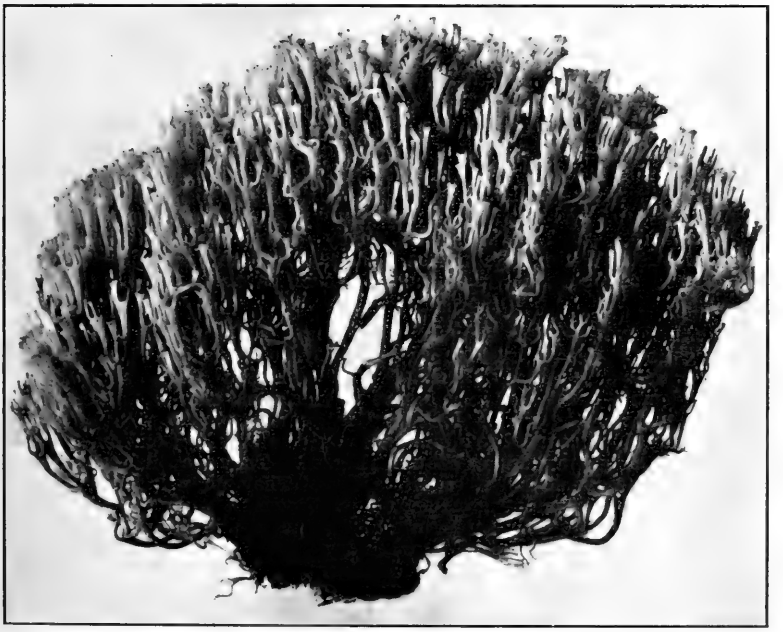


Fig. 48. CLA-VA-RI-A PYX-I-DA-TA. CORAL FUN-GUS. Edible. Of a dull or dirty white color, rather firm texture, growing from rotten wood in shady grove. Photo of specimen collected at Columbus, Ohio.

University Bulletin, Series 8, No. 9. Entered as Second Class Matter, Post-office at Columbus, O.

Drop Ohio.—The membership of the Club, confined originally to the people in the Ohio State University and in Ohio, has (I am glad to say) grown so as to include a much wider area; therefore we may cast off the territorial restriction and henceforth call our Leaflet the Mycological Bulletin.

Of Course—It is yet too cold to go out to get the Mushrooms, but it is not too early to plan the expeditions, and to get ready for the work as soon as warm weather is assured. Could not many young people make an effort this year to sketch and paint some of the showy Mushrooms—perhaps make a record of their characters, such as size, shapes, colors, odor, structure It is impossible to dry the fleshy fun-gi in any way so as to retain their life-like colors and shape, hence the necessity of resorting to the pencil and brush—but think of the pleasure!

It May Be—Well perhaps to state again at the very beginning of the Second Volume that the Mycological Bulletin is not at all designed for advanced botanists, and professional mycologists, though their interest and assistance is highly appreciated—at the same time some of the paragraphs may, I fear, seem difficult to beginners and young people. At any rate all can enjoy the illustrations of our common fun-gi published on these pages. In fact, to send these out plainly labeled and with simple explanations, is the main purpose of the enterprise. Here I may add (as if in parenthesis) that 24 persons have our thanks for contributions beyond the 10-cent fee.

Too Technical.—Several persons have made inquiry relative to the "Journal of Mycology." This we send only to specialists and students, since mainly technical matter is included in the magazine. However, some popular articles are published, and extended readable notes from mycological literature are given in the six Numbers issued during the year; but the price of the Journal is $2.00 per annum.

Acknowledgements.—The photo of interesting little Ág-a-rics shown in Fig. 49 was taken by Rev. W. Leon Dawson, our Ohio ornithologist, who it seems has also an eye for the beautiful in Mushrooms. Supt. M. E. Hard is a veteran in our line—for his taste see Fig. 50. Appreciation of their assistance can be expressed in no better way than by requesting them to continue their contributions! It is hoped that many persons who use the camera will send prints during the season. Notes as to the Mushrooms in any locality will also be most welcome. For such favors thanks are extended in advance.

Coral Fungi.—These peculiar Mushrooms, a sample shown on the preceding page, form a large family which the botanists call *Cla-va-ri-á-ce-ae* which means: plants *Cla-vá-ri-a* like. *Clavária* (the name of the principal genus) was given in reference to their usual club-shape—the Latin word *Clá-va* meaning club. They are all upright plants, some of them simple and club-shaped, but others more or less forked. Sometimes there is a great mass of branches as shown in Fig. 48. They grow in shady woods attached to decaying sticks or on rotten logs. They present a striking appearance—some of them being white, others brownish, yellow, red, or red-tipped. Nearly all of the species are to be included in the edible list. A few are viscid and jelly like—horny when dry.

An Important Subject.—In the next No. of the Bulletin some account will be given of the genus Am-a-ní-ta, which includes the Death Cup, the Fly Ág-a-ric, and several other poisonous Mushrooms. If we thoroughly learn the different kinds, we would have no opportunity—certainly no excuse—for eating any but the numerous wholesome species.

THE LIST OF MEMBERS FOR 1904 WILL BE GIVEN IN THE NEXT AND SUCCEEDING NUMBERS.

Fig. 19. Coprinus micaceus. Glistening Coprinus. Edible. Common and abundant. From photo by Rev. W. Leon Dawson; taken at Sugar Grove, Ohio.

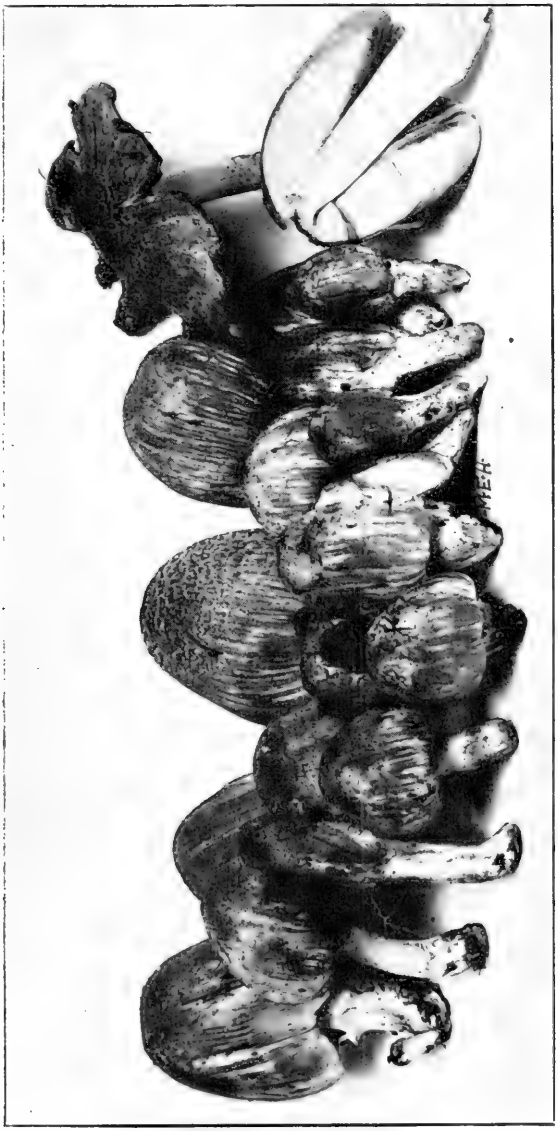


Fig. 50. Co-pri-nus at-ra-men-ta-ri-us. Ink-cap. Edible. To be found during the growing season after heavy rains, but perhaps more abundant in the early autumn. It grows in manured or rich soil, mostly scattered, but sometimes in clusters. The specific name given by the botanists is a Latin word meaning *inky*, alluding of course to the character possessed by all the species of Co-pri-nus, namely, that the moist gills at maturity dissolve into an inky fluid. The spores are black—hence the color of the gills; these are white at first but change gradually to black as the spores ripen. Notice the deliquescent (dissolving) cap in the specimen to the right above the sectioned plant. The cut was made from a photo by Supt. M. F. Hard, Chillicothe, Ohio

The Mycological Bulletin is issued from time to time and sent to all members of the Mycological Club. All eligible to membership who are interested in Nature or the Bulletin. Fee, 10 cents. A few copies of Vol. I remain; price 50 cents each.

Mycological Bulletin No. 14

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio. March 26, 1904

NOTE.—Requests for bound copies of the MYCOLOGICAL BULLETIN, Vol. I, have been complied with, and a very few copies may be obtained at an advance of 25 cents in price, namely, 75 cents a copy.

TWO OBJECTS.—This No. of the Bulletin is designed to introduce the genus of Mushrooms called AM-A-NÍ-TA, which unfortunately contains *poisonous* species; and at the same time to renew the notice relative to Atkinson's book on "MUSHROOMS EDIBLE AND POISONOUS," which I regard as the best work for every body to use.

PORTRAIT.—The portrait of Professor Geo. F. Atkinson (with autograph) is presented on the second page, and at the same time acknowledgement is made for the illustrations in this No., all of which are taken from his admirable book on Mushrooms. We will therefore call this issue of the Bulletin the ATKINSON NUMBER.

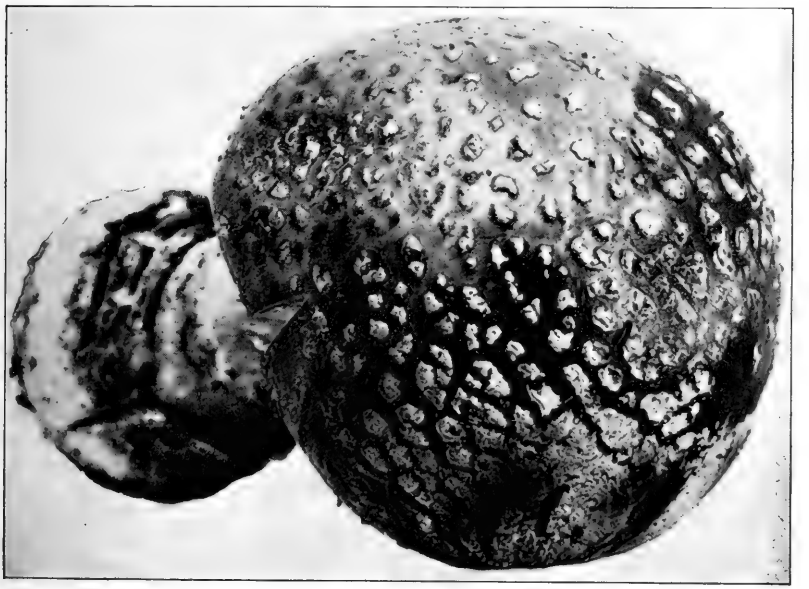


Fig. 51. AM-A-NI'-TA MUS-CA'-RI-A. FLY AG-AR-IC. POISONOUS. Cap yellow or orange; scales on cap and at base of stem white—but these may be yellowish and later they fall off readily. Stem and gills white; a spore-print (evident on colored paper) white. Occurs in Summer and early Autumn. It may be found along roadsides near trees, or in woods. It is a conspicuous plant—the orange or yellow coloring usually brilliant and in strong contrast to the white of stem and gills. The specimens may be five to seven inches high, and the cap three to five inches broad. It is widely distributed in this country and elsewhere in the world. Photo from specimens collected at Ithaca, N. Y. This cut, also Figs. 52 and 53, from Atkinson's Mushrooms.

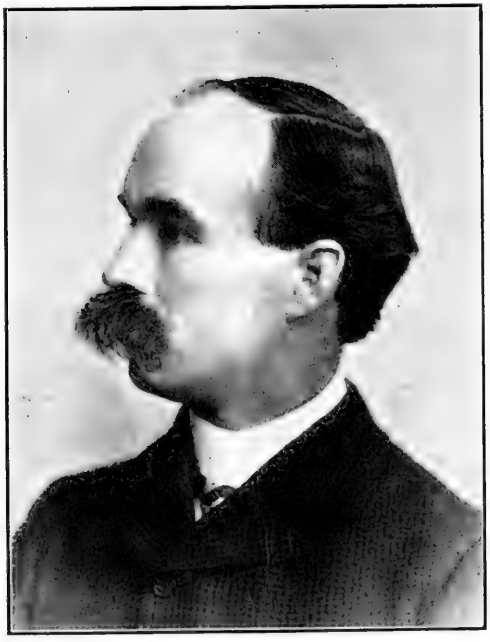
University Bulletin, Series 8, No. 11. Entered as Second Class Matter, Post-office at Columbus, O.

HENRY HOLT & CO. PUBLISHERS.—It has recently been announced that this firm (New York) are now the publishers of Atkinson's Mushrooms. The price is $3.00, (by mail $3.23). This notice is to correct the statement in an early No. of the Bulletin that the author was the publisher.

COLORED ILLUSTRATIONS.—We are convinced that the most valuable representations of Mushrooms are the photographic ones, not the colored plates; of course both are to be desired—but *rely* on the former rather than the latter. Poor ones, whether photos or paintings, ought not to be tolerated —at any rate not used. "Put no trust in color" a great botanist said over a century ago—colors are not always a stable affair, but the minute anatomical characters can be relied on.

AM-A-NÍ-TA.—The Mushrooms of this genus, some of them deadly poisonous, include two or three dozen kinds, with white gills and white spores. They may be positively known by the presence (seen in the early stages of development) of a *vól-va* and a *veil*. The VOL-VA is the sac-like portion or cup below the surface of the soil, out of the top of which the cap and stem push. This is shown in all of our Figures. Look *carefully for it* when getting specimens. It is called in some of the books, *universal veil*—better understood if the plants are seen in the "button" stage. The VEIL, sometimes called the *partial veil*, is very conspicuous in these Mushrooms, shown in the Figures immediately under the cap—in fact it was attached to the cap before the latter expanded; but this structure remains cohering to the stem, ringlike —hence it is called the *án-nu-lus*, or *ring*.

Correction.—According to Professor Morgan, who kindly communicated with me on the subject, Fig. 48, Clavaria pyxidata (Myc. Bull. p. 49) should be changed to *Cla-ra'-ri-a cor-o-na'-ta* "Resembling in form the preceeding, but a distinct species." Fig. 49 (p 51) is not Coprinus micaceus, but *Psath-y-rel'-la dis-sem-i-na'-ta*.



Very sincerely yours
W. A. Atkinson

Fig. 52. Am-a-ni'-ta mus-ca'-ri-a. Fly Ag'-ar-ic. POISONOUS. Cap orange or yellow: scales, stem and gills, white. See explanation under Fig. 51.

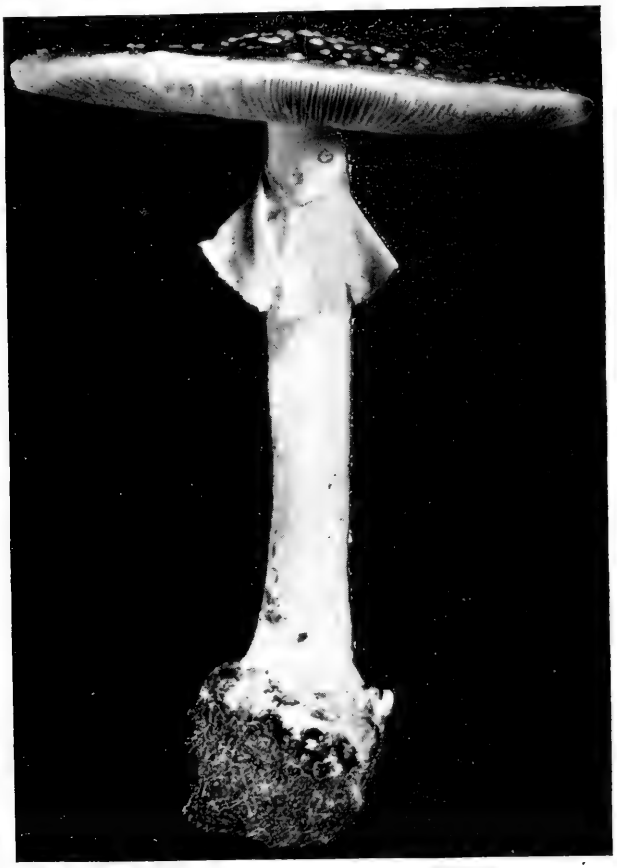


Fig. 53. Am-a-ni'-ta phal-loi'-des. Deadly Ag-a-ric. *POISONOUS.* Varies from pure white to yellowish, green, olive or umber. The cap is slimy when moist, convex or bell-shaped and finally expanded as shown in the figure; the margin may be then slightly elevated. The scales are not always present on the cap. The plant usually occurs in or at the border of woods. It may be even larger than the Fly Ag-a-ric. The plant, especially the vol-va, is quite variable. Taken with permission from Atkinson's Mushrooms.

MEMBERS OF THE MYCOLOGICAL CLUB, 1904.

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(TO BE CONTINUED)

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Mycological Bulletin No. 15

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio, April 15, 1904

ACKNOWLEDGMENT.—To Superintendent M. E. Haid of Chillicothe, and to Dr. H. S. Pepoon of Chicago, we extend thanks for the photos used in making the cuts for this Number. All of the species are common ones and may perhaps be recognized when found. The figure of the Jack-my-Lantern (Fig. 55) will be supplemented in a future No. by a photo of a single specimen natural size—and this very common species then could not be mistaken. This is one that should be learned at once, for attractive as it is, unfortunately it is not an edible species.

AM-A-NI'-TA AGAIN.—The figures given in Bulletin No. 14 are to be most carefully studied. Especial attention was called to the presence of a *vol'-va* (usually conspicuous) and the *an'-nu-lus*—these terms being also there explained. The vol'-va forms a *universal veil* in the young stage, that is, a layer of thin tissue that entirely envelopes the young plant; it is more or less *free* from the cap. When the veil is attached and inseparable, not easily distinguishable, the botanists say it is "concrete" with the pileus.

Fig. 54 HY-PHO-LO'-MA LAC-RY-MA-BUN'-DUM. Cap and stem tawny, light yellowish, or shades of umber; the surface with soft and floccose scales. The flesh is tinged yellowish or brownish, soft and easily broken. Height 2 or 3 inches, cap one or two inches wide. The spores are purple-brown in the HY-PHO-LO-MAS, the gills attached to the stem, rarely or never with a ring, or annulus. Atkinson says the edible qualities of HY-PHO-LO'-MA LAC-RY MA-BUN'-DUM have not been tested. From a photo by Supt. M. E. Hard, Chillicothe, Ohio.

University Bulletin, Series 8, No. 14. Entered as Second Class Matter, Post-office at Columbus, O.

How to Handle These Plants.—The Mushrooms must be secured before too old and the presence or absence of the vol'-va determined; to this end, dig them up carefully with a trowel or strong knife—in fact all the species should be collected in this particular way for close inspection or real study. Have a basket of generous size to carry them home. Tissue paper surrounding the moist or viscid kinds will protect them if handled carefully—but one can only learn by experience how to treat delicate and perishable Mushrooms.

Am-a-ni'-ta a large Genus.—In the Third Volume of the Journal of Mycology (pages 25–33) Professor Morgan describes 28 species which is the approximate number of kinds in our country. Peck enumerates 14 New York species in his 33rd State Report. Lloyd has published a Compilation of the Volvae of the United States in which 38 species are enumerated. Illustrations—colored and half-tones—have been published of many of the kinds; see Atkinson's Mushrooms, McIlvaine's One Thousand American Fungi, Peck's illustrated Reports, &c.

Most Species of Am-a-ni'-ta Deadly Poisonous.—Reasonable care based on proper examination may banish any fear entertained relative to Mushrooms that resemble the Am-a-ni'-tas. The latter are poisonous as is well known—but that should not interfere with an intelligent interest in them and all other fungi too. There are hundreds of palatable and delicious Mushrooms and it is rare that they resemble any species of Am-a-ni'-ta or could be mistaken for one of these poisonous kinds. It is remarkable that the Am-a-ni'-ta called Caesar's Mushroom (the botanical name being *Am-a-ni'-ta cae-sa'-re-a*) is not poisonous but edible; it is a large and beautiful Toadstool, orange or yellow throughout but the vol'-va is white and prominent.

A-man-i-top'-sis.—The Mushrooms so named by the botanists are like Am-a-ni'-ta (that is what the word means) except they never have a ring, or an'-nu-lus. They bear no bad reputation amongst fungus-eaters, and at least a dozen species occur in our country.

Lep-i-o'-ta.—This genus has many common representatives, and though near relatives of Am-a-ni'-ta they are not poisonous—or at any rate only a few are to be let alone. In the Lep-i-o'-tas there is no sac-like vol'-va; but the an'-nu-lus, or ring on the stem, is present. Figure 56 is a representative of this genus.

Comparison of Am-a-ni'-ta, A-man-i-top'-sis, and Lep-i-o'-ta.—These majestic Toadstools will likely be encountered in great numbers during the season, and too close attention can not be given them. With but one or a very few exceptions the species of Am-a-ni'-ta are *deadly poisonous*—therefore do not eat Mushrooms indiscriminately; the tasting and testing should be done with great caution when it pertains to the forms here under consideration. Neither must it be assumed that all the representatives of A-man-i-top'-sis and Lep-i-o'-ta are edible—most of them are but some certainly are not. The fine large Mushroom called Lep-i-o'-ta mor-gan'-i (Professor Morgan discovered this species several years ago and Professor Peck named it) is eaten by some, but it is very inimical to most persons so far as tested. In all the representatives of these three genera the stem is *fleshy* rather than *cartilaginous*, and the gills are usually free, *i. e.* not attached to the stem. The cap is *easily separable from the stem.* The striking differences pertain to vol'-va and ring, or an'-nu-lus, thus:

Volva and ring present.....Am-a-ni'-ta
Volva present, ring wanting.....A-man-i-top'-sis
Volva wanting, ring present.....Lep-i-o'-ta

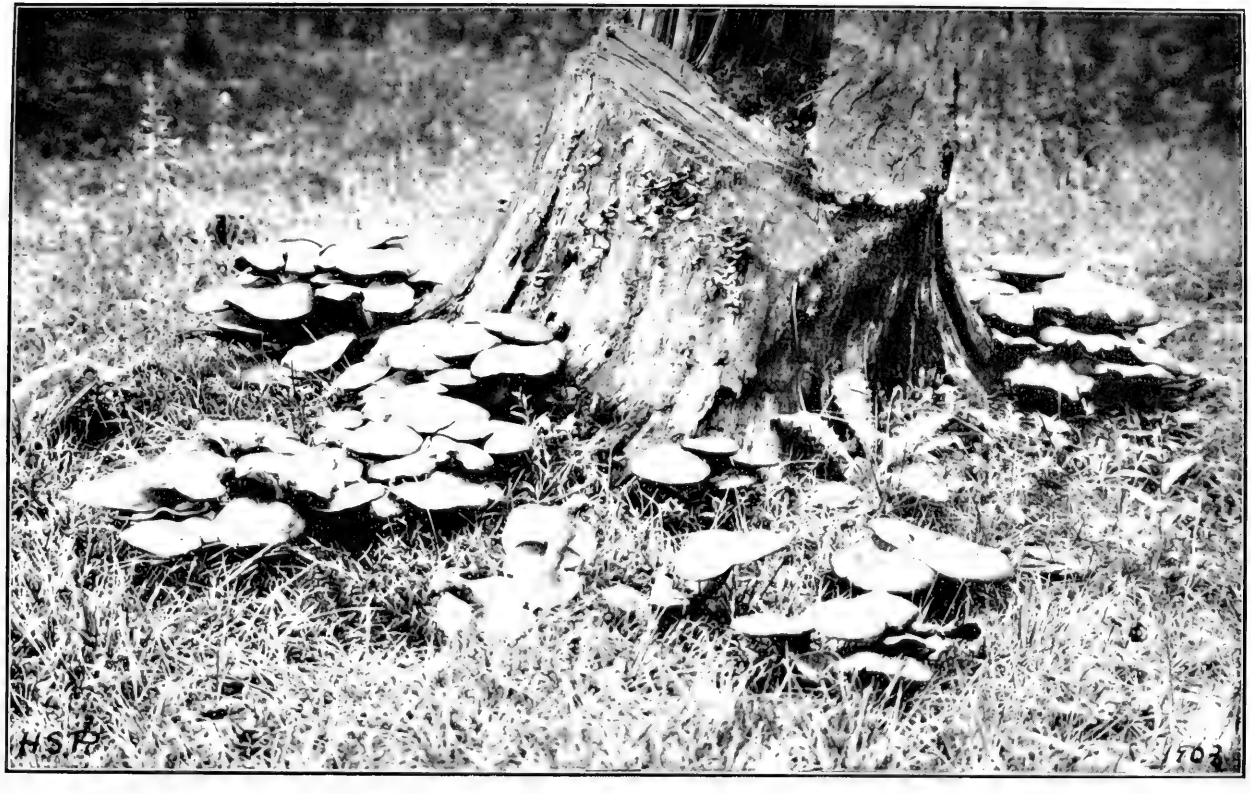


Fig. 55. Cli-toc'-y-be il-lu'-dens. Jack-my-Lantern. Not Edible. Very large, orange yellow; gills phosphorescent when fresh. Photo by Dr. Pepoon, Chicago.

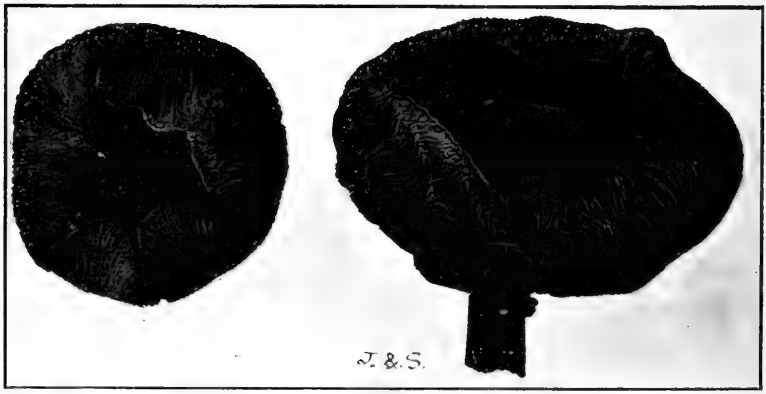


Fig. 56. Lep-i o'-ta a-mer-i-ca'-na. American Lepiota. Edible. Plants 3 to 4½ inches high. The cap is 2½ to 4 inches broad, at first white then reddish or brownish with scales except at center. The white flesh becomes reddish when cut or bruised and the whole plant *turns reddish in drying*. The cap in age becomes sometimes strongly recurved as the two lower specimens show. To be looked for in July and later. The upper figures from photo by Supt. M. E. Hard, Chillicothe; the lower made from specimens collected on a pile of old saw-dust, Columbus.

List of Members of the Mycological Club, 1904, to be resumed in next No.

The Mycological Bulletin is issued from time to time and sent to all members of the Mycological Club. All eligible to membership who are interested in Nature or the Bulletin. Fee, 10 cents. A few copies of Vol. I remain; price 50 cents each.

Mycological Bulletin No. 16

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio, May 5, 1904

THE ILLUSTRATIONS.—The Bird's-nest Fungus is such a common thing that a figure and name will doubtless be welcomed by many, and accordingly that from the Nina L. Marshall *Mushroom Book* has been used by permission of the publishers. The cut on the third page of this Number supplements Fig. 55 given in Bulletin No. 15. For the figure of Pluteus cervinus, a common edible species, we are indebted to Supt. M. E. Hard. To him, and to all others who have kindly sent photos of Mushrooms thanks are extended.

MY COLUMBUS BOOKSELLER.—It will meet the wishes of many to call attention to the fact that Mr. L. S. Wells, Columbus, Ohio, will promptly supply any of the Mushroom books upon request. He furnishes these at *special rates* to members of the *Mycological Club*. Note was made of this last year and some quotations then given, as, Marshall's Mushroom Book, $3.00, rebate 20 cts.; Atkinson's Mushrooms Edible and Poisonous, $3.00, rebate 40 cts.; McIlvaine's One Thousand American Fungi, $5.00, rebate 20 cts.; in all cases Mr. Wells prepays transportation.

CLI-TOC'-Y-BE IL-LU'-DENS or JACK-MY-LANTERN.—Some account was given in Bulletin No. 9 (p. 33-4) of this large orange or saffron-colored Gill-Mushroom, so common about old stumps and similar localities, easily recognized by the size, habit of growth, color, absence of annulus, or ring, and the phosphorescence of the gill-portion of the fresh specimens. Fig. 55 (p. 59) showed the species in the natural habitat. The cut which we add, Fig. 58, shows a near view of a single plant fully mature, in fact showing signs of decrepitude, and in such specimens the color is sordid or brownish. Note that the gills are *de-cur'-rent*; *i. e.* attached to and running down the stem.

Fig. 57. BIRD'S-NEST FUNGUS. This is shown because a common and attractive little thing—not to be thought of in an esculent sense. Two genera are represented abundantly in our flora, *Cy-a'-thus* (the above) and *Cru-cib'-u-lum*, but perhaps only botanists would be concerned in their distinguishing characters. The "eggs" in the nest contain the spores, and the plants are near relatives of the Puff-balls. From the Mushroom Book; Doubleday, Page & Co., publishers.

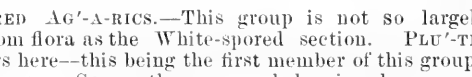
University Bulletin, Series 8, No. 15. Entered as Second Class Matter, Post-office at Columbus, O.

It is a white spored Agaric—the decurrent gills, absence of volva and annulus, the texture of the stem and cap similar and the former not breaking away readily from the latter, being the characters which are peculiar to the genus Cli-toc'-y-be. From one to two dozen American species have been enumerated. Many of them have not been tested but at present only one species is known to be injurious, and that is precisely the one specially mentioned above and shown in Figs. 55 and 58, namely, the showy Jack-my-Lantern Fungus. This is injurious to most people, and should be *tested with due caution.* Some correspondents claim that people have eaten it with immunity. McIlvaine says "many eat and enjoy it".

PLU'-TE-US CER-VI'-NUS; FAWN-COLORED PLU'-TE-US — This edible Mushroom belongs to the *Rosy-spored* group of Ag'-a-rics. The genus Plu'-te-us has no volva or annulus. The stem is easily separated from the cap—in fact it is almost a regular "ball and socket" joint. The substance of the cap, when the stem thus readily separates, is said to be "*not continuous*" with the stem; were it "*continuous with the stem*" it would be difficult or impossible to make the separation without much injury to the tissue. When PLU'-TE-US CER-VI'-NUS is quite young, or before fully mature and ready to discharge its flesh-colored spores, the gills are white but eventually take on the characteristic pinkish color, and its positive identification is then possible. The cap is grayish brown, or sometimes sooty, but some forms of the plant are entirely white and only the gills show a coloration. It grows on the ground from underground rotten wood, on stumps, logs, etc., and may be found from early Spring to late Autumn.

SPORE-COLOR IN AG'-A-RICS.—Beginners might be reminded that the *Agarics* are the *Gill-Mushrooms,* and that they may be grouped according to the color of the spores. A spore-print (see p. 10) should be made on white paper (but for spores that are probably white, use colored paper); then the Mushroom can, from the color of the spore mass, be placed in one of the following groups: *White-spored, Ochre-spored, Rosy-spored, Brown-spored* or *Black-spored.*

ROSY-SPORED AG'-A-RICS.—This group is not so largely represented in our Mushroom flora as the White-spored section. PLU'-TE-US, shown in Fig. 59, belongs here—this being the first member of this group illustrated so far in the BULLETIN. Some other genera belonging here are CLAU'-DO-PUS, VOL-VA'-RI-A, EN-TO-LO'-MA, CLI-TOP'-I-LUS. In Clau'-do-pus alone is the stem *ec-cen'-tric* (not in the center) or wanting and the pileus lateral; Vol-va'-ri-a has a *vol'-va*; in En-to-lo'-ma the spores are *angular*; in case of Cli-top'-i-lus the gills are *de-cur'-rent.* It is hoped that photos may be obtained of some of these interesting Toadstools for reproduction in the BULLETIN.



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(TO BE CONTINUED)

Fig. 58. CLI-TOC'-Y-BE IL-LU'-DENS. JACK-MY-LANTERN. NOT EDIBLE. The orange or saffron-colored Mushroom described on p. 61 and figured on p. 59 as usually seen growing. This illustration is nearly natural size, but some specimens may be 8 inches high, and the cap 6 inches broad. Its large size, bright yellow color and phosphorescence combine to make it an interesting and attractive species, but as remarked elsewhere, it can not be eaten with impunity. From a photo of a plant collected near Sandusky, Ohio.

Fig. 59. PLU'-TE-US CER-VI'-NUS. "FAWN-COLORED PLU'-TE-US. EDIBLE. Belongs to the Rosy-spored section of the Gill-Mushrooms. A common and widely distributed species occurring throughout the season, growing from rotten wood, sometimes on the ground but usually on stumps, logs, etc. The mass of spores is plainly flesh-colored the pinkish color evident in the gills when they are quite mature though at first they are white. Usually the plants are grayish or even dark-colored; in the woods some specimens of pure white may be found. The absence of volva and annulus, and the ease with which the stem may be twisted out of a socket-like cavity of the cap together with color of spores, enables one readily to recognize the species, which is delicious for the table. It is 3 to 6 inches high, the cap 2 to 4 inches broad. From Photo by Supt. M. E. Hard, Chillicothe, Ohio.

A copy of Vol. I bound in cloth may be obtained for 75 cents.

List of Members of the Mycological Club, 1904—See page 62.

The Mycological Bulletin is issued from time to time and sent to all members of the Mycological Club. All eligible to membership who are interested in Nature or the Bulletin. Fee, 10 cents. A few copies of Vol. I remain; price 50 cents each.

Mycological Bulletin No. 17

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio, May 28, 1904

THE ILLUSTRATIONS.—We are indebted to the Messrs. Bowen-Merrill Company, publishers of ONE THOUSAND AMERICAN FUNGI, for the four half-tones which embellish the present NUMBER. These illustrate species not be-

Fig 60. CLI-TOC'-Y-BE MON-A-DEL'-PHUS. CLUSTERED CLI-TOC'-Y-BE. FRESH YOUNG PLANTS EDIBLE. This species was named by Professor Morgan in allusion to its cespitose habit—the clusters being dense, and found during autumn on the ground in wet woods. The cap is said to be honey-colored, varying to pallid brownish or reddish. The stem is solid, crooked or twisted, tapering at the base, pallid brownish or flesh color. Gills short de-cur'-rent not crowded, pallid flesh color. Cut from McIlvaine's One Thousand American Fungi, made from a photo by Dr. J. R. Wiest.

University Bulletin, Series 8, No. 16. Entered as Second Class Matter, Post-office at Columbus, O.

fore shown in the Bulletin, and at the same time furnish a fair sample of the figures (not colored) used in that well known book, which has been spoken of by one of our members as a real "Encyclopoedia of American Mushrooms." The numerous colored plates in that work are from studies by the author, Charles McIlvaine.

LEP-I-O'-TA NAU-CI'-NA; SMOOTH LEP-I-O'-TA.—The American plant was named Lep-i-o'-ta nau-ci-noi'-des [*like nau-ci'-na*] by Professor Peck since it differed slightly from the European Lep-i-o'-ta nau-ci'-na, but mycologists generally do not regard it as specifically distinct, hence the use of the first name. It is to be found in the latter part of the summer and autumn, in lawns, pastures, etc. It is entirely white or the cap is sometimes buff, and the gills (which are at first white) become in age dirty pink in color. The plant grows from 2½ to 4½ inches high and the cap may be from 2 to 4 inches broad. The stem is gradually enlarged below, *i. e.* cla'-vate, or club shaped. This species is much like the common Mushroom (*A-gar'-i-cus cam-pes'-tris*) but the gills do not, as in the latter, become *brown* when old. Close inspection will also separate it from poisonous species of *Am-a-ni'-ta*, which have a *vol'-va*; the Lep-i-o'-tas never show this structure.

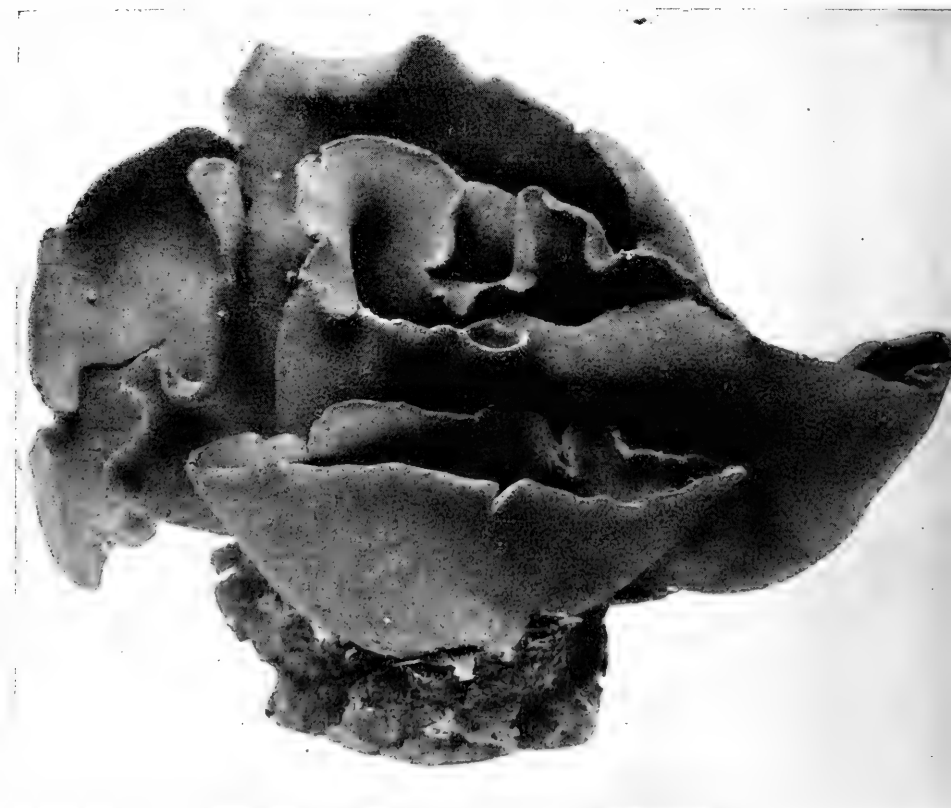

Fig. 61. PE-ZI'-ZA BA'-DI-A. BROWN PE-ZI'-ZA. EDIBLE. A bay or umber brown plant, growing in clusters, on bare ground, in the grass or where it has been burned over. The disk of the cup is dark brown, externally paler and minutely granular, often with a purplish tinge. The cut is from McIlvaine's One Thousand American Fungi, made from a photo by Mr. C. G. Lloyd, Cincinnati, Ohio.

Fig. 62. Lep-i-o'-ta nau-ci'-na. Smooth Lep-i-o'-ta. Edible. From McIlvaine's One Thousand American Fungi. See preceding paragraph for notes

Fig 63. LEP-I-O'-TA PRO'-CE-RA. *Parasol Mushroom.* YOUNG PLANTS EDIBLE. This splendid species grows in pastures, by roadsides, in the woods, etc., during summer and early autumn. The cap is greyish brown or reddish brown but the flesh is white. It is oval, then bell shaped, later convex, and then nearly expanded to a plane; there is a marked elevation in the center and this is called the *um'-bo.* The ring on the stem is usually movable. Cut from McIlvaine's One Thousand American Fungi, the photo taken by Dr. J. R. Wiest.

List of Members of the Mycological Club, 1904, to be resumed in next No.

The Mycological Bulletin is issued from time to time and sent to all members of the Mycological Club. All eligible to membership who are interested in Nature or the Bulletin. Fee, 10 cents. A few copies of Vol. I remain; price 50 cents each.

Mycological Bulletin No. 18

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio, June 25, 1904

THE ILLUSTRATIONS.—Although the Mushrooms shown in this NUMBER are not the common edible forms, they are attractive and peculiar, and our interest in them need be none the less because we can not enjoy them as esculents; they are however not inedible and the *Phallus* particularly is considered a delicacy—to be used only of course in the egg stage. But there are other uses for plants even those of low degree and the editor being a schoolmaster will give a little lecture touching one phase of the subject—see next paragraph.

ECONOMY OF NATURE.—A brief paragraph may lend itself to the discussion of the group of Fungi, particularly to the *sap-ro-phyt'-ic* forms as factors in Nature's economy. The common plants—those which possess *chlo'-ro-phyll*, as the green coloring matter is called—are independent; they take from the air and soil inorganic matter, convert it with the aid of the light-energy that comes from the sun, into organic material out of which the vegetable fabric (and ultimately animal tissue) is built up. But the fungi are *dependent* plants; being destitute of *chlo'-ro-phyll* they rely for their food on living plants or on dead organic matter;—if the former we call them *par'-a-sites*, if the latter we say they are *sap'-ro-phytes*. Now all the Mushrooms and the common Bacteria are Saprophytes and their food is the organic matter—mainly dead wood, leaves, dead animal matter, etc. Those Mushrooms that grow out of the soil really use as food not the mineral soil particles, but the

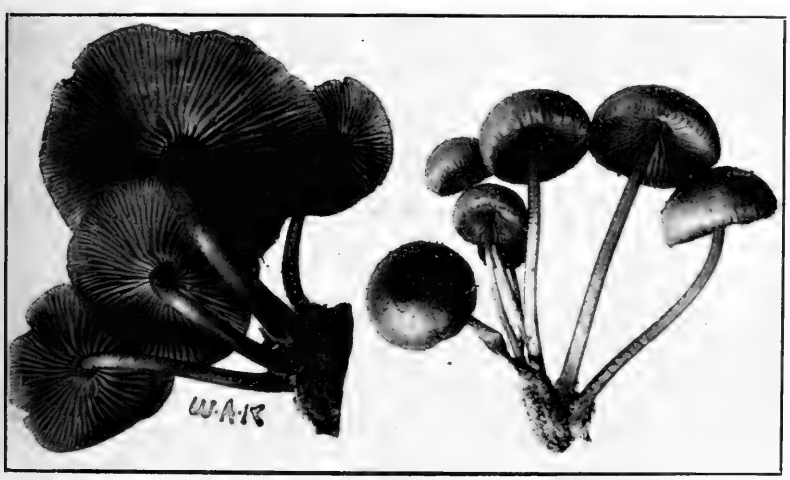

FIG. 64. MY-CE'-NA LEA-I-A'-NA. LEA'S MY-CE'-NA—This deeply salmon-tinted Mycena is one of the most charming little Agarics found in the woods and very common on rotten logs in the vicinity of Columbus. It does not lose all its color in drying, and while it shrivels much the plant is readily recognized in this partially collapsed state. It will be seen mostly in the condition shown at the right, but the deep rich color is displayed to best advantage when the fully expanded form is encountered—the figure at the left exhibiting this interesting phase. Ohio members of the club should know that the specific name was given by the English mycologist Berkeley, and commemorates one of the eminent early botanical collectors, who lived near Cincinnati, Ohio. Photo from specimen collected near Columbus.

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organic matter that is buried beneath the surface. Then it is evident that these plants decompose or reconvert the dead vegetable matter, which, bear in mind, would not of itself change. Logs, stumps, twigs, old leaves, animal substance would remain unchanged forever were not the agents of decomposition at hand, namely, *Bacteria*, *Mushrooms*, *Toadstools*, etc. The products of decomposition are the disorganized and disintegrated organic matter; they are, in other words, the chemical elements or the simple compounds handed back to the inorganic world *for use again as food* for plants, and secondarily for animals. The important work the saprophytes have to perform will be appreciated when we remember that the available quantity of plant food is limited and its continued restoration or replenishment is necessary to the continuance of of the higher plants and of course indirectly to the existence of animals even including man.

The genus My-ce'-na.—These plants are mostly small white-spored Agarics. They are very numerous and so are their near relations, thus even the specialist might despair of really knowing all of them. They resemble some of the other genera very strongly and only careful study will result in positive identification. The genus My-ce'-na is closely related to Col-lyb'-i-a, says Atkinson. The plants are usually smaller, many of them being of small size; the cap is usually bell-shaped, rarely umbilicate [that is, with a small abrupt depression at top], but what is a more important character the margin of the cap in the young stage *is straight* as it is applied against the stem and not at first incurved as it is in *Collybia*, when the gills and margin of the pileus lie against the stem. The stem is cartilaginous as in *Collybia* and is usually hollow. The gills are not decurrent or only slightly so by a tooth-like process. Some of the species are apt to be confused with certain species of *Om-pha'-li-a* in which the gills are but slightly decurrent, but in *Omphalia* the pileus is umbilicate in such species, while in *Mycena* it is blunt or umbonate. Some of those which grow on leaves might be mistaken for species of *Ma-ras'-mi-us*, but in the latter the plants are of tough consistency, and when dried will revive again if moistened. In the above manner a specialist states the case but the apparent difficulty should not bring discouragement—an abundance of material will be favorable for repeated study of common forms that are encountered.

The Phal'-loids, or Stink-Horn Fungi.—It has been previously explained that two of the larger and important groups of Fungi are the *As'-co-my-ce'-tae* and the *Ba-sid'-i-o-my-ce'-tae;* the former having spores produced in an enlarged cell, called an *as'-cus*, and the latter bearing the spores on pedicels growing out of an enlarged cell, called a *ba-sid'-i-um*. The species of Pe-zi'-za for example, belong to As'-co-my-ce'-tae; and the Puffballs, Phalloids, and Agarics are members of the group Ba-sid'-i-o-my-ce'-tae.

These microscopic characters might be passed by for the present or for all time, no doubt some beginners and amateurs are inclined to think, yet our knowledge of the multitudes of Fungi will be quite imperfect and our progress in their study much impeded if we do not fully apprehend what is so fundamental in their classification. Then to proceed—The Ba-sid'-i-o-my-ce'-tae includes the two Orders: represented by the Puffballs and the Phalloids, which the botanists call *Gas'-ter-o-my-ce'-tae;* and the Mushrooms or Agarics and their relatives designated, in botanical language, as the *Hy'-men-o-my-ce'-tae*.

It can be seen from the above where our Stink-horn Fungi or Phalloids belong in the Vegetable Kingdom. And to make the matter more emphatic, recur to the fact that the *Gas'-ter-o-my-ce'-tae* have their spore-bearing layer of tissue (which is called the *hy-me'-ni-um*) enclosed by a wall or covering, that is, a *pe-rid'-i-um* which does not rupture before the maturity of the spores. But in case of the *Hy'-men-o-my-ce'-tae*, the spore-bearing layer (*hy-me'-ni-um*) is borne on a free outer surface—as seen in the "gills" in Mushrooms, &c. The "veil" that in some cases covers the spore-bearing portion of the common Mushrooms is a false pe-rid-i-um, "pseudo-peridium," and ruptures before the maturity of the spores.

Ravenel's Phalloid.—This species is rather common, especially about old saw-dust piles and its vile odor easily identifies the Stink-horn. Stages in its developement are shown in fig. 65.

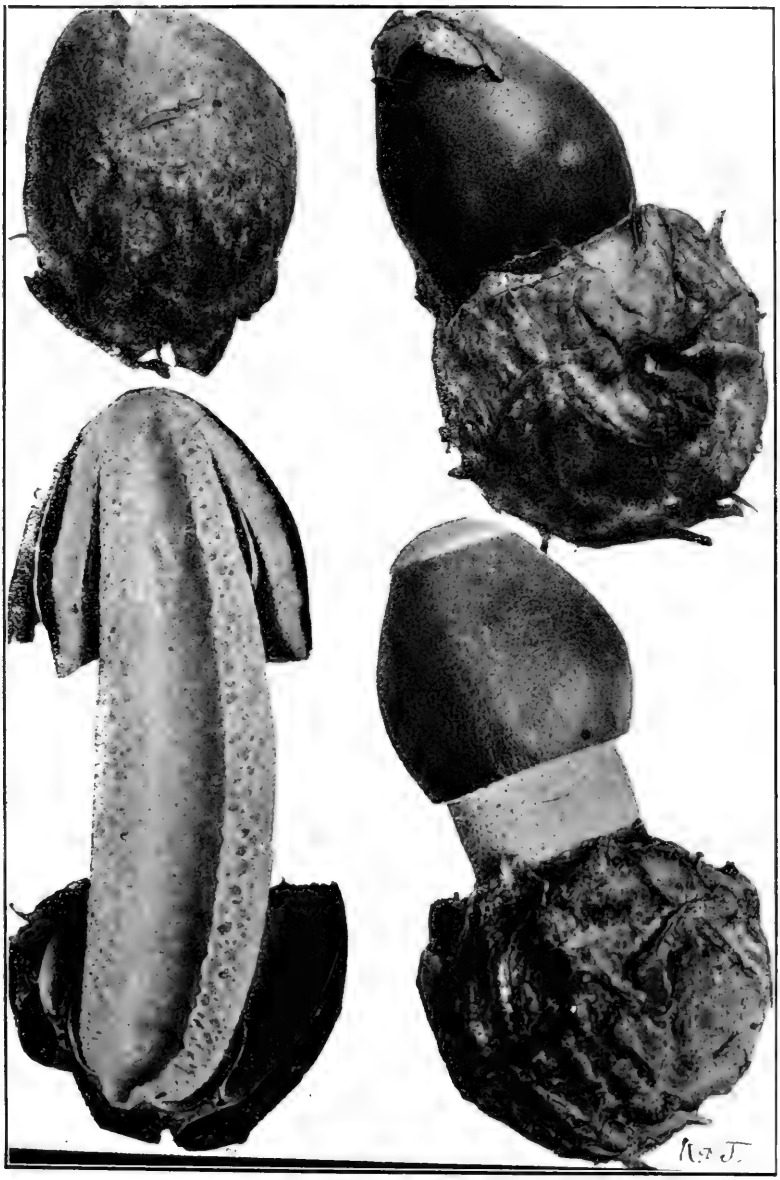

Fig. 65. Dic-ty-oph'-o-ra ra-ve-nel'-i-i. Ravenel's Phal'-loid.—This, like other species of the Stink-horns, is only disgusting in the fully developed stage: the "eggs" are agreeable to the palate. *Caution: Never mistake a poisonous "button" of Am-a-nit'-ta for one of these eggs;* a vertical section will diagnose the specimen. The photographs were made from growing specimens sent from Chillicothe, Ohio, by Supt. M. E. Hard.

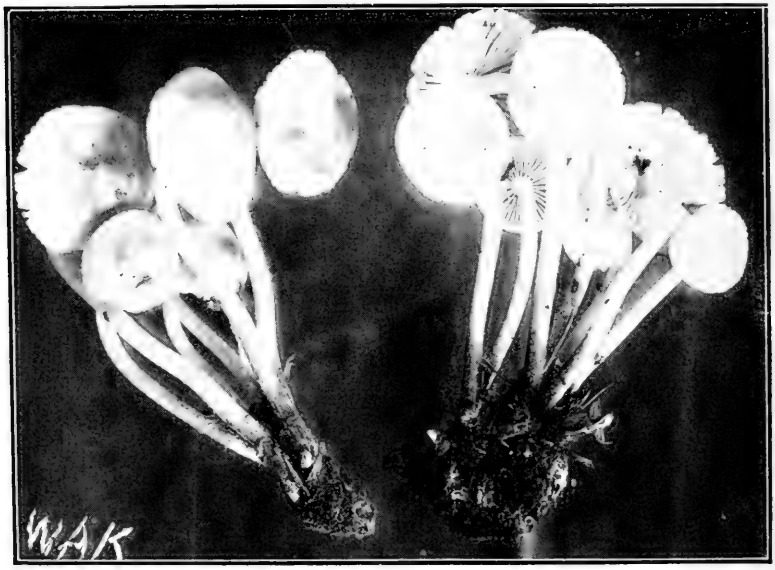

Fig. 66. My-ce'-na stan'-ne-a. Stannate My-ce'-na.—A delicate species that grows in the woods, occurring in tufts on rotten wood in very damp secluded habitats. The general character is well shown in the illustration, being nearly white in color but many of the pilei are rather smoky or a trifle darkened. The species was described by the botanist Fries many years ago from European specimens. The second or specific name is taken from the Latin, and means *tin*—though I do not know that it is very appropriate to characterize these specimens as stannous in appearance. The halftone was made from a photograph of specimens collected May 30, at Sugar Grove, Ohio.

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(to be continued.)

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Mycological Bulletin No. 19

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio, July 15, 1904

ACKNOWLEDGMENT.—We are indebted to Professor L. F. Henderson for the use of the plate from which Fig. 68 is printed. This with other figures appear in a Bulletin (No. 27) of the Idaho Experiment Station, on the food values of fungi. Those interested in that phase of the subject will find in that Bulletin a summary of our knowledge thereto pertaining. In this connection attention might be called to Professor Atkinson's instructive chapters (in Mushrooms Edible and Poisonous) on Selection and Preparation of Mushrooms for the Table; Uses of Mushrooms; Cultivation of Mushrooms; Recipes for Cooking Mushrooms; Chemistry and Toxicology of Mushrooms.

THE GENUS HY-PHO-LO'-MA.—This is included in the section of Brown-spored Agarics, the spores being purple brown. The veil when ruptured clings to the margin of the pileus so that rarely or never is there present, on the stem, a ring or annulus. The genus is closely related to *A-gar'-i-cus* and *Stro-pha'-ri-a*, but in these genera an annulus is present. Several species of *Hy-pho-lo'-ma* are common and they are edible. Four species are illustrated by half-tones and fully described in Atkinson's Mushrooms. McIlvaine

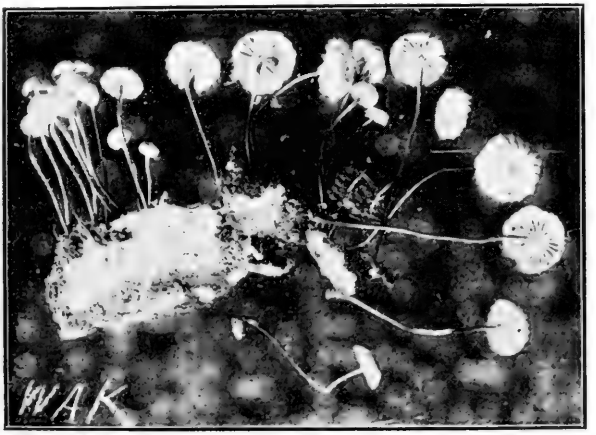

FIG. 67.—MA-RAS'-MI-US RO'-TU-LA. This beautiful little Ma-ras'-mi-us grows on sticks and leaves and seems to be a common species in our woods. The pileus is one-half inch or less in breadth, and white or whitish in color. The stem or stipe is whitish above. Morgan describes the species as follows: Pileus membranaceous, a little convex, umbilicate, plicate; stipe horny, hollow, shining, glabrous, blackish; lamellæ few, broad, distant, joined behind to a free collar, whitish. The cut above was made from a photograph of specimens collected in a woods near Columbus.

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includes 14 species in One Thousand American Fungi, one species illustrated by a half-tone plate, and three species shown in a colored plate. We have shown. in the Mycological Bulletin, *Hy-pho-lo'-ma sub-lat-er-i'-ti-um* on page 25, and *Hy-pho-lo'-ma lac-ry-ma-bun'-dum* on page 57.

RAVENEL'S PHAL-LOID.—On page 71 a figure was given of *Dic-ty-oph'-o ra ra-ve-nel'-i-i*, or in simple language, Ravenel's Phalloid; but space was wanting for an account of the specimen's from which the photograph was made and reference to the interesting characters of this fungus. The fresh "eggs" — such as shown in the left figure above — were sent in quantity by Supt. M. E. Hard, of Chillicothe, and keeping them moist in Sphagnum. the development took place with considerable rapidity, as indicated in the successively developed forms in the plate on page 71 The thick *volva* ruptures at the apex with one or two wide clefts and the central column then elongates rapidly. The cap-shaped or bell-shaped pileus is covered with the spore bearing layer which is called the *gle'-ba*.

In Ravenel's Phalloid the surface of the pileus is merely granular or minutely wrinkled after the gleba melts away, but in other species there is a conspicuous reticulation of ridges and crests, remotely suggestive of the pitted cap of a Morel. The plant presented in longitudinal section shows that the stem is hollow, and this cavity extends quite to the apex, the perforation being conspicuous from above where it is surrounded by a broad light-colored circular lip. The pitted or spongy character of the tissue of the stem can be determined from the figure. It can be seen also that the cap or pileus is attached only near its apex. Beneath the cap is a *veil* — characteristic of this genus.

Botanists include the Phal-loids and their near relatives in the group called *Phal-lin-e'-ae*, of which about 50 species have been described. Most of the forms are found in the Tropics — especially in Australia; about 10 species are reported for North America.

The group contains the two orders, *Clath-ra'-ce-ae* and *Phal-la'-ce-ae;* the latter includes the Phal'-loids or Stink-horns and they are enumerated under 7 different genera. The species most likely to be encountered are members of the genus *Dic-ty-oph'-o-ra* (as shown in Fig. 65, alluded to in the account above) and *Ith-y-phal'-lus*. The unbearably vile-smelling Stinkhorn, common in our region, is *Ith-y-phal'-lus im-pu'-di-cus*.

THE IVORY HY-GROPH'-O-RUS.—This species, which we illustrate on the opposite page, is common in pine woods in Idaho according to the interesting account by Professor L. F. Henderson. He says that it occurs in immense quantities—tons upon tons could be collected in the wooded hills of Idaho from September to December—and although coated with a slimy covering, causing it often to slip from the hands like an eel, when cleaned nicely and cooked into a stew makes a delicate dish of oyster flavor — having a decidedly vegetable rather than meat flavor. The plants are from one to four inches wide and three to six inches high. The entire plant is white and the gills are decurrent. The pileus is rather thick, generally flat or convex, though in age it may become tilted upwards; it is always incurved along the edge when young.

Professor Henderson says many other species of this interesting genus are to be found abundantly in fir woods, or in forests of mingled pine and fir, but he has reserved the discussion of these for his future Bulletins. It is supposed that all of the species are edible; they present various shades of colors from white, yellowish-white, yellow, yellowish-red, to dull brownish or dirty olive. He says, besides, that they all agree in the following important generic characters:

The gills are rather distant, of a waxy consistency, broadening towards their attachment to the cap; and the central portion of the gill, called the *tra'-ma*, is but a continuation of the material of the pileus, so that when they are pulled off from the cap they each leave a projecting line of the trama behind them on the cap.

This genus is closely related to *Can-tha-rel'-lus*, but in the latter the gills are blunt and forked.

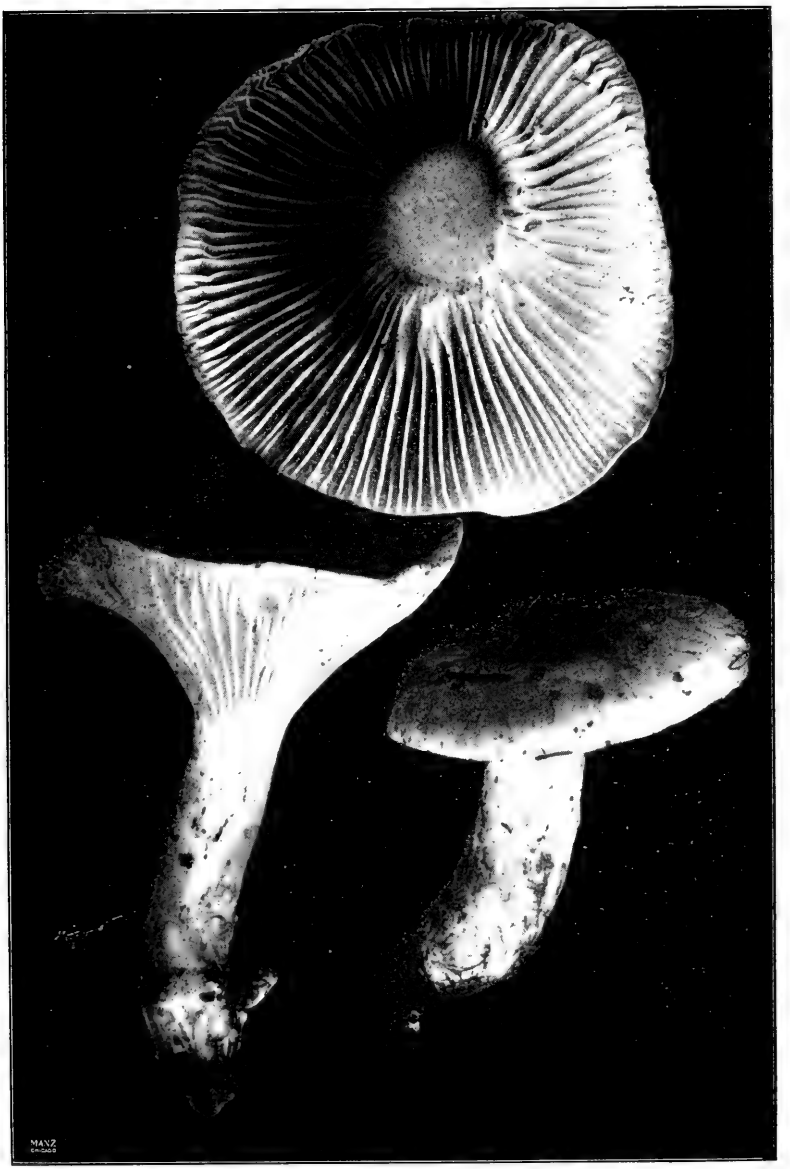

Fig. 68. Hy-groph'-o-rus e-bur'-ne-us. Ivory Hy-groph'-o-rus. Edible. The half-tone is kindly furnished by Professor Henderson, who first used it to illustrate a Bulletin (No. 27) published by the Idaho Experiment Station, and referred to in the first paragraph of this number of the Mycological Bulletin. The specimens were collected at Moscow, Idaho.

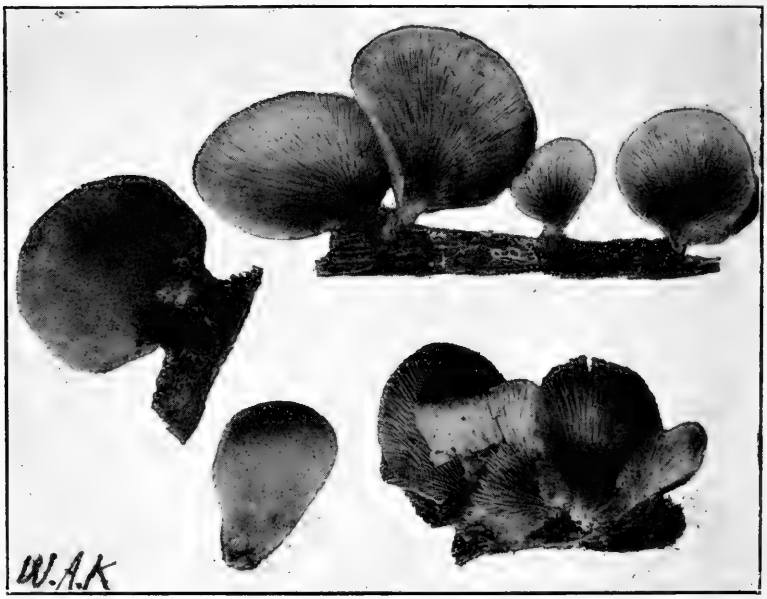

FIG. 69.—PA'-NUS AN-GUS-TA'-TUS.—NARROW PA'-NUS. This is a fleshy-coriaceous fungus more or less spatulate or flabelliform. It is minutely hairy and of a dirty white or yellowish color. The stem is very short or altogether absent. The gills are very numerous and crowded; they are decurrent. The species is common in the woods. Morgan says this and *P. dealbatus* are two fine new species first discovered by Mr. Lea. It was described and named by Berkeley, a pioneer English mycologist. The cut was made from a photograph of specimens collected on a rotten log near Columbus.

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Mycological Bulletin No. 20

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio, August 25, 1904

BACK NUMBERS OF THE BULLETIN.—Single odd Nos. will be furnished gratis to subscribers when needed to complete sets, *but No. 2 is entirely exhausted.* Will all those who have an extra copy of this *No.* kindly return same to the Editor who then can accommodate others. Unfortunately only a *very few* complete sets of Vol. I are left but the price will remain as before noted, namely, 50 cents; for bound copies, 75 cents.

ACKNOWLEDGEMENT.—We take pleasure in thanking Dr. Wm. Trelease for the use of the beautiful cut of Lepiota on the last page of this *No.*, originally published in the Annual Report of the Missouri Botanical Garden. Another from the same source will follow.

DESCRIPTIONS.—At the risk of seeming technical, suggestions and directions are given on the inside pages of this *No.* for critical study of *Mushrooms.* Really very many ought to lay hold of this matter seriously, ergo profitably, —particularly teachers of Nature Study and of Botany. The two pages will be reprinted on a single narrow leaf for convenience of the strenuous. Additional suggestions to appear on page 81.

Fig 70. CLI-TOC'-Y-BE IN-FUN-DIB-U-LI-FOR'-MIS. FUNNEL CLI-TOC'-Y-BE. A neat little toadstool collected in woods near Sandusky, Ohio.

University Bulletin, Series 8. No. 30. Entered as Second Class Matter, Post-office at Columbus, O.

FIELD STUDY OF MUSHROOMS

(AGARICACEAE)

USE THE BLANK ON REVERSE SIDE

Field study is necessary in case of *Mushrooms with soft fleshy texture.* They cannot be prepared for the herbarium in any way that will fully retain the characters of the fresh plant. But dried specimens are not useless—prepared with care they serve to interpret the descriptions that are drawn up from the fresh specimens.

Abundant specimens should be dried quickly by fire-heat in a wire rack placed over a stove or lamp. They should then be stored in pasteboard boxes—not moistened and pressed flat as is sometimes advised.

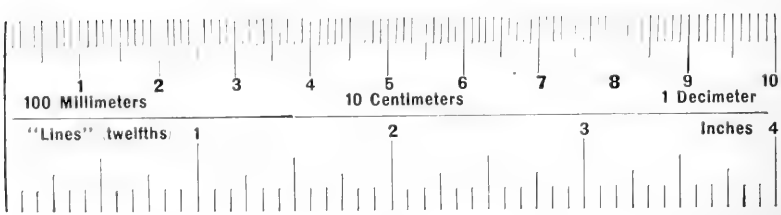
To kill larvae or infesting insects: Put the specimens in a small box with tight-fitting lid and with them place a little Carbon Bisulphide (in a small dish, or saturate a wad of cotton); this volatile substance will prove effectual in an hour or in several hours if specimens are large. The vapor of the Carbon Bisulphide is *highly inflammable*—do not use it at night or near a stove. It is well to keep moth balls in the boxes with the specimens.

The blank on the reverse side and the ideas above are compiled for the most part from Prof. Earle's article in Torreya. He also adds the pertinent suggestion that the discriptions be supplemented by photographs and water-color sketches.

It is scarcely necessary to add that an ample quantity of complete specimens should be at hand when making out the descriptions; the plants should be *dug* up or a portion of the *matrix* removed—never broken off and leaving the basal part. All stages in development should be illustrated. Particularly the change of colors should be noted. Gills, for example, as well as spores when immature may be pure white, but take on a characteristic color with age. It is suggested that Prang's nomenclature of colors be used. ("The Prang Standard of Color," Popular Edition, No. 1, One Dollar; Louis Prang, Boston, Mass.)

For package of these descriptive blanks, send five cents to

W. A. KELLERMAN, Columbus, Ohio



No. ____

Name ____

Habitat ____

Locality ____

Date ____

Collector ____

PILEUS

- *Width* ____
- *Shape* ____
- *Color* ____
- *Surface* ____
- *Margin* ____

GILLS

- *Attachment* ____
- *Number* ____
- *Shape* ____
- *Color* ____
- *Spores* ____

Veil ____

Annulus ____

STEM

- *Length and Thickness* ____
- *Shape* ____
- *Surface* ____
- *Color* ____
- *Substance* ____

Volva ____

FLESH

- *Color* ____
- *Changes* ____
- *Consistency (incl. Juice)* ____
- *Taste* ____
- *Odor* ____

NOTES:

Described by ____

FIG 71. LEP-I-O'-TA NAU-CI'-NA. SMOOTH LEP-I-O'-TA. EDIBLE. Taken from the Annual Report of the Missouri Botanical Garden, by permission of Dr. Wm Trelease. Further explanation in next Number.

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Mycological Bulletin No. 21

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio, Sept. 5, 1904

THE ILLUSTRATIONS.—Fungi to be found by everybody are shown in this No. and while we have to bear the responsibility of three illustrations, it is to the kindness of Dr. Wm. Trelease that the beautiful cut of Lepiota, Fig. 73, is given on page 82. This is supplementary to Fig. 71 which was published on page 80.

EXPLANATIONS OF THE DESCRIPTIVE BLANK.—Recurring to the blank for descriptions of Mushrooms published in the previous NUMBER for those who wish to study somewhat carefully the Gill-fungi, it has seemed best to suggest a few points that may aid beginners.

First, it is suggested that *all* specimens be *serially* numbered whether they are thoroughly studied, described or figured, or merely collected and sent away for name and comment. Never repeat a number—there is no objection or inconvenience even if the series runs up to hundreds.

The *habitat* is quite important—meaning the place in which the specimen is found or usually grows—as in fields, open woods, thick shady woods, on soil, on stumps, logs, etc.

The *pileus* can be easily described in brief, plain language, as to size, shape and color; the shape is commonly *convex* like the Common Mushroom, but the convexity may be greater when it would be *campanulate* (bell shape), or it may become expanded or *plane* (flattened) as it approaches maturity. If it has a sharp, deep depression (as in Fig. 70) it is said to be *in-fun-dib'-u-li-form;* a slight depression is indicated by the word *um-bil'-i-cate;* if it has a boss or knob (*umbo*) in the centre it is described as *um'-bo-nate.* The pileus may be smooth, scaly, striate, moist, viscid (sticky), water-soaked, etc.; its margin may be straight as applied to the stem or *incurred.*

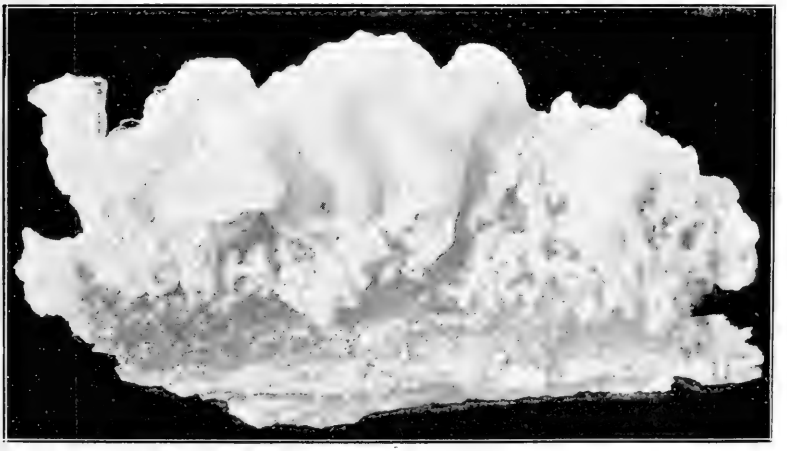

Fig. 72. TRE-MEL'-LA AL'-BI-DA. WHITE TRE-MEL'-LA. EDIBLE. This belongs to the group of *Trembling fungi*, having a gelatinous consistency, when fresh having a soft clammy touch and yielding like a mass of gelatine. The botanists put them in the group of Ba-sid-i-o-my-ce'-tae to which all the Gill fungi and many others belong. This species is common on rotton wood in moist shady places. The specimens were collected near Sandusky, Ohio.

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The *Gills* can not be characterized off-hand so readily and certain technical terms are indispensable. For example, they are said to be broad, narrow, lanceolate, triangular, etc., according to their shape when viewed from the side,—*i. e.*, when the pileus is cut in halves showing the gill in full width and length. The ends of the gills next to the stem are to be especially noted; they are said to be *adnate* when set squarely to the stem and attached; if they run down on the stem they are *decurrent;* but if they are rounded and not attached to the stem they are said to be *free*. In some cases they have a notch or curve at the posterior end (end next to stem), when they are described as *emarginate* or *sinuate*.

The *spores* should always be described as to color seen in mass—the spore print settles this; or a pocket lens or a low power of the microscope can be used to advantage. When a high power is available (say a $\frac{1}{4}$ or a $\frac{1}{6}$) the shape and size of the spores should be recorded.

Doubtless the above suggestions will be ample to guide the beginner who wishes to try his hand on the descriptive blank, which was given in the previous NUMBER. If some question then still persists in the mind, the party is requested to speak out.

Fig. 73. LEP-I-O'-TA NAU-CI'-NA. SMOOTH LEP-I-O'-TA. EDIBLE. This illustration shows a mature specimen of the same Mushroom given under Fig. 71, p. 80. As has been stated elsewhere, the genus *Lepiota* is closely related to *Amanita* but differs from it in not having a *volva*. Careful inspection relative to this point should always be made. The Smooth Lepiota grows in lawns, in pastures, by roadsides, etc. At this season of the year it is quite abundant. It is white or the cap may be buff, and in age the gills become dirty pink in color. Our figure is reproduced from the Annual Report of the Missouri Botanical Garden by permission of Director Wm. Trelease.

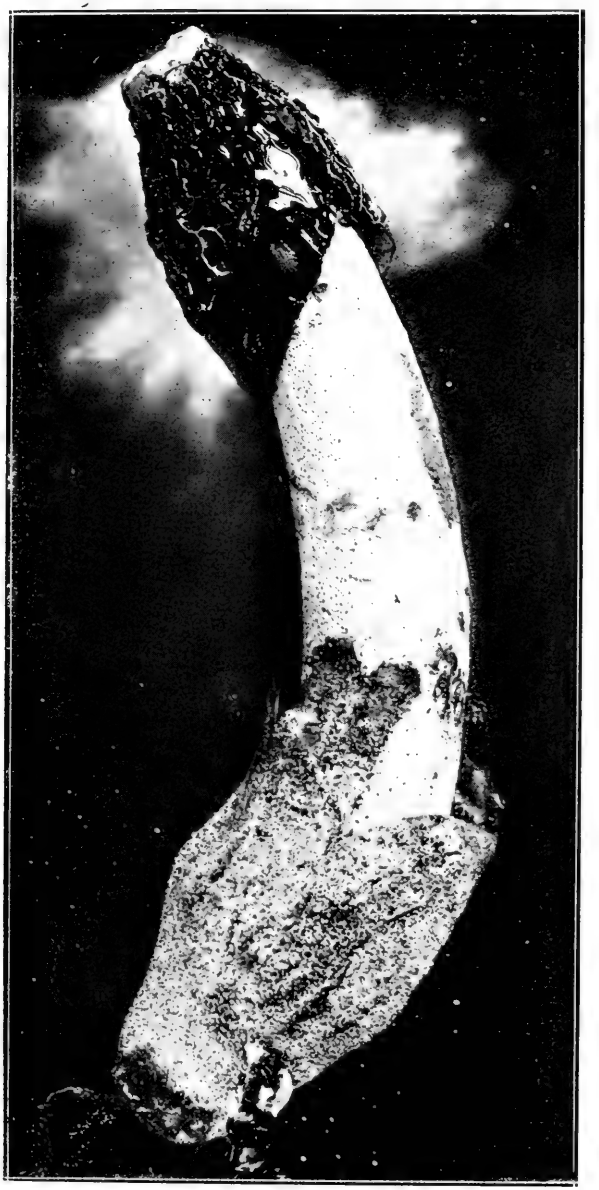

Fig. 74. ITH-Y-PHAL'-LUS IM-PU'-DI-CUS. STINKHORN. This is a common *Phal'-loid* at once known by its peculiar shape and vile odor about which comments may be reserved for the future. The photograph was made from a specimen collected near Sandusky, Ohio, by Professor F. L. Landacre.

Fig. 75. AM-A-NI'-TA RU-BES'-CENS. REDDISH AM-A-NI'-TA. Of these species Professor Atkinson says: "Edible *but use great caution.* It is so-called because of the sordid reddish color diffused over the entire plant, and especially because bruised portions quickly turn to a reddish color." The specimen from which the photograph was taken, was collected in open woods, Johnson's Island, Sandusky, Ohio, by H. H. York.

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Mycological Bulletin No. 22

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio, Oct. 20, 1904

A NEW PROPOSITION.—The publication of the BULLETIN has been satisfactory *so far*, yet it is the opinion of some (including the editor) that more frequent issues would be very desirable. Therefore a tentative proposition is made, namely, to print the MYCOLOGICAL BULLETIN in 1905 as a *semi-monthly* periodical—the total number of pages, illustrations, etc., would in that manner be doubled. For this there would be charged 25 cents a year. I thank those very sincerely who have voluntarily paid more than the regular subscription price of 10 cents; only one half of the cash expense (I may say it privately) has been met by the total receipts. This statement is made simply to justify the charge of 25 cents—in case the Bulletin is enlarged as suggested. If those, who consider this an unfortunate and undesirable step, will kindly

Fig. 76. HEL-VEL'-LA LA-CU-NO'-SA. GROOVED HEL-VEL'-LA. Attractive white plants with irregular caps — near relatives of the Morchellas, or Morels; like the latter they are edible. The deep longitudinal grooves in the stem are characteristic for this species. The specimens from which the halftone was made were collected in moist woods near Sandusky, Ohio.

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protest *at once*, I will know better what course to pursue. If no objection comes and your subscription is *not ordered discontinued*, I will take it that you wish your name continued on the mailing list at the new price.

WHAT MAY THEN BE DONE IN THE FUTURE.—In case the proposed increase in size of the annual volume of the BULLETIN obtains, more illustrations made from photos sent in by subscribers will be published, and this opportunity is taken to urge that abundant photos be sent. The commonest mushrooms and all conspicuous fungi are the very ones most desirable for this purpose. The BULLETIN will continue to be a Leaflet for *beginners* and *amateurs*—students too might perhaps use it to their advantage, and teachers of Botany and those carrying on Nature Study in the schools likewise may find it interesting and profitable. The increased size would not only afford opportunity to double the number of illustrations, but also allow fuller and perhaps more systematic explanations of matters mycological and mycophagical. Many descriptive terms that are technical and difficult—but their use as advantageous as unavoidable—could be explained if more space is available. But I desist—for I have already betrayed too strong *inclination to enlarge the* BULLETIN!

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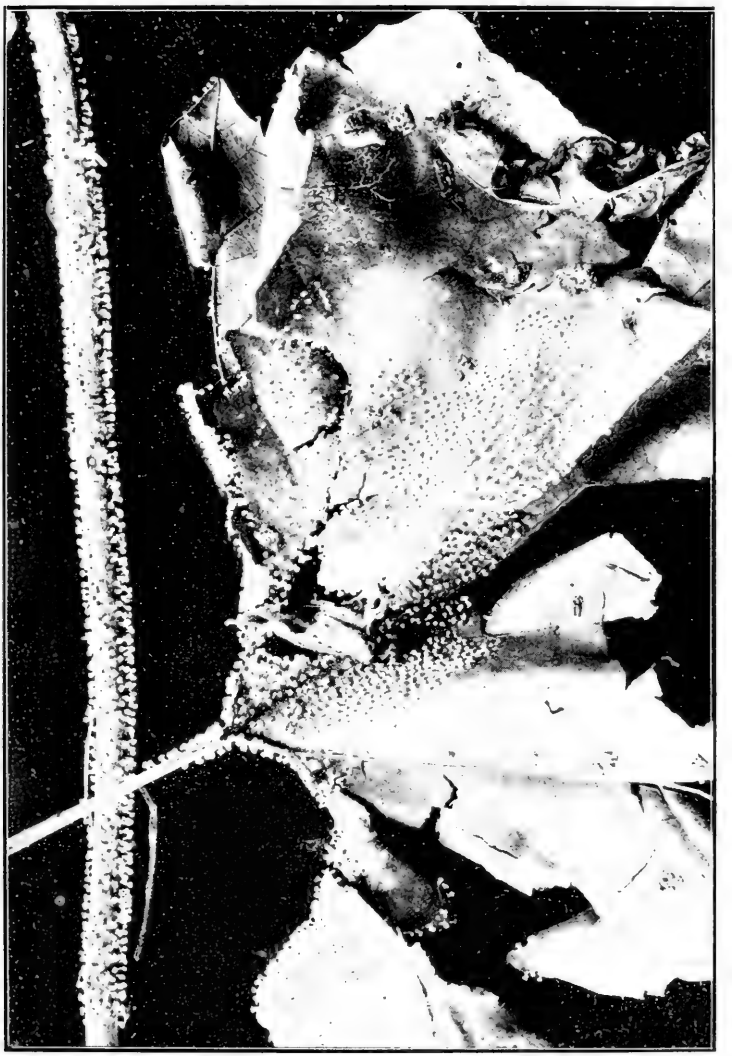

Fig. 77. DI-DYM'-I-UM- SQUA-MU-LO'-SUM. A SLIME MOULD. The Slime Moulds while they are feeding and growing, creep about over decaying vegetation in sheltered places. The slime or jelly-like substance of which they are composed may be yellowish, or occasionally of a deep yellow or bright red color. Finally the soft matter (protoplasm) shapes itself into little bodies as shown in the illustration; other species of course have different forms. The *spores* are formed within the globous receptacles—and were not this reproductive stage in some respects like that of plants, these organisms would unhesitatingly be excluded from the vegetable kingdom. Other species will be shown in the future, and more can be said in regard to these peculiar 'plants.' The above specimens were collected on Cedar Point, near Sandusky, Ohio.

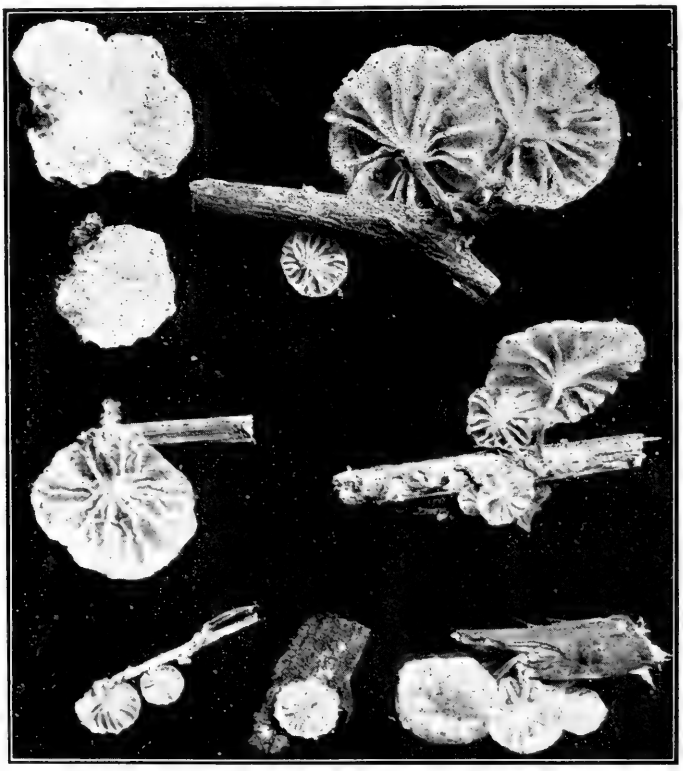

Fig. 78. MA-RAS'-MI-US CAN'-DI-DUS. WHITE MA-RAS'-MI-US. This delicate species grows in moist, sheltered, shady places in woods—its habitat and structure fully illustrated in the half tone presented. The specimens were collected near Sandusky, Ohio, by H. H. York and C. J. Carter.

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Mycological Bulletin No. 23

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio, Nov. 20, 1904

ANNOUNCEMENT.—It has been definitely decided that during 1905 the MYCOLOGICAL BULLETIN will be issued as a Semi-monthly. It will retain its present form, style and character, but the frequency of the issues will be

Fig. 79. A-MAN-I-TOP'-SIS VAG-I-NA'-TA. SHEATHED A-MAN-I-TOP'-SIS. EDIBLE. A common plant in woods being gray or mouse-colored; some forms are said to be brownish or fulvous. The cut shows the conspicuous cylindrical volva and the deep striae or ridges of the pileus. The plant is brittle and fragile. It is a near relative of the genus *Am-a-ni'-ta*, but from the latter *A-man-i-top'-sis* is separated by the *absence of an annulus*. The photo was made from a specimen collected by H. H. York, on Johnson's Island, Sandusky, Ohio, July 20, 1904

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doubled: the total number of pages, cuts, &c. will be twice as many as printed during 1904. The price will be 25c. per annum.

Subscribers are asked to forward the 25 cents at an early convenience; an especial request is made that if in any case it is desired that a name be removed from the mailing list, the person will kindly notify me at once.

PHOTOGRAPHS SOLICITED.—It will be a pleasure to reproduce photos of fungi that subscribers may send for the purpose—and we will not confine our-

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selves strictly to the conspicuous Mushrooms, many of which have been generously illustrated in the good books; but—following the recent suggestion of a subscriber—it is hoped that many of the common smaller forms, interesting fungi of various groups, may find place on the pages of the Semi-monthly leaflet during the year

THE GENUS A-MAN-I-TOP'-SIS.—Some comment has already been made on this genus of white-spored Agarics on a previous page, and especial attention called to the characters that separate *Am-a-ni'-ta*, *A-man-i-top'-sis*, and *Lep-i-o'-ta*—all of which contain many common and conspicuous Mushrooms. On the first page of this No. is shown a common species of *A man-i-top'-sis* that is edible. The volva can be seen, and its affinity to *Am-a-ni'-ta* is thereby indicated; but no annulus is present. In *Lep-i-o'-ta* a ring is present and a volva is wanting. As mentioned before, the cap in all these is easily separable from the stem. By some mycologists *A-man-i-top'-sis* is considered but a subgenus of *Am-a-ni'-ta*, since it differs from that genus only in having no veil. There are about ten American species. Atkinson describes and figures three of the species. McIlvaine mentions ten species and gives colored figures of three of them. None of the species are known to be poisonous. The word *A-man-i top'-sis* means *like Am-a-ni'-ta*.

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Fig. 80. HY-PHO-LO'-MA CAP-NOI'-DES. GRAY-GILL HY-PHO-LO'-MA. Cut from the Idaho Experiment Station Bulletin, No. 27, by L. F. Henderson. This, Prof. Henderson says, is a fine Mushroom, good raw or cooked. MacIlvaine says there is no better Hypholoma. This species has been reported from New York to California.

Mycological Bulletin No. 24

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio, Dec. 24, 1904

End of Second Volume.— It is most gratifying to close the second volume of the Bulletin with even greater interest than was manifested a year ago. This is all the encouragement needed to continue the publication of the Leaflet. Better paper has been used, and I am hoping for possibly better halftones also the coming year. All camera fiends will now see their opportunity! It was only after much hesitation that the price was increased to 25 cents, but I may be excused for this expansion which had, of course, to go along with increase of pages and cuts. When the Bulletin arrives at the "paying basis" there will be another expansion — but the *price will not* be increased again for 99 years.

Notice to Subscribers.— The change in price may possibly disturb the mailing list to some extent, hence it will be a great favor if the annual fee of 25 cents is sent in at once, or the notice sent immediately to remove name when preferred. *The Bulletin is sent to no one gratis.*

The Genus Hy-pho-lo'-ma—This includes several common and interesting fungi with dark brown or purple brown spores. The Greek words from which the word Hy-pho-lo'ma is derived, means *web* and *fringe*; the veil is web-like and adheres to the margin of the pileus. There is therefore no ring or an'-nu-lus. The gills are attached to the stem. The stem is said to be continuous with the substance of the cap; that means, it is not easily separated from it. In Atkinson's Mushrooms Edible and Poisonous there are several beautiful illustrations of some of the species. The cut of Hy-pho-lo'-ma capnoi'-des on the last page of this No. was kindly loaned by Prof. Henderson of the Idaho Experiment Station.

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SUBJECTS.

ILLUSTRATIONS.

ILLUSTRATIONS.—Continued.

Unless otherwise stated in connection with the figures, the photographs were made in the Botanical Department of the Ohio State University. The Assistants helped in part of this work.

The MYCOLOGICAL BULLETIN will be issued in 1905 as a Semi-monthly—total 24 Numbers. The price, 25 cents.

Volume II (12 Numbers unbound) can be supplied to a few persons for 50 cents; *cloth-bound* copies of this Volume, 75 cents.

Volume I *is exhausted*, except a very few cloth-bound copies which may be had for 75 cents.

Mycological Bulletin

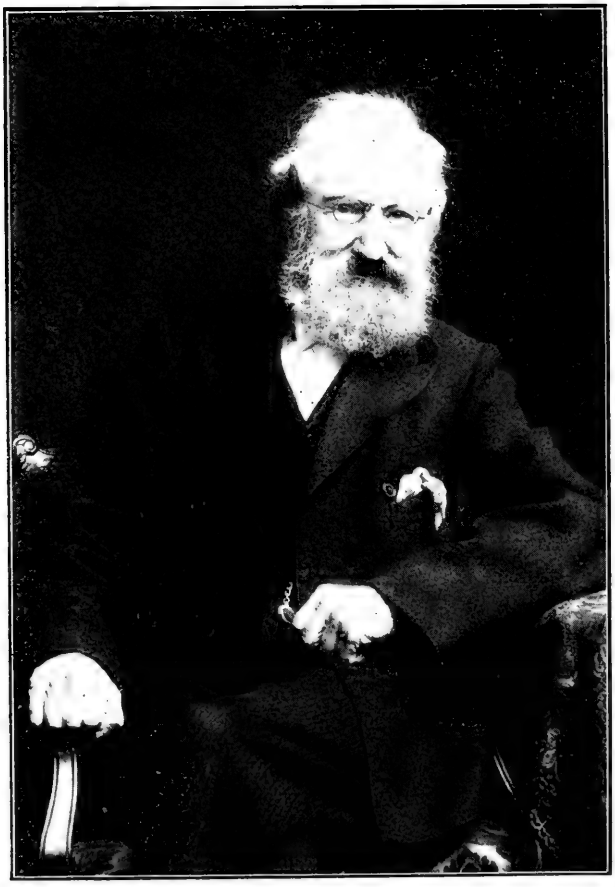
(Nos. 25 to 48)

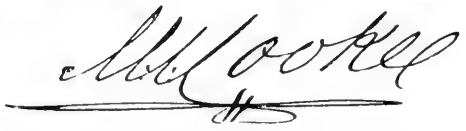
Volume III

1905

W. A. Kellerman, Ph. D.
Ohio State University

Entered as Second Class Matter, Postoffice, Columbus, Ohio.
University Bulletin, Botanical Series No. 37





EMINENT PIONEER MYCOLOGIST OF LONDON.

MYCOLOGICAL BULLETIN

No. 25

W. A. Kellerman, Ph. D., Ohio State University.

Columbus, Ohio, January 1, 1905

THE NEW DEPARTURE.—Beginning with the issue of this number, the MYCOLOGICAL BULLETIN will be made a Semi-monthly publication. It has been sent out heretofore as an experiment, so to speak—at least it was not certain that approximately a thousand persons would care to pay for such a periodical. There are not, to be sure, 1,000 names yet on the mailing list, but if all who desire such a leaflet as this, knew of its regular issuance, price, and editor's address, it can safely be presumed that there would be an ample number of subscribers. Many persons have, to my knowledge, kindly called attention to the BULLETIN, and to these as well as other unknown friends, hearty thanks are extended.

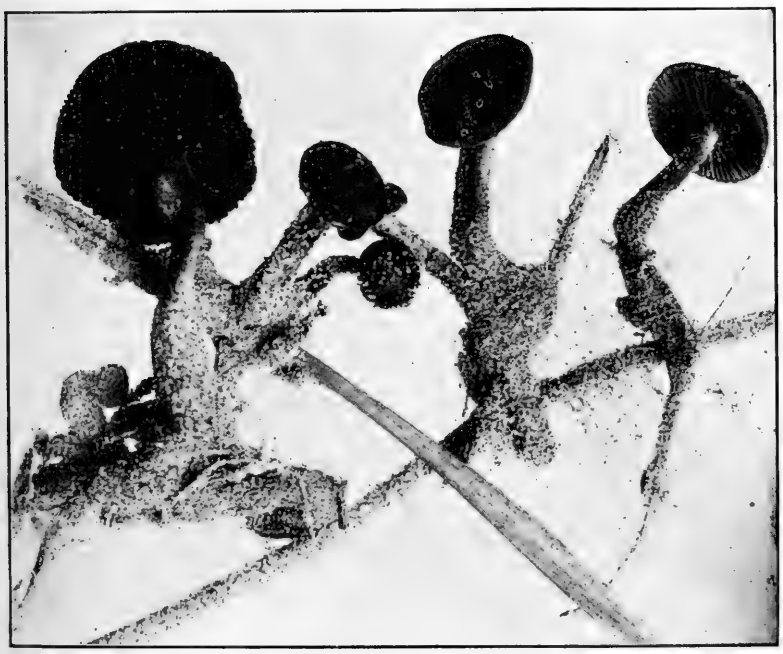


FIG. 81. PSI-LOC'-Y-BE AM-MOPH'-I-LUS. An interesting little Toadstool found during the middle and latter part of the summer on Cedar Point beach at Sandusky, Ohio. The plants grow only on the old stems of the Beach Grass (*Ammophila arenaria*). The plants are brownish or dark buff color and of size indicated in the illustration. There were immense quantities of the mushrooms and a test was made of the cooking qualities. It was edible, but found to be rather insipid. The half-tone was made from photographs of specimens first collected in the locality named above by Student Chas. E. Brown.

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MYCOLOGICAL GLOSSARY.

Abbreviations: *nov. gen.* (or *n. g.*), new genus; *n. sp.*, new species; the Greek letter *mu*, micron or one-thousandth of a millimeter; 2-5x6 -9" means 2 to 5 by 6 to 9 "lines" or twelfths of an inch.
Aber'rant: departing somewhat from the usual form or type.
Abstriction: separation by constriction near the end as in *conidia*.
Acer'vuli: tufts of hyphae bearing spores.
Acetab'uliform: shape of a shallow bowl.
Acic'ular: needle-shaped, like pine leaves.
Acrog'enous: produced at the top.
Acrop'etal: developing from base toward apex.
Acu'leate: with slender point.
Acuminate: having a long-drawn-out point.
Adnate: growing fast to; the gills attached to the stem as in the Fig.
Adnexed: said of gills when attached slightly or by the upper angle only.
Aecid'ial spores: those produced in the *Aecidium*.
Aecid'ium: the first fruiting stage of the Rusts, as the Violet Aecidium, etc.
Aethal'ium: fruiting plasmodium-like mass covered with a cortex in case of some of the Slime-moulds.
Ag'aric: a gill-bearing mushroom.
Agar'icoid: like an Agaric, or mushroom-like.
Allan'toid: narrowly-oblong or sausage shaped.
Allia'ceous: with odor of onions.
Alluta'ceous: of pale brown color, like leather.
Amor'phous: without definite form.
Amphig'enous: produced on both sides or all around.
Amyla'ceous: starchy, like or containing starch.
Am'ylum: starch.
Analogy: resemblance in function and perhaps in external form, but fundamentally different in structure or origin, see *morphology*.
Anas'tomose: to run together irregularly or netlike.
An'nulus: the ring on the stem, see mushroom for illustration.
Anterior: said of the end of the lamella next to the margin.
Apic'ulate: having a short, abrupt point.
Apic'ulus: a short abrupt point.
Apothe'cium: used in connection with the Ascomycetes where the fructification is more or less cup-shaped and having the hymenium (fruiting surface) on its concave surface; ascoma.
Appendic'ulate: with an appendage, or hanging in small fragments.
Ap'planate: flattened out or horizontally expanded.
Appressed: applied closely to the surface or to each other.
Approximate: said of gills which do not quite reach the stem.
Aqueous: may be watery, or merely lacking color, that is, hyaline.
Arach'noid: like a cobweb, as is the veil in some mushrooms.
Are'olate: divided into little patches or areas.
Argilla'ceous: resembling clay.
Ascending: said of lamellae in a conical pileus; said of the partial veil in its young stage when its marginal attachment is below its stem attachment.
Ascig'erous: bearing asci.
As'cocarp: the spore cap or fructification in *Ascomycetes*.
Asco'ma: the *apothecium* or fruiting body in Lichens, Pezizae, etc.
Ascomyce'tes: the group of fungi whose spores are borne in asci.
As'cospores: the spores borne in an ascus.
As'cus (pl. *as'ci*): a cell in which spores are borne.
As'tomous: without an aperture or mouth.
Atten'uate: gradually narrowed.
Aurantia'ceous: orange colored.
Au'reus: golden; yellow with a tinge of red.

[TO BE CONTINUED.]

THE PURPOSE?—Yes, it is a Leaflet for *beginners* and *amateurs;* it contains much in the way of pictures and little in the way of reading matter. The long hard names are divided into syllables with accent indicated. It is hoped that the explanations in connection with the illustrations will be found full enough for the ordinary mycophagist or mycologist. Other paragraphs containing erratic remarks, timely suggestions, and occasional matter with scientific tinge, may be pardoned—at least endured.

SUBSCRIPTION.—It seems best to call attention to the present plan, according with universal custom, that when a name is placed on the mailing list the party is a regular subscriber and will be expected to pay the subscription price until the subscription is ordered stopped. This will leave my estimable subsrcibers only this one little thing to remember, namely, to send a quarter (25 cents) on the first day of January each year. Occasional reminder, if perchance necessary, will of coures give no offence to either party involved.

GLOSSARY OF TECHNICAL TERMS.—After some hesitation it has been decided to devote one page in a half dozen or more consecutive numbers to a brief illucidation of the technical terms generally employed in the books to describe Mushrooms and other common fungi. This will not be entertaining reading matter, I dare say, but certainly such a little dictionary will prove useful on many occasions. A few of the terms are very uncommon or used in a very peculiar sense—and doubtless all amateurs as well as beginners will find reference to the *second page* of the several BULLETINS for the winter and spring not an unprofitable, even if not the most agreeable employment.

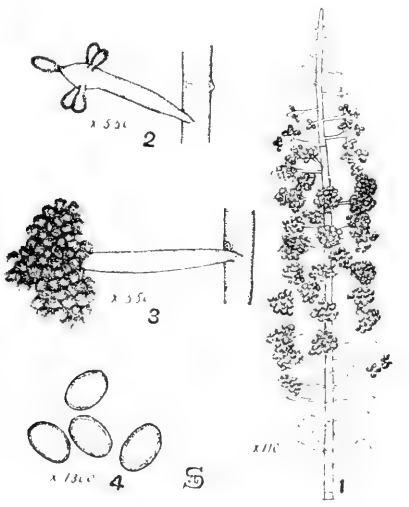

FIG. 82. BO-TRY-SPO'-RI-UM PUL'-CHRUM. This is a beautiful fungus belonging to the large group of *Hy-pho-my-ce'-tes*, all of which bear *co-nid'-i-a* on simple or branching hyphae above the surface or matrix on which they grow. They have no perithecia or pycnidia. Some of the forms are extremely ornamental, and all often are supposed to be stages of other fungi; for this reason these forms are called "*imperfect* fungi." In only a few cases, however, have they been identified by experiment as being connected with higher fungi. The plant here figured was found on dead stems in the green house, from which the illustrations were drawn by J. G. Sanders. This species has been described no less than nine times and given nine different names (the writer apologizes for the last mistake in this connection), but the name here used is that first given by Corda in 1839. Many botanists here as well as abroad have detected this fungus.

FIG. 83. STRO-BI-'OM'-Y-CES STRO-BI-LA'-CE-US. A tube bearing mushroom, belonging to the family *Bo-le-ta'-ce-ae*. Its peculiar appearance renders it easy of recognition. The half-tone was made from photograph of specimens collected in sandy soil of woods at Cedar Point, Sandusky, Ohio, August, 1904. McIlvaine says: "With many this Boletus is a prime favorite. It has a strong woody taste, sometimes musky, sometimes faintly of anisette. It cooks well by any method.

AT A DISTANCE.—The editor will have arrived at Guatemala (Central America), before this number of the BULLETIN reaches the subscribers. At a long distance therefore the next half dozen or more BULLETINS will be edited. In spite of care on the part of my faithful assistant, Miss Clara G. Mark, some mistakes may occur in the matter of distribution, correction of addresses, financial records, etc. A rich botanical field is to be visited; perhaps there may later some account be given of an interesting Mushroom or two way off from home, where it is summer all winter—and therefore, dear reader, I crave your indulgence, and run to catch the boat.

The Mycological Bulletin is issued on the 1st and 15th of each Month. Price 25c. Copies of Vol. II (1904 may be had for 50 cents each, or cloth bound copies for 75 cents. No copies remain of Vol. I (1903 except a few cloth bound for which 75 cents is charged.

MYCOLOGICAL BULLETIN

No. 26

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio, January 15, 1905

THE GENUS STRO-BI-LOM'-Y-CES.—In the family *Po-ly-po-ra'-ce-ae* to which this belongs, pores instead of gills from the lower side of the cap and constitute the *hy-me-ni-um*, or spore-bearing layer. The common genera are: (1) *Fis-tu-li-na*, which has the pores close together but free from each other—all the others have the pores *joined* side by side; (2) *Po-ly-po-rus*, firm, often corky or woody; (3) *mer-u-li-us*, with tubes or pores shallow, formed by a network of folds or wrinkles, plants somewhat gelatinous; (4) *Bo-le-tus*, not woody or corky, the mass of tubes easily separable from the cap when pulled off; (5) *Stro-bi-lom-y-ces*, the stratum of tubes not so easily separating, and cap with coarse prominent scales. Both the generic and specific name of the common species refer to its slight resemblance to a pine-cone. This character readily separates it from a *Boletus*. The flesh is whitish, but changes to reddish and later to black when wounded or cut.

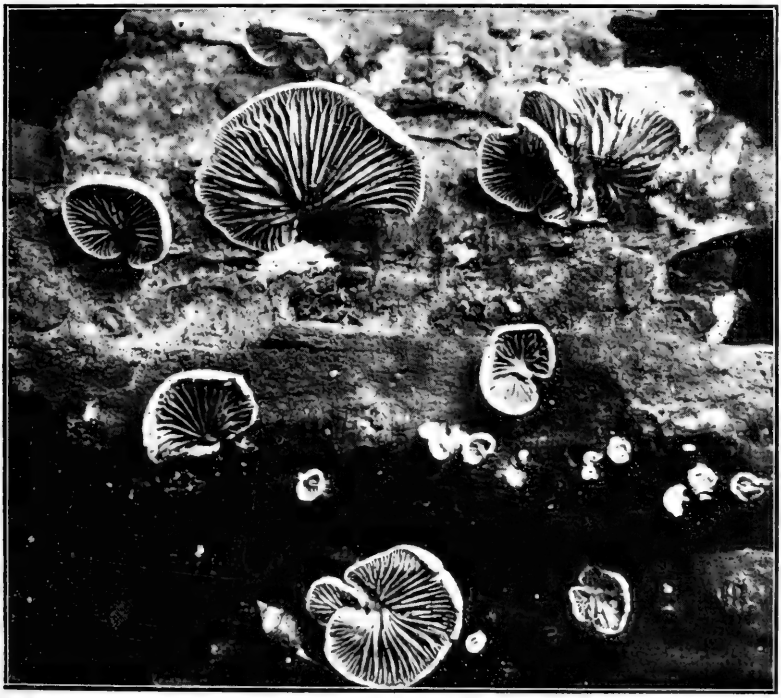

FIG. 84. CREP-I-DO'-TUS VER-SU'-TUS. An ochre-spored, white-capped little Mushroom not uncommon on stumps and logs. It may grow on the under side of logs and be resupinate; the cap is shelving when attached to sides of logs and stumps. The plants are shown natural size and on their usual substratum an old log. The halftone was made from a photograph of specimens collected at Sandusky, Ohio.

University Bulletin, Series 9, No. 4. Entered as Second Class Matter, Post-office at Columbus, Ohio

MYCOLOGICAL GLOSSARY.

Auric'ulate: ear shaped.
Auton'omous: said of plants that are complete in themselves and not a part only of the life cycle.
Bad'ious: bay, chestnut color, or reddish brown.
Basidiomce'tes: the group of fungi that have spores borne on a basidium.
Basid'iospore: spores borne on a basidium.
Basid'ium (pl. *basidia*): an enlarged cell on which are borne spores.
Basip'etal: proceeding toward the base.
Bay: a rich dark reddish chestnut.
Biloc'ular: having two cavities.
Biog'enous: growing on living plants or animals.
Booted: said of a mushroom stem when encased in a sheath.
Boss: an umbo, or short rounded protuberance.
Byssa'ceous or *byssoid:* of fine filaments or byssus.
Bys'sus: a fine filamentous mass.
Caes'pitose: growing in tufts or clumps.
Campan'ulate: bell shaped.
Can'cellate: latticed.
Canes'cent: having whitish or hoary pubescence.
Cap: pileus of mushrooms.
Capilli'tium: capillary threads mixed with the spores in case of some species.
Carbona'ceous: rigid, black and brittle.
Car'inate: with a keel or longitudinal line.
Car'neous: flesh color.
Car'nose: flesh color.
Castan'eus: chestnut color.
Cau'date: having a slender or tail-like appendage.
Caulic'olous: growing on herbaceous or woody stems.
Cell: the minute living mass of protoplasm which is the unit of structure in organisms. The vegetable cell has a cell-wall in case of mushrooms and common plants.
Cel'lular: composed of cells.
Cel'lulose: the chemical substance (a carbohydrate) of which the vegetable cell-wall is composed.
Cera'ceous: like wax.
Cere'briform: brain-shaped.
Ces'pitose: growing in tufts or clumps.
Chartaceous: like paper.
Chlam'ydospores: resting spores in rows formed by the breaking up of a hypha into bead-like cells.
Cil'ia (plural of *cilium*): marginal hairs or hair-like projections.
Cil'iate: with cilia.
Cine'reous: light bluish-gray, or ash-gray.
Circumscis'sile: breaking at or near the middle on equatorial line.
Clath'rate: latticed.
Cla'vate or *Clav'iform:* club-shaped, thickened toward top.
Cluster-cups: the first stage (Aecidium) of the Rusts.
Col'loid: like glue or jelly, not crystalline.
Columel'la: a stalk extended into or through a spore case.
Comate, comose, comous: with a tuft of silky hairs, or hairy.
Com'planate: flattened to a level surface above and below.
Concat'enate: linked together in a chain.
Concep'tacle: a closed spore-receptacle.
Concol'orous: of a uniform color.
Concres'cent: growing together.
Concrete: grown together.
Confer'void: loose and filamentous, like the alga *Conferva.*

[TO BE CONTINUED.]

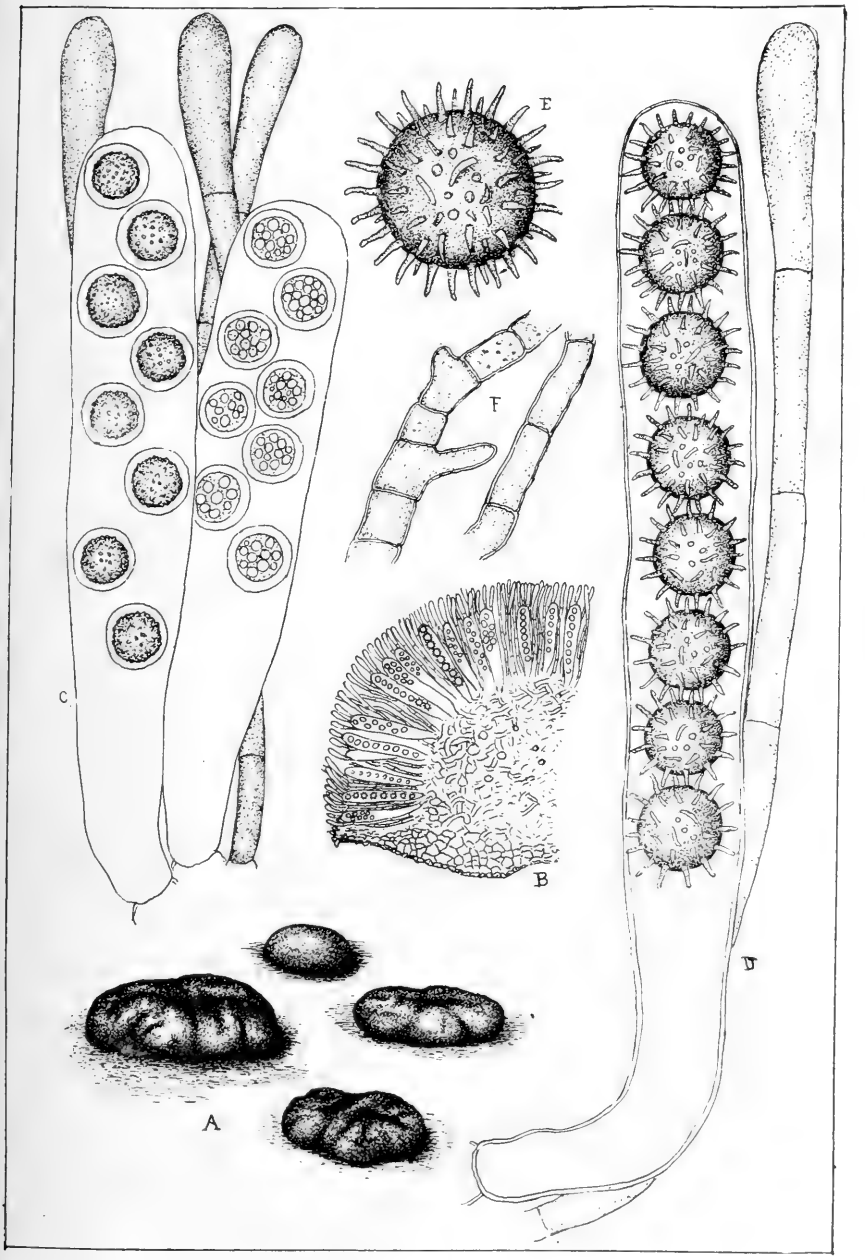

FIG. 85. SPHAE-RO-SO'-MA E-CHIN-U-LA'TUM. (See next page for explanation.)

EXPLANATION OF FIG. 85.

FIG. 85. SPHAE-RO-SO'-MA E-CHIN-U-LA'-TUM. The illustrations show the fungus in its several stages of development and its microscopic structure. Four plants are shown at Fig. A, natural size—the smallest being in an early stage of development, the largest fully matured. Fig. B shows a small portion cut vertically from the hyme'-nium, or layer of as'ci, and paraph'yses, slightly magnified. Fig. C illustrates stages in spore-formation in the as'cus. Fig. D represents a ripe as'cus containing the mature spores, accompanied by a paraph'ysis; magnified 600 diameters. Fig. E shows a ripe spore with its prominent spines, magnified 1200 diameters. Fig. F is a portion of the myce'lium from the soil; magnified 1000 diameters. These figures were drawn by Mr. Fred. Jay Seaver from plants collected on damp soil between the tufts of grass in an open place in the margin of woods near Iowa City, Iowa, June to October. The plant is a species not heretofore known to botanists. Mr. Seaver is he auhor of the name and description. An extended article on this plant is found in the January number of the Journal of Mycology.

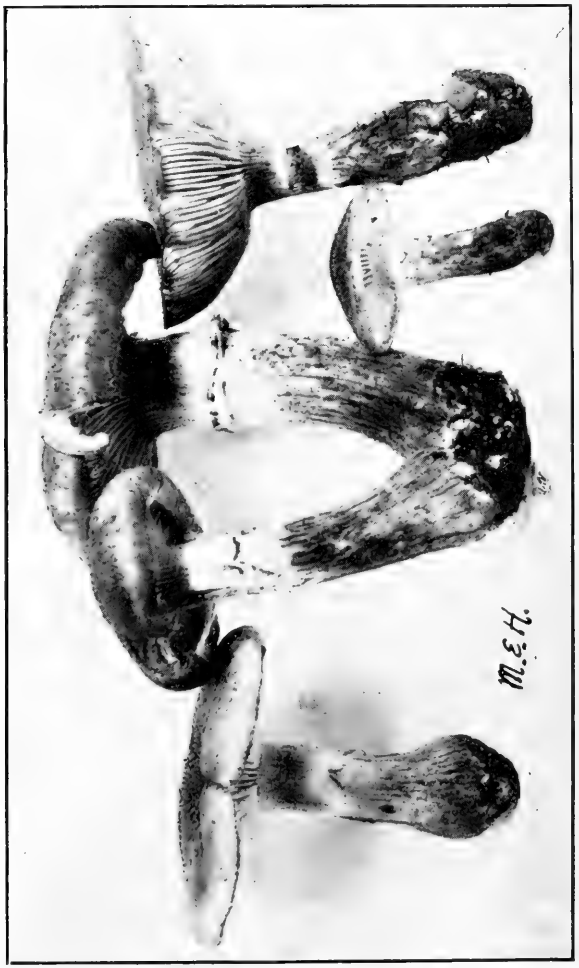

FIG. 86. AR-MEL-LA'-RI-A MEL'-LE-A. The Honey-colored *Ar-mil-la'-ri-a.* Edible A white-spored Agaric, the commonest of this genus, occurring late in summer and autumn. Photo by M. E. Hard, Chillicothe, Ohio.

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MYCOLOGICAL BULLETIN

No. 27

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio, February 1, 1905

WHAT MAKES THE FAIRY-RING?—Several mushrooms are arranged in circles, the so-called *Fairy-ring*. Explaining this matter in connection with the account of the common Fairy-ring Mushroom, *Ma-ras'-mi-us o-re'-a-des*, Professor Atkinson says: "Having started at a given spot the mycelium consumes the food material in the soil suitable for it, and the plants for the first year appear in a group. In the center of this spot the mycelium, having consumed all the available food, probably dies after producing the crop of mushrooms. But around the edge of the spot the mycelium or spawn still exists, and at the beginning of the next season it starts into growth and feeds on the available food in a zone surrounding the spot where it grew the previous year. This second year, then, the plants appear in a small ring. So in succeeding years it advances outward, the ring each year becoming larger. Where the plants appear only in the arc of a circle, something has happened to check or destroy the mycelium in the remaining arc of the circle.

It has been noted by several observers that the grass in the ring occupied by the mushrooms is often greener than that adjoining. This is perhaps due to some stimulus exerted by the mycelium which may in some way make certain foods available for the grass which gives additional supply to it at this point."

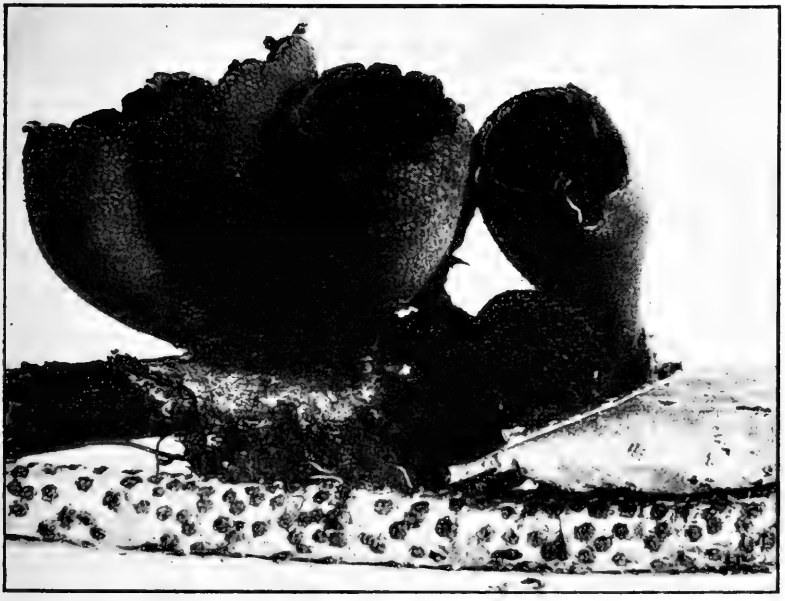

FIG. 87. UR'-NU-LA CRA-TE'-RI-UM. BLACK PE-ZI'-ZA. A very common and conspicuous *As-co-my-ce'-tous* or Cup-fungus, growing in clusters on rotten limbs and logs that lie in moist places. The *hy-me'-ni-um* or spore-bearing surface is the interior wall of the cup. The spores are at maturity shot out of the as'-ci, and can be seen sometimes by gently jarring the fungus when it is ready to make a discharge, as a little cloud an inch or two above the cup. The illustration was made from a photograph sent by T. E. Savage, Des Moines, Iowa.

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Conid'ia: plural of *condium.*
Conid'ial: pertaining to conidia.
Conidiif'erous: bearing conidia.
Conid'iophore: a hypha bearing conidia.
Conid'ium: a spore (non-sexual) arising singly or in chains from the ends of a hypha or hyphal branches.
Con'text: texture, substance.
Continuous: non-septate, applied to hyphae or spores that have no septa.
Coria'ceous: of a leathery texture.
Cor'neous: of a horny texture.
Cor'tex: outer, rind-like layer.
Cor'ticular: pertaining to or with a cortex
Corti'na: the web-like veil of the genus Cortinarius.
Cor'tinate: with a *cortina.*
Cos'tate: with a ridge or ridges.
Crate'riform: saucer-shaped, basin or crater-shaped.
Cre'nate: notched, indented or scalloped at the edge.
Creta'ceous: chalky or the color of chalk.
Crib'rate: sieve-like, or with small holes.
Cri'nite: with a tuft of long weak hairs.
Cris'tate: crested.
Crusta'ceous: of hard and brittle texture.
Cryp'togam: an old name for the "lower plants" or all those not included in the *spermatophytes* or flowering plants.
Cu'neate: wedge-shaped.
Cus'pidate: with a cusp or sharp point.
Cu'ticle: distinct skin-like layer or epidermis.
Cyath'iform: cup-shaped, slightly widened at top.
Cym'biform: boat-shaped.
Cyst: a bladder-like cell or cavity.
Cystid'ium (pl. *cystidia*): sterile cells of the *hymenium*, usually bladder-like, and different from the *basidia.*
Decur'rent: said of gills that are prolonged down the stem.
Deliques'cent: melting down, becoming liquid at maturity.
Den'droid: shaped like a tree.
Den'tate: toothed.
Dentic'ulate: with small teeth.
Descending: applied to the veil in a young stage when its marginal attachment is below its stem attachment.
Diagno'sis: a technical description.
Diaph'anous: transparent or permitting passage of light.
Dichot'omous: regularly forked into two.
Dic'tyoid: the same as muriform.
Did'ymous: of two equal parts.
Dif'fluent: dissolving into a fluid, as of the gills.
Dif'form: not uniform.
Dimid'iate: halved, as a semi-circular sessile pileus attached to the plane edge; or a perithecium with the lower half wanting.
Dimorph'ic: existing in two forms.
Disc (disk): the hymenial surface, usually cup-shaped, of the *Discomycetes.*
Discomyce'tes: the *Ascomycetes* with hymenium exposed.
Dis'crete: distinct, not united.
Divar'icate: diverging widely.
Eben'eous: ebony black.
Ebur'neous: ivory white.
Eccentric: excentric, as stem not attached at center of pileus.
Ech'inate: with stiff bristles.
Echin'ulate: with minute processes.
Effused: spread over and without regular form.

[TO BE CONTINUED.]

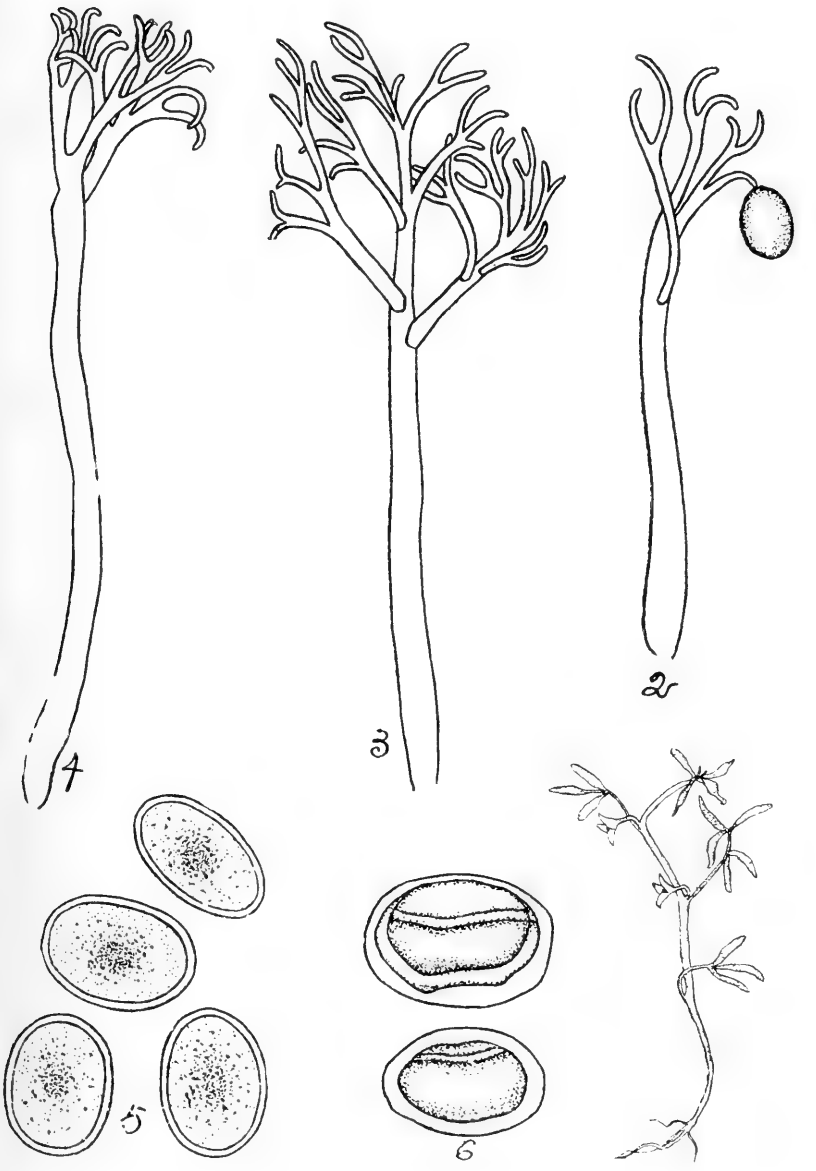

Fig. 88. Per-o-nos'-po-ra iloer-ke'-ae. Leaf Mildew of False Mermaid.
(See next page for explanation.)

EXPLANATION OF FIG. 88.

FIG. 88. PER-O-NOS'-PO-RA FLOER-KE'-AE. Leaf Mildew of False Mermaid. This is a parasitic fungus that attacks the little wild plants of the woods and shady places, called the False Mermaid. The Mildew is usually abundant on the lowest leaves and often covers the entire plant, stunting the growth of the host very much. Without a lens even the parasite can be seen when abundant, forming a powdery or white fuzzy covering over the epidermis. This consists of little branched hy'phae as shown in Figures 2, 3 and 4 on the opposite page (Fig. 88). These tree-like *co-nid'-i-o-phores*, as they are called, bear the spores, *i. e., co-nid-i-a;* one *co-nid'-i-um* is still attached in Figure 2. Four *co-nid'-i-a*, mature, are shown in Figure 5. Besides these spores—summer spores they are—there are others (as shown in Figure 6) that have thickened walls and can endure the winter. They germinate in the spring—the parasite is an annual plant. Those winter spores are formed within the tissues of the leaves and stems of the host. A plant much dwarfed by the attack of the parasite is shown also (Figure 1). This fungus is somewhat similar to the Powdery Mildew, or Grape Rot, that inflicts great damage on vine yards. A full account of his new species, with technical description was given in the Journal of Mycology, July, 1904.

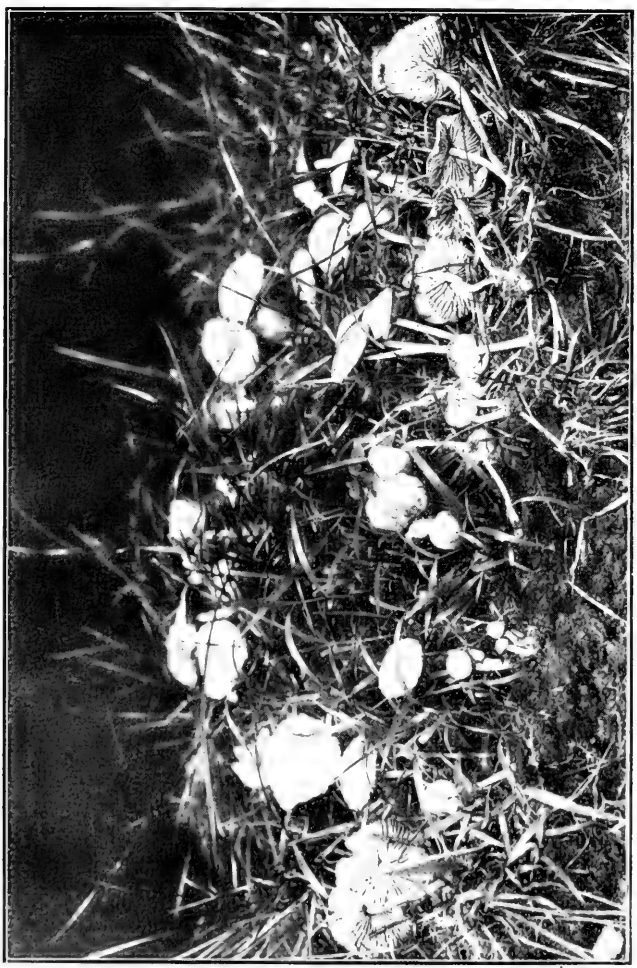

FIG. 89. MA-RAS'-MI-US O-RE'-A-DES. Fairy-Ring Mushroom.

EXPLANATION OF FIG. 89.

MA-RAS'-MI-US O-RE'-A-DES. FAIRY-RING MUSHROOM. EDIBLE. This interesting, widely distributed, common toadstool every one has seen in grassy places, in lawns, by roadsides, etc., during favorable weather in summer and autumn. While found often in circles, "fairy-rings," it may form only an arc of a circle or the plants may be somewhat scattered. The general character of the plant is well shown in the illustration. The cap is buff color, or tawny, or reddish; when dry it is paler. When moist, the cap may have striae (ridges) on the margin. The gills are broad and free or adnexed. This is a highly prized plant. The half-tone is from a photograph sent by Supt. M. E. Hard, Chillicothe, Ohio.

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MYCOLOGICAL BULLETIN

No. 28

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio, February 15, 1905

THE GENUS PSI-LOC'-Y-BE.—This is a small group of the brown-spored Agarics, and the name from two Greek words, means *naked head.* Some authors accent the third syllable, thus, *Psi-lo-cy'-be.* In structure this is much like *Col-lyb'-i-a* (white-spored), *Lep-to'-ni-a* (rosy-spored), and *Nau-co'-ri-a* (ochre-spored), but its brown spores separate it from those genera. It has no veil, the stipe is tenaceous and 'continuous' with the pileus, the margin of the pileus is *at first incurved,* and the gills are not decurrent; these characters separate it from its near relatives in the group of brown-spored Agarics. Atkinson's Mushrooms Edible and Poisonous gives no species; McIlvaine's One Thousand American Fungi notes two species. Fig. 81 in this BULLETIN is not very common.

FIG. 90. MER-U'-LI-US RU-BEL'-LUS. RED ISH MER-U'-LI-US. Not inedible, but tough. This species grows on rotten trunks, stumps, etc. It is more or less cespitose, imbricate and sessile, and of a soft and tenaceous texture. It is strongly tinged with red, but becomes pole when dry. The beautiful red-orange specimens from which the cut was made, were collected by Professor J. H. Schaffner and H. H. York, in a woods near Columbus, in October, 1904.

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MYCOLOGICAL GLOSSARY.

Egg: applied to the young mushroom before the volva has ruptured in Phalloids, Amanitas, etc.
Egut'tulate: without guttae or guttulae.
Emar'ginate: with a notch; gills may be emarginate or with a sinus or notch near the stem.
Endoperid'ium: an inner layer of the peridium.
En'dospore: the inner coat or wall of a spore.
Entomog'enous: growing from insects.
Epider'mis: a distinct outer layer.
Epig'enous: growing on the surface of a plant.
Epigae'us: growing on the ground.
Epiphyl'lus: growing on the upper side of the leaf.
Ep'ispore: the inner coat or wall of a spore.
Epithe'cium: the layer sometimes formed on a hymenium by the union of the tips of paraphyses above the asci.
Epix'ylous: growing on wood.
Erum'pent: breaking through the epidermis or through the surface of the matrix.
Excen'tric: out of the center; as stem not attached to center of pileus.
Excip'ulum: outer layer of an *Apothecium.*
Exoperid'ium: outer layer of the peridium.
Ex'ospore: the outer coat or wall of a spore.
Ex'planate: flattened, expanded.
Exser'ted: projecting; standing out.
Exsicca'ti: dried specimens; sets of specimens.
Facultative-parasite: a fungus normally saprophytic but which may live for a time or a part of its life cycle as a parasite.
Facultative-saprophyte: a fungus normally parasitic but which may live for a time or a part of its life cycle as a saprophyte.
Fal'cate: hooked or curved like a scythe.
Farina'ceous: mealy.
Far'inose: covered with a white mealy powder.
Ferru'ginous: rust-red.
Filiform: thread-like.
Fim'briate: fringed.
Fis'tulose: with stem hollow, or becoming hollow.
Flab'ellate: fan-shaped.
Flabel'liform: fan-shaped.
Flac'cid: soft and flabby.
Flaves'cent: turning yellow or yellowish.
Floc'cose: woolly, with woolly locks or flocci.
Floc'culose: minutely floccose
Fo'veate: with pits on depressions.
Fove'olate: with small pits.
Free: said of gills not attached to the stem.
Fri'able: easily crumbling.
Fuga'ceous: falling or fading early, disappearing.
Fuligin'eous, fulig'inous: sooty-brown or dark smoke color.
Ful'vous: tawny, yellowish-brown tint.
Fun'gus (pl. *fungi*): mushrooms and other "low" plants that are of simple structure, destitute of chlorophyll and consequently must live as parasites or saprophytes.
Furfura'ceous: with brown scales.
Fus'cous: dingy, brownish, or brown tinged with gray.
Fu'siform: spindle-shaped
Fusoid: like a spindle: fusiform.
Gasteromyce'tes: those *Basidiomycetes* in which the hymenium is enclosed in a sack-like envelope, as the Puffballs.

[TO BE CONTINUED.]

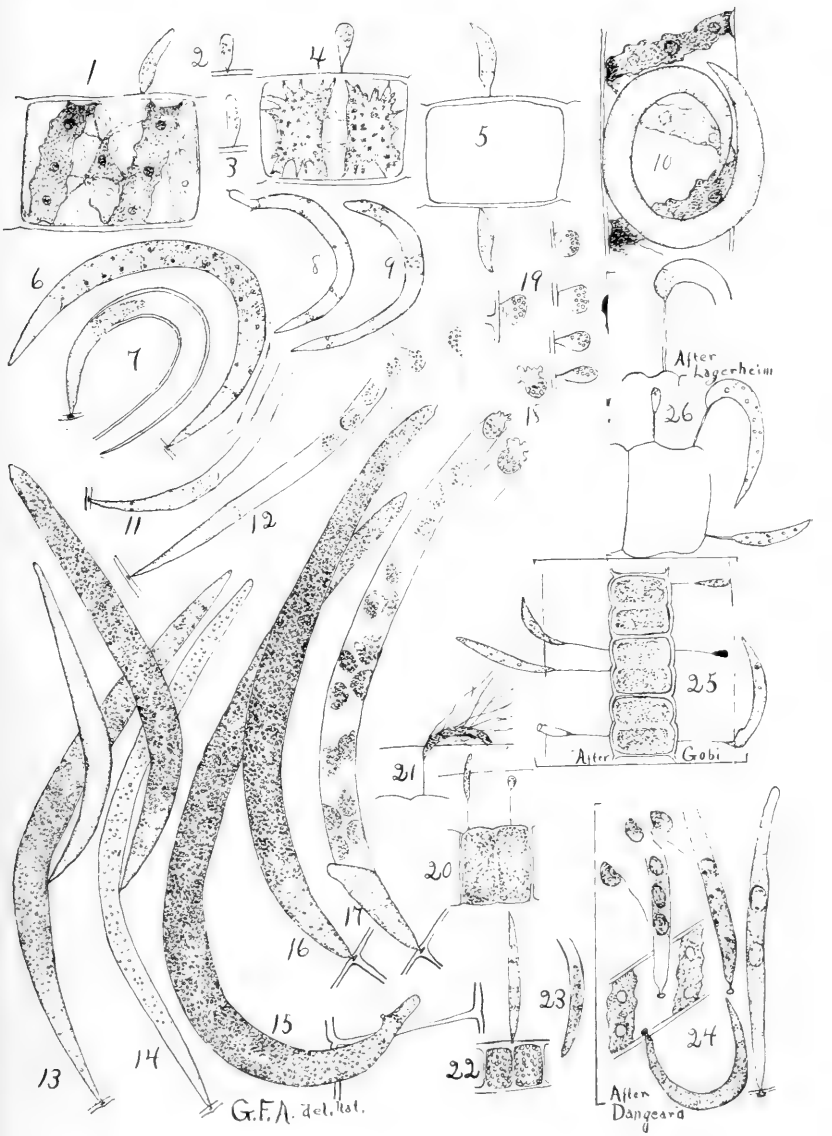

FIG. 91. Three species of HAR-PO-CHYT'-RI-UM.

This plate represents the structure, habit and life-history of a very interesting genus of fungi parasitic on *Algae*, a full account of which was published recently by Professor Atkinson in a German periodical. The plate with notes was reproduced in the Journal of Mycology, whence we transcribe the main portion of the explanation of the plate.

HAR-PO-CHYT'-RI-UM HEDENII, Willie.

Figs. 1, 2, 3, 4, 5, Young stage of plant on *Spirogyra* and *Zygnema*, developed in cell culture. Fig. 6, Mature plant.

Fig. 7, Old plant with two empty sporangia and young tertiary sporangium growing out in the old secondary one.

Figs. 8, 9, Plants half grown showing large and long vacuoles separated by granular protoplasm. Both of these plants became freed from their attachment to the host, the one illustrated in Fig. 8 was attached at two points, one point directly at the base, the other upon the side a short distance from the end. The plant in Fig. 9 was attached at one point on the side, a little distance from the end. Here the short, slender stalk and the disk-like expansion is shown.

Fig. 10, Plant coiled in the form of a serpent on the side of the *Spirogyra* thread.

Fig. 11, Old plant with empty sporangium and young secondary sporangium developing within.

Fig. 12, Mature plant, zoospores escaping, sterile, basal part limited by thin wall which is arched outward slightly because of the endosmotic pressure in the protoplast, and the removal of the pressure within the primary sporangium.

Fig. 13. One individual of *Har-po-chyt'ri-um* attacked by another, the parasitic one one-half the size and age of the host individual.

Fig. 14, Later stage, showing degeneration of the host individual and the increased size of the parasitic individual.

Fig. 15, Mature individual attached at the side a short distance from the base.

Fig. 16, Mature individual attached at the end at a point between two adjacent *Spirogyra* cells.

Fig. 17, Same plant with zoospores escaping. This plant was kept in cell culture and the secondary sporangium from the sterile basal part began to grow before the developed zoospores escaped, and was forced out slightly at one side. The apex of individuals in Figs. 15, 16, show the peculiar condition shortly before formation of zoospores. In Fig. 17, amoeboid movement of some zoospores shown in the sporangium and also escaping.

Fig. 18, The zoospore after escaping, still showing amoeboid movement.

Fig. 19, Five individuals showing stages in attachment and elongation of zoospores. Figs. 6, 7, 11, 12, 13, 14, show the disk-like holdfast and absorbent disk between the outer and inner lamellae of cell wall.

Figs. 1-19 from specimens collected at Ithaca, N. Y. Fig. 24, after Dangeard.

HAR-FO-CHYT'-RI-UM HYALOTHECAE, Lagerheim.

Fig. 20, Showing two young individuals attached to cell of host (Hyalotheca dissiliens), one of the zoospores still within the slime and just having developed the slender stalk; the other individual, the zoospore having elongated and the outer end projecting beyond the slime sheath.

Fig. 21, Mature individual attacked by a filamentous bacterium.

Figs. 20, 21, from specimens collected at Ithaca, N. Y. Fig. 25, after Gobi. Fig. 26, after Lagerheim.

HAR-PO-CHYT-RI-UM INTERMEDIUM, Atkinson.

Fig. 22, Half grown individual attached to *Conferva utriculosa*, showing disk-like haustorium between outer and inner lamellae of cell wall.

Fig. 23, Mature individual with empty primary sporangium, and young secondary sporangium developing. Figs 22, 23, from material collected at Ithaca, N. Y.

THE GENUS CA-LOS'-TO-MA.—This is a small group of *Gas-tro-my-ce'-tous* fungi having some affinity with the common Puffballs. A very good account is given of the American species by Mr. C. E. Burnap, in the Botanical Gazette, of March, 1887, Vol. 23, p. 180-192, with plate. His study was based mainly on the commonest species. He says: "The fact that this fungus passes its early stages just below the surface of the ground and is usually protruded only after the elements of the *gleba*, or spore bearing portion have disappeared by absorption, renders it difficult to procure in a young condition. At maturity *Colostoma cinnabarinum*, which is the most common American species and may serve as a type for the whole genus, presents the appearance of an ochraceous globose body opening above by a stellate mouth guarded by tooth-like valves, and extending below into a footstalk composed of anastomosing strands. The gleba lies at the center of the globose body, and is surrounded in its younger stages by four layers: (1) the volva, an outer gelatinous layer which soon disappears; (2) the exoperidium, a layer just within the volva, also breaking away at an early stage; (3) the endoperidium, which is the external layer in older specimens; and (4) the spore sac containing the gleba." There are four American species, namely, *Ca-los'-to-ma cin-na-ba-ri'-num*, *Ca-los'-to-ma lu-tes'-cens*, *Ca-los'-to-ma ra-ve-nel'-li*, and *ca-los'-to-ma mi-cro-spo'-rum*. The name *Ca-los'-to-ma*, formed of two Greek words, means *beautiful mouth*. Some authors use the name *Mi-trem'-y-ces* instead but this is not the original name and hence not tenable.

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MYCOLOGICAL BULLETIN

No. 29

W. A. Kellerman, Ph. D., Ohio State University
Columbus, Ohio, March 1, 1905

THE GENUS CREP-I-DO'-TUS.—About a dozen American species belong to this genus which is described as follows by Atkinson: "In *Crepidotus* the pileus is lateral, or eccentric, and thus more or less shelving, or it is resupinate, that is, lying flat or nearly so on the wood. The species are usually of small size, thin, soft and fleshy. The spores are reddish brown (ferruginous). The genus corresponds to *Pleurotus* among the white-spored agarics, or to *Claudopus* among the rosy-spored ones." Fig. 84 shows a very common species on logs and stumps in shady woods.

FIG. 92. AR-MIL-LA'-RI-A MEL'-LE-A. Photo by Frank H. Cloyes, Waltham, Mass. Same species as Fig. 86.

University Bulletin, Series 9, No. 7 Entered as Second Class Matter, Post-office at Columbus, Ohio

MYCOLOGICAL GLOSSARY.

Ge'nus: a group of closely related species.
Gib'bous: swollen at one point.
Gills: the *lamellae* or plates in an Agaric on which the basidiospores are borne.
Glab'rous: smooth, devoid of pubescence or hairiness.
Glau'cous: with a whitish waxy bloom.
Gle'ba: in Gasteromycetes the spore-bearing cavernous tissue, as the Puff-balls and Phalloids.
Gonid'ium: same as *Conidium*, but formerly used only for the green bodies (algae) in the tissue of Lichens.
Grega'rious: said of Mushrooms not solitary, but many in a locality growing together, yet not caespitose.
Gut'ta (pl. *guttae*): drops or included oil-globules.
Gut'tate: with tear-like drops or guttae.
Gut'tula (pl. *guttulae*): small drops or minute included oil-globules.
Gut'tulate: with guttulae.
Gymnocar'pous: with exposed hymenium at maturity.
Gyrate, gyrose: wavy folds or like the brain convolutions.
Hab'itat: the natural place of growth of a plant.
Hausto'rium (pl. *haustoria*): a special branch of a hypha or projection that acts as a sucker and holdfast for a parasitic fungus.
Het'eroecism: living on more than one host during the life-cycle; for example one Wheat Rust has its first stage on Barberry leaves.
Hir'sute: with stiff hairs.
Host: the plant or animal on which a parasitic fungus grows.
Homol'ogous: said of parts having fundamental likeness in structure or of corresponding origin; analogy refers to similarity merely in function; homology takes into account only structure and origin.
Hy'aline: transparent, clear like glass.
Hygromet'ric: readily absorbing water.
Hygroph'anous: watery appearance when moist, but opaque when dry.
Hygroscop'ic: absorbing moisture from the air.
Hyme'nium: the fruit-bearing (spore-bearing) surface.
Hymenomyce'tes: those Basidiomycetous fungi which have the hymenium exposed.
Hy'menophore: the portion which bears the hymenium.
Hy'pha (pl. *hyphae*): one of the elongated cells or filaments of which the fungus is composed.
Hy'phal: pertaining to a hypha.
Hyphomyce't'es: the "imperfect fungi" whose conidia are borne on superficial often floccose hyphae, pycnidia absent.
Hypocrate'riform: of the form of a cylindrical cup with outwardly turned margin; salver-form.
Hypogae'ous: below the surface of the ground.
Hypog'enous: growing on the under side.
Hypophyl'lous: growing on the under side of a leaf.
Hypothal'lus: a membranous or fleshy base to perithecia or sporangia
Hypothe'cium: the hyphal layer beneath the hymenium.
Hyste'rioid: elongate boat-shaped, like one of the group of *Hysteriaceae*.
Im'bricate: overlapping like shingles.
Imperfect fungi: those fruiting stages of fungi which precede the form that represents the final stage in the life-cycle of the species.
Incar'nate: flesh-colored.
Indehis'cent: not opening at maturity as an indehiscent peridium.
Indu'sium: in Phalloids it is the veil beneath the pileus.
Inferior: as the ring of an Agaric far down on the stem.
Infundib'uliform: funnel-shaped.
Innate: within or blending with the substance of a part.

[TO BE CONTINUED.]

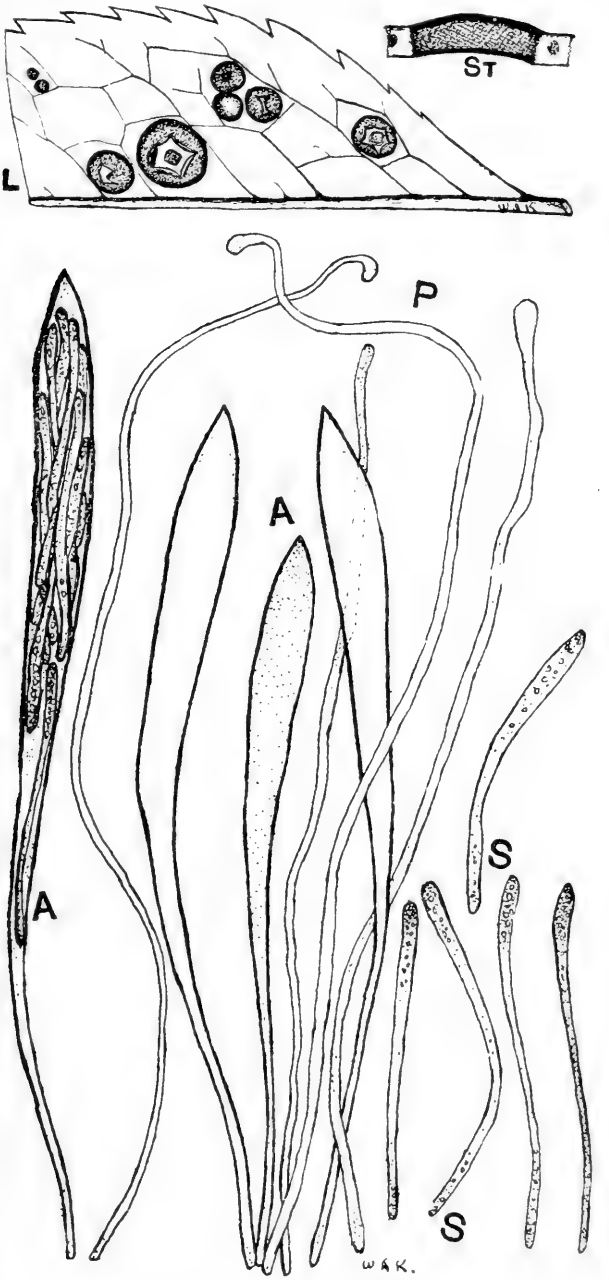

Fig. 93. Rhy-tis'-ma con-cav'-um. A parasitic fungus on *Ilex verticillata* (Winter-berry). At *L.* is shown the leaf with the ripe fungus natural size; a section, slightly magnified, at *St.* The other figures show the microscopic structure.

FIG. 94. GA'-LE-RA SPHAG'-NUM. This charming little Toadstool grows, as the cut shows, on the lower dead portion of the stems of Bogmoss or *Sphagnum*. It belongs to the section of ochre-spored Ag'arics. The specimens were collected on a cranberry island in Buckeye Lake, the latter part of October, 1904.

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MYCOLOGICAL BULLETIN

No. 30

W. A. Kellerman, Ph. D., Ohio State University
Columbus, Ohio, March 15, 1905

PARASITIC FUNGI.—It is easier to tell the difference between saprophytic and parasitic fungi than it is to draw the line of demarkation in all cases. Some fungi are purely parasitic and others are just as distinctly saprophytic. That is, some species (*parasites*) take their food directly and exclusively from living plants and animals; the saprophytes, on the other hand, live on decaying organic matter. It is now known that some saprophytic forms may for a time at least adjust themselves to a parasitic mode of life—or as a botanist would say, they are *facultative-parasites*. Again, some parasites are able to live for a time on dead organic matter—they are therefore *facultative-saprophytes*. Some species of a given genus may be parasitic, and others—though of the same genus—may be classed with the saprophytes; but such cases are not numerous. The common Mushrooms and Toadstools—for the illucidation of which this BULLETIN has its reason d'etre —are usually very conspicuous, exhibit manifold forms, and varied colorings. The parasitic species on the contrary, are mostly inconspicuous, indeed microscopic, and known chiefly by their devastations. Innumerable discolored areas on leaves, conspicuous spots because the tissue is dead and bleached or may be peculiarly colored, may indicate the presence of a parasitic fungus—yet to detect the latter a hand lens may be necessary, and only with the aid of a compound microscope can the form and structure of the fungus be determined

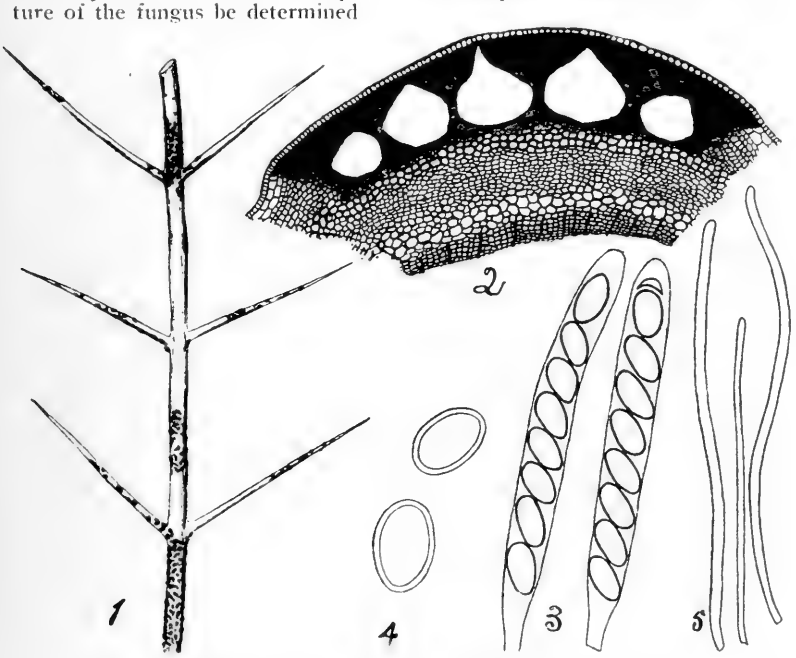

FIG. 95. PHYL-LACH'-O-RA MEX-I-CA'-NA. A parasitic fungus on *Adolphia* sent from Mexico. The stem (Fig. 1) is attacked by the fungus and forms blackened areas. Figure 2 shows a section through the part of the stem which is affected and the *stro'-ma* (as the black solid part of the fungus is called) is seen to be occupied by cavities in which as'ci and ascospores are formed; the latter are illustrated in Figures 3 and 4. Figure 5 shows some of the *pa-raph'-y-ses* which are mixed with the as'ci. This, a new species when collected last summer, was sent by Professor A. L. Herrera, of Mexico City, Mexico.

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MYCOLOGICAL GLOSSARY.

Insiti'tious: inserted.
Inter'calary: inserted between.
In'tercel'lular: between cells.
In'tracel'lular: within the cell.
Intumes'cent: becoming swollen.
Invag'inated: sheathed.
In'volute: rolled inwards.
Isabel'line: color of sole leather, brownish yellow.
Lac'cate: varnished or coated as with ceiling wax.
Lacerate: irregularly torn.
Laciniate: cut into many lobes or threads.
Lactes'cent: with milky juice.
Lacu'na: a pit or cavity.
Lac'unose: pitted.
Lamel'la (pl. *lamellae*): gill of a mushroom bearing the hymenium.
La'nate: woolly.
Lateri'cious: of brick color.
La'tex: milky juice of plants.
Laticif'erous: bearing latex.
Lax: not compact, flaccid.
Lep'idote: scurfy with minute scales.
Leucospor'ae: the group of Agarics that have white spores.
Lev'igate: with a polished surface.
Lig'natile: growing on wood.
Lig'neous: growing on wood.
Lig'ulate: flattened and strap-like.
Liv'id: bluish-black, color of a flesh bruise.
Loc'ular: divided into cavities; as trilocular, three cavities.
Lu'men: cavity; cavity formed by cell wall.
Lu'rid: color between purple, yellow and gray; dirty brown.
Lu'teous: yellowish; buff-like or clay color.
Lutes'cent: yellowish; becoming luteous.
Mac'ulate: spotted.
Mam'miform: breast-like; teat-like.
Marginal veil: in Agarics the veil extending from margin of pileus to stem.
Ma'trix: the substance on which or in which a fungus grows.
Me'dial: as of an annulus when at the middle of the stem.
Medul'la: inner substance extending to the cortical portion.
Melanospo'rae: the black-spored Agarics.
Meris'moid: like Merisma, that is, a pileus divided into many small pilei.
Mes'opod: a plant having a central stem.
Mica'ceous: covered with glistening scales.
Mic'ron (pl. *micra* or *microns*): the μ or one-thousandth of a millimeter; it is nearly .00004 of an inch.
Mil'limeter: the thousandth of a meter, and a thousand micra, or μ, nearly one twenty-fifth of an inch.
Min'iate: vivid red or vermillion color.
Mi'trate, Mitriform: bonnet-shaped, mitre-shaped.
Mold, mould: may refer to fine organic earth as leaf-mold, or to the common fungi on foods, etc., as Penicillium, Mucor, etc.
Monil'iform: like a string of beads.
Morphol'ogy: this as contrasted with Physiology (which deals with function) refers to structure of parts, particularly their interpretation as based on their origin and development.
Mucc'dinous: resembling the mildews or moulds.
Mu'cro: a short abrupt point.
Mu'cronate: with a short abrupt point.
Multipar'tite: divided into many parts.

[TO BE CONTINUED.]

FIG. 96. TRI-CHO-LO'-MA MEL-A-LEU'-CUM. This *Tri-cho-lo'-ma* was found in great abundance in the woods of Cedar Point, near Sandusky, Ohio, first brought to the laboratory by H. H. York. The size and general character of this white-spored Agaric are fully shown in the illustrations. It was found in sandy soil, growing singly in the shady woods. The color is usualy pale, nearly white at first, later much darker, but hardly sooty. Photograph from specimens collected near Sandusky, Ohio, August, 1904.

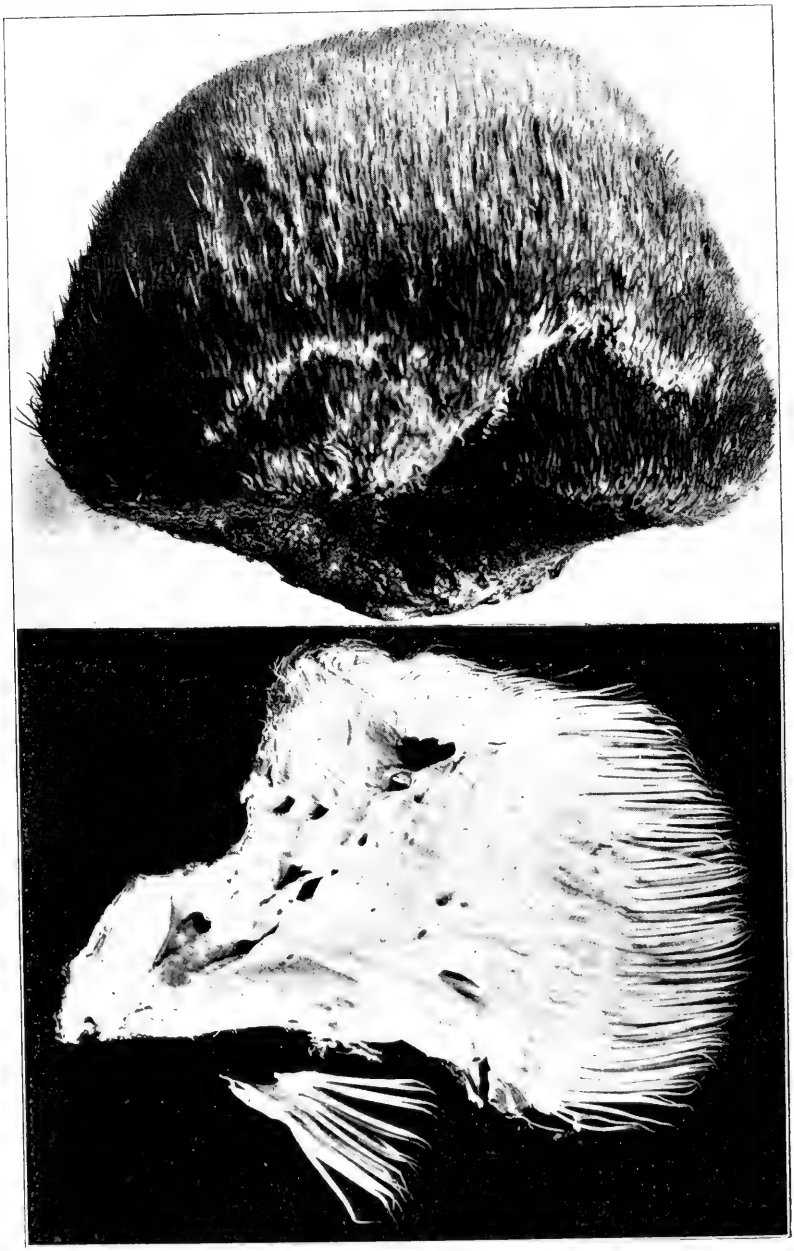

FIG. 97. HYD'UM ER-I-NA'-CE-US. SATYR'S-BEARD. EDIBLE. This common and attractive Hedge-hog fungus or Hyd'num was collected by Miss Luda B. Porter, Newark, Ohio.

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MYCOLOGICAL BULLETIN

No. 31

W. A. Kellerman, Ph. D., Ohio State University
Columbus, Ohio, April 1, 1905

PERHAPS REGULAR AFTER THIS.—An unexpected delay has occurred in issuing the April Nos. of the BULLETIN, due to late return from a winter trip to Guatemala. However, the 24 Nos. for the year will be received by the subscribers and possibly from now on they may be sent out regularly as dated. All who are not duly receiving the Nos. may know that we have not received the subscription (25 cents) for the year.

ACKNOWLEDGMENTS.—Two correspondents have made valuable contributions to this Number, namely, Mr. S. S. Crosby, of Massachusetts, and Dr. O. E. Fischer, of Michigan. Their photographs of interesting fungi are reproduced as Figs. 98 and 99.

HY-PHO-LO'-MA.—We present a habit-figure of *Hy-phy-lo'-ma ap-pendic-u-la'-tum* from a photo by Mr. S. S. Crosby, and will as opportunity offers try to show a plant the natural size. Figures of some other species may be seen on preceding pages. For example, *Hy-pho-lo'-ma sub-laterri'-ti-um* was shown on p. 25, made from a photo by Fred. J. Braendle; *Hy-pho-lo'-ma lac-ry-ma-bun'-dum*, from a photo by M. E. Hard, was published on p. 57; and *Hy-pho-lo'-ma cap-noi'-des* may be found on p. 92, printed from a cut furnished by L. F. Henderson. Some explanation of the genus was given on p. 73 and therefore need not be commented on here.

FIG. 98. HY-PHO-LO'-MA AP-PEN-DIC-U-LA'-TUM. Edible. The photo for this Appendiculate Hy-pho-lo'-ma was furnished by Mr. S. S. Crosby, Cambridge, Mass.

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GLOSSARY.

Multisep'tate: having many partitions or septa.
Mu'ricate: covered with short hard points.
Muric'ulate: finely muricate.
Mu'riform: descriptive of spores that have septa at right angles to each other, or like bricks in a wall.
Mu'rine or *murinous:* mouse-colored.
Mushroom: a word used for all the conspicuous higher fungi; the term is not properly confined to the edible toadstools.
Myc- (*mycet-* or *myco-*): is a prefix meaning fungus.
Myce'lium: the mass of hypae or threads (elongated cells) of which the tissue of fungi is composed, especially the visible mat of hyphae of the moulds, etc.
Myce'lioid: like mycelium.
Mycol'ogy: the division of botany which treats of fungi.
Mycol'ogist: one versed in mycology.
Mycoph'agist: one who eats fungi.
Ni'tid, nitidous: shining, polished.
Niv'eous: snow-white.
Nu'cleus: the central dense and very complex part of the protoplasm.
Obligate-parasite: one that can grow only as a parasite; see Facultative-parasite.
Obligate-saprophyte: one that can grow only as a saprophyte; see Facultative-saprophyte.
Ochrospor'ae: the Agarics that have ocher-colored or brownish spores.
Oö'spore: a spore resulting from the act of fecundation, usually a resting-spore; egg-spore.
Oper'culate: with an operculum or lid.
Oper'culum: lid of a spore-case.
Os'tiolate: with an ostiolum.
Os'tiole, os'tiolum: orifice for exit of spores; mouth of perithecium.
Pal'lid: pale or of an undecided color.
Papil'lose: with minute rounded projections.
Paraph'ysate: with paraphyses.
Paraph'yses: slender cells, often clavate, etc., mixed with the asci, and are apparently sterile asci.
Par'asite: a plant that receives its nourishment direct from living plants or animals to which it is attached.
Pari'etal: pertaining to or on the wall.
Partial veil: in Agarics the veil reaching only from the margin of the pileus to the stem.
Patel'late: shape of a dish or pan (patella).
Patel'liform: shape of the patella or pan.
Pec'tinate: with teeth like a comb.
Pel'licle: a very thin skin or cuticle.
Pellu'cid: translucent.
Peridio'lum: a secondary or interior peridium.
Perid'ium: the outer coat of a sporophore, as the covering in case of Puffballs, Geasters, etc.
Perithe'cium (pl. *perithecia*): a globular or otherwise-shaped receptacle in which asci (and ascopores) are produced; it may be closed or open above; ascoma, ascocarp, etc.
Per'onate: sheathed.
Pezi'zoid: cup-shaped or resembling a Peziza.
Phycomyce'tes: The Algal-fungi, as Grape Mildew (Peronospora), etc.
Pi'leate: having a cap or pileus.
Pi'leus: the cap-like or umbrella-like portion of an Ag'aric or other mushrooms; the pileus with the stem supporting it is the sporophore or so-called fructification.

[TO BE CONTINUED.]

Is Gy-ro-mi'-tra es-cu-len'-ta Poisonous?—Atkinson (Mushrooms, p. 220) says: "While this species has long been reported as an edible one, and has been employed in many instances as food with no evil results, there are known cases where it has acted as a poison. In many cases where poisoning has resulted the plants were quite old and probably in the incipient stages of decay. However, it is claimed that a poisonous principle, called *helvellic acid,* has been isolated by a certain chemist, which acts as a violent poison. This principle is very soluble in hot water, and when care is used to drain off first water in which they have been cooked, squeezing the water well from the plants, they are pronounced harmless. The safer way would be to avoid such suspicious species." Another author may be quoted. McIlvaine (One Thousand Am. Fun., p. 547) says: "Since 1882 myself and friends have repeatedly eaten it. In no instance was the slightest discomfort felt from it. It was always enjoyed. Mr. Charles H. Allen, San Jose, Cal., writes to me that G. esculenta grows plentifully in his region, and that it is not only edible, but he has found it one of the best. But the species, though long ago esteemed highly in Europe and by many in America, now rests under decided suspicion. . . . . The species would be better let alone." Dr. Fischer says "it undoubtedly—though rarely—causes symptoms of poisoning in the United States."

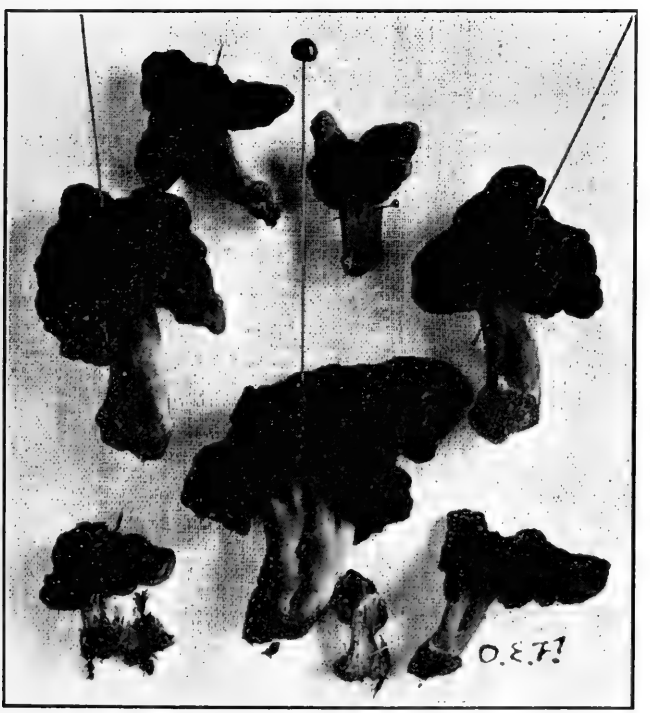

Fig. 99. Gy-ro-mi'-tra es-cu-len'-ta. Hel-vel'-la or Gy-ro-mi'-tra. Edible. Photo by Dr. O. E. Fischer, Detroit, Mich. The plants are represented less than life size. For comments see paragraph above.

FIG. 100. TRI-CHO-LO'-MA MEL-A-LEU'-CUM. This *Tri-cho-lo'-ma* was found in great abundance in the woods of Cedar Point, near Sandusky, Ohio, first brought to the laboratory by H. H. York. The size and general character of this white-spored Agaric are fully shown in the illustrations. It was found in sandy soil, growing singly in the shady woods. The color is usually pale, nearly white at first, later much darker, but hardly sooty. Photograph from specimen collected near Sandusky, Ohio, August 1904. This represents the same Mushroom as shown in Fig. 96. All the plants shown in Fig 96 are rather young; the same is true of those shown in Fig. 100 except the one to the left. Here the cap is flattened out and ultimately curved upward.

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MYCOLOGICAL BULLETIN

No. 32

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio, April 15, 1905

A Po-ly'-po-rus Number.—Though the fungi belonging to the *Pol-y'-po-ra'-ce-ae,* or Pore-fungi, are not so important to the mycophagist as some other groups they are just as interesting to the student and lover of Nature. When very young some of the species are edible and used to a considerable extent. They soon become tough or hard and leathery, most of the conspicuous forms being woody in consistency. Some of the common forms will be shown in this and succeeding Numbers of the Bulletin.

Classification.—These fungi are near relatives of the Ag'arics or the Gill-fungi, inasmuch as the spores are borne on enlarged cells, called *ba-sid'-i-a.* Each ba-sid'-i-um bears at its apex a few (commonly two or four) spores at the tips of little stalks. The name of this slender stem or stalk is, in botanical language, *ster-ig'-ma;* the plural is *ster-ig'-ma-ta.* All fungi that produce ba-sid'-i-a and basidiospores constitute the group of *Ba-sid-i-o-my-ce'-tes.* Again, those fungi that bear the spores within a cell, which is called an *as'-cus,* form the group of *As-co-my-ce'-tes.* The common and conspicuous Mushrooms are members of these groups and are spoken of sometimes as the *true fungi,* or expressed in technical language, *Eu-my-ce'-tes.* The Grape Mildew, the Black Mould or Mucor, etc., are quite different in some of their characters, particularly in their mode of spore production; in fact they are in this respect, like some Algae and hence have been called *algal-fungi.* For this group the botanical name, which has this signification, is *Phy-co-my-ce'-tes.* At the risk of offending the gentle reader with a prolix classification, it may be said that these groups of plants, *i. e.,* the Fungi, may be set opposite the Al'-gae (the latter plants being simple in structure like the fungi, but unlike them in having *chlo'-ro-phyll,* or "leaf-green")—the two groups constituting what the botanists call Thal'-lus plants or *Thal'-lo-phytes.*

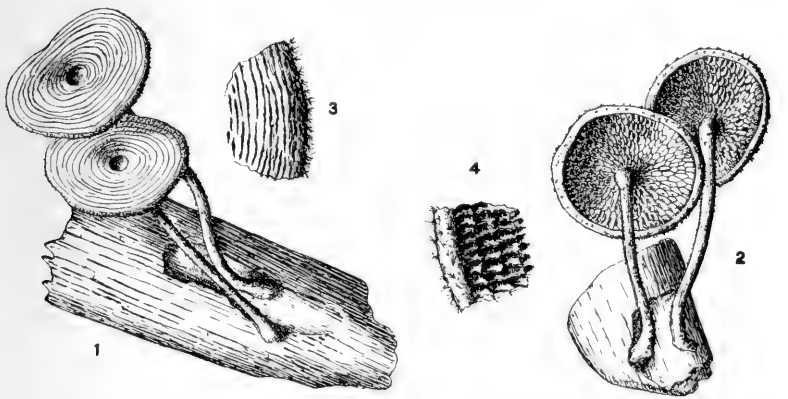

Fig. 101. Po-ly'-po-rus ar-cu-la-ri-for'-mis. This polypore was recently described as a new species by William A. Murrill, in the October Number of Torreya (1904). It was collected at Unaka Springs, East Tennessee. The upper side is shown in Fig 1, the under side in Fig. 2, magnified 2⅔ times. A small portion of the upper surface is shown at 3, and a small portion of the lower surface is shown at 4, both magnified 8 times. Professor Murrill has kindly loaned us the electro for reproducing the figure of this interesting species.

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MYCOLOGICAL GLOSSARY.

Pilif'erous: covered with soft hairs.
Placen'tiform: shape of a circular disk depressed above and below in the middle.
Plasmo'dium: the motile protoplasmic mass representing the vegetative stage of the slime-moulds.
Pli'cate: folded like a fan.
Plum'beous: lead-color, bluish-gray.
Poculiform: cup-shaped.
Pore: in the Pyrenomycetes same as ostiole or ostiolum.
Porrect: stretched horizontally.
Posterior: in case of the gills of the Agarics, denotes the point next to the stem; that is, the posterior end is that next to the stipe.
Pro'toplasm: the living nitrogenous mass of the cell which is the physical basis of life.
Pubes'cent: with short hairs.
Pul'vinate: cushion-shaped.
Punctate: dotted.
Pus'tular: with elevations like blisters or pustules.
Putres'cent: soon decaying.
Pycnidial spores: sporules, or the 'spores' (not ascospores) found in pycnidia.
Pycnidium (pl. *pycnidia*): a perithecium-like ascocarp or body in which sporules are produced.
Pyrenomyce'tes: the Ascomycetes with enclosed or nearly enclosed hymenium.
Recep'tacle: the part of the sporophore that contains the spores.
Remote': said of gills that do not reach the stem.
Re'pand: wavy.
Re'plicate: folded back upon itself.
Resu'pinate: attached by the back, hence the hymenium facing outwards; in this case there is no stem to the fungus which is spread over the matrix; applied to the Polypori, etc.
Revo'lute: rolled backward.
Rhi'zomorphs: the dark root-like mesh of mycelial cords often seen in rotten wood which represents the vegetative (perhaps resting) stage of Agarics, etc.
Rhodospo'rae: the pink or rosy spored Agarics.
Ri'mose or *rimous:* full of cracks.
Ring: the part of the partial-veil that adheres to the stem of an Agaric; annulus.
Ros'trate: beaked.
Rubes'cent: somewhat reddish in color.
Rufes'cent: of a dull red color, or becoming rufous.
Ru'gose: wrinkled.
Sanguin'eous: blood-colored.
Sap'rophyte: a fungus that draws its nourishment from dead vegetable or animal matter.
Scab'rous: with a rough surface.
Scis'sile: easily split; said of gills readily separable into two plates.
Sclero'tium: a hard black mass, sometimes resembling a tuber, which is the dormant or resting vegetative stage of some fungi, and from which later sporophores may arise.
Scorbic'ulate: with small pits or furrows.
Scu'tellate: like a plate or platter.
Se'pia: deep dark reddish brown.
Sep'tate: having partitions.
Sep'tum: a partition.
Seri'ceous: silky.

[TO BE CONTINUED.]

Explaining similarly the basis of classification and arrangement of the other plants, we would have the Mosses and Liverworts forming the group *Bry'-o-phytes;* the Ferns, Scouring Rushes and Ground Pines forming the *Pter-id'-o-phytes;* and finally the Pines and common higher plants as Sage, Rose, Oak, Dandelion, etc., forming the *Sper-mat'-o-phytes.* Putting this all in the form of a diagram or synoptical tabulation we would have it presented to the eye thus:

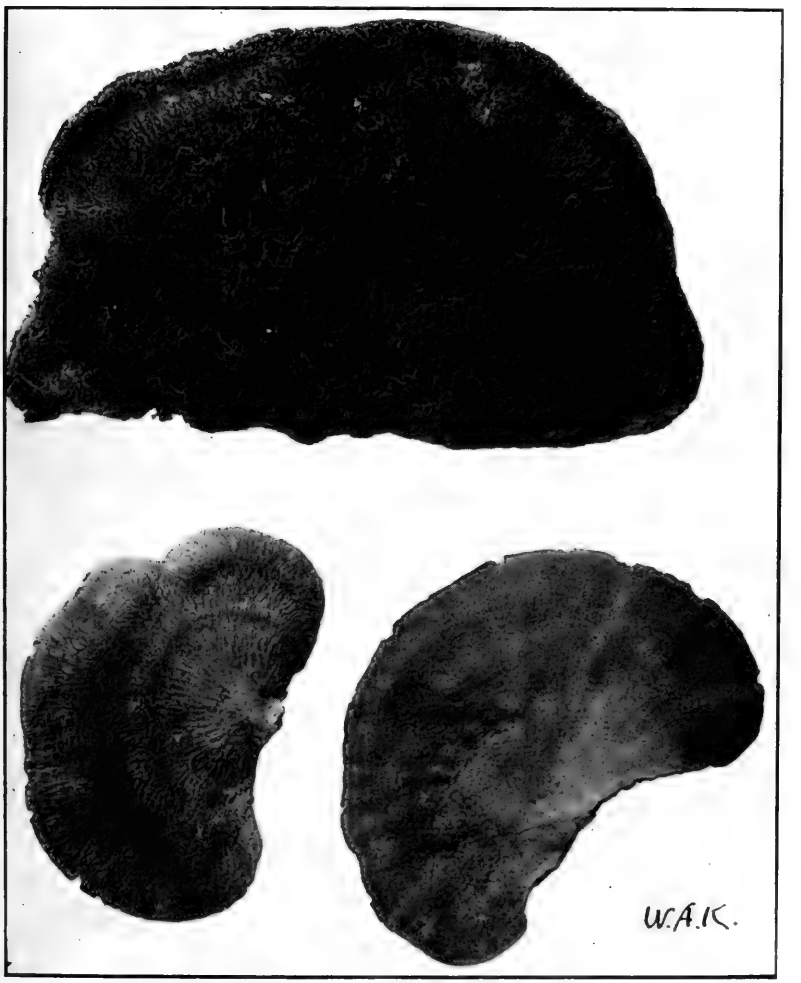

FIG. 102. PO-LY'-PO-RUS HYD-NOI'-DES. A Polypore from Central America, very striking by reason of its black color and covering of long bristles or scale-like hairs above. The underside is shown in the lower specimen on the right, and a small portion of this magnified is shown in FIG. 103. The plants were collected the past winter from old railroad ties, near Port Barrios, Guatemala.

PLANTS
- SPER-MAT'-O-PHYTES, or the common higher plants, as the herbs, shrubs and trees.
- PTER-ID'-O-PHYTES, or the Ferns, Scouring Rushes, and Lycopods or Ground Pines.
- BRY'-O-PHYTES, or the Mosses and Liverworts.
- THAL'-LO-PHYTES
  - Fungi
    - *Ba-sid'-i-o-my-ce'-tes*
    - *As'-co-my-ce'-tes*
    - *Phy'-co-my-ce'-tes*
  - Algae

ORDERS COMPRISING THE BA-SID'-I-O-MY-CE'-TES.—If we carry this matter of tabulation a little further we will have the following scheme:

BA-SID'-I-O-MY-CE'-TES
- NID-U-LAR-I-A'-LES, the Bird's-nest Fungi.
- LY-CO-PER-DA'-LES, the Puff-balls.
- PHAL-LA'-LES, the Phalloids or Stinkhorns.
- A-GAR-I-CA'-LES, Mushrooms and related Fungi.
- TRE-MEL-LA'-LES, the gelatinous Fungi.
- AU-RIC-U-LAR-I-A'-LES, the Jew's ear, etc.
- U-RE-DIN-A'-LES, the Rusts.
- US-TI-LA-GIN-A'-LES, the Smuts.

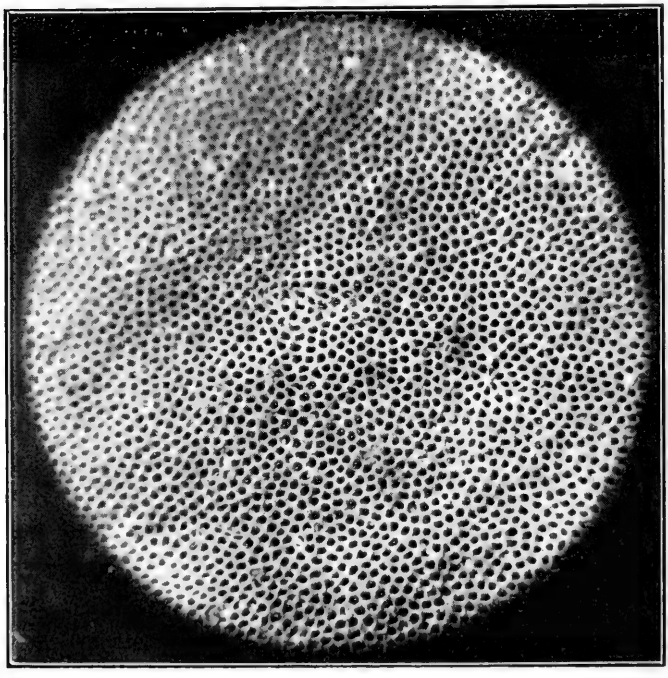

FIG. 103. The PORES or portion of the hymenial layer of PO-LY'-PO-RUS HYD-NOI'-DES. The microphotograph was made by using a 2-inch ocular and a 3-inch objective. The fungus is shown natural size in Fig. 102, where further explanation may be found.

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MYCOLOGICAL BULLETIN
No. 33

W. A. Kellerman, Ph. D., Ohio State University
Columbus, Ohio, May 1, 1905

ACKNOWLEDGMENT.—We have to thank Mr. Fred J. Seaver for the instructive illustration contained in Fig. 106, and Professor McBride, of the University of Iowa, for the use of the electro. This and many others were used in Volume 5 of the Bulletin from the Laboratories of Natural History of the State of Iowa, and we will take occasion to reproduce one or two more illustrations from this series in future Nos. of the BULLETIN.

AN INTERESTING ILLUSTRATED ARTICLE.—It is a pleasure to call attention to Mr. Seaver's article on the Discomycetes of Eastern Iowa which is fully illustrated—twenty-five plates being used, each illucidating two species. Our Fig. 106 is a sample. The plant, natural size usually, is given, then enlarged figures—these always showing an ascus and paraphyses if any, also the spo-rid'-i-a or ascospores.

FIG. 106. The following is the explanation for the plate marked Fig. 106, p. 132: The illustrations marked I, *a*, *b*, and *c*, show SPATH-U-LA'-RI-A CLA-VA'-TA. At *a* three plants are represented natural size, and in their natural habit. At *b* is given a figure of a single ascus containing spores, accompanied by two branching pa-raph'-y-ses; these are magnified 1000 diameters. Fig II, *a*, *b*, *c*, exhibits LE-O'-TI-A STI-PI-TA'-TA. At *a* three plants are given natural size; at *b* a mature ascus with spores and two pa-raph'-y-ses magnified 750 diameters are shown. Fig. *c* exhibits a single spo-rid'-i-um, or ascospore, magnified 2000 diameters. The figures are all drawn by Fred J. Seaver from specimens collected in Iowa. SPATH-U-LA'-RI-A CLA-VA'-TA is a common yellow species occurring in woods in summer. LE-O'-TI-A STI-PI-TA'-TA has a globose or spreading pileus of dark aeruginous green, the stem is a light yellow. It occurs in woods in summer and fall.

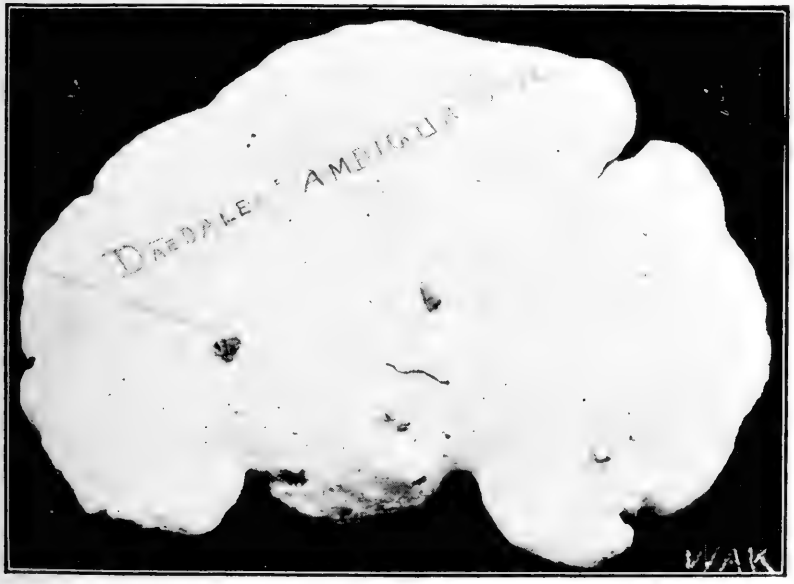

FIG. 104. DAE-DA'-LE-A AM-BIG'-U-A. This represents, considerably reduced from the natural size, a common fungus in habit much like the common Polypores; but the pores are changed slightly from this circular shape, as in this case, or they become much flattened so as to form labyrinthine passages, or even lamellae or plates. A magnified view of the pores is shown in the next figure. The photos are from a herbarium specimen that was distributed by the Alabama Biological Survey, collected by F. S. Earle in 1898.

University Bulletin, Series 9, No. 19. Entered as Second Class Matter, Post-office at Columbus, Ohio

MYCOLOGICAL GLOSSARY.

Serrate: margin with saw-like teeth.
Ser'rulate: minutely serrate.
Ses'sile: attached directly to the base; without stem.
Se'ta: a bristle or stiff hair.
Seta'ceous, seti'gerous, or *se'tose:* bristly.
Set'ulose: finely setaceous.
Sig'moid: S-shaped.
Sinuate, sinuose, sinuous: waved or serpentine.
Si'nus: the curve between two lobes.
Smooth: destitute of hairs (not necessarily an even surface).
Sordid: of a dirty dingy hue.
Spadic'eous: date-brown, *i. e.*, a dull dark brown.
Spath'ulate: shaped like a spathula or spoon.
Spat'ulate: shaped like a spatula or spoon.
Species: a group of individuals that are alike or of one kind.
Spic'ule: a minute point or slender granule.
Spin'ule: a small spine or slender prickle.
Spore: the minute simple reproductive body of the Mushrooms and other plants similar in function to the seed or complex structure of the common plants. The terms spore, sporule, sporidium, conidium, etc., are often used indiscriminately.
Spo'rocarp: the fruiting portion (not the vegetative part) of the Ascomycetes.
Sporid'ium: see spore.
Spo'rophore: the hypha or other part that bears spores.
Sporule: see spore.
Squa'ma: a scale.
Squa'mose, squa'mous: scale-like or with scales.
Squa'mula: a little scale.
Squamulose, squamulous: with small scales or squamae.
Squar'rose: rough with scales or projecting points.
Sterig'ma (pl. *sterig'mata*): a little stalk on a basidium bearing the spore.
Stipe: the stem of a mushroom.
Sti'pitate: with a stipe, or stem.
Sto'ma (pl. *stomata*): an opening or mouth.
Straight: a term applied to the edge of a pileus when not involute.
Strami'neous: of straw or straw-color.
Stra'tose: in distinct strata or layers.
Stri'ate: marked with parallel lines, or *striae.*
Strobil'oform: like a pine cone.
Stro'ma (pl. *stro'mata*): a compact mycelium on or in which perithecia or other organs of fructification are produced.
Stuffed: said of a mushroom stem if filled within by material of a texture different from that of the wall.
Sub-gleba: the basal portion of the gleba.
Subic'ulum: a layer of hyphae covering the matrix and over which is the hymenium.
Substra'tum: the matrix, or that on which the mushroom grows.
Sul'cate: with furrows or grooves.
Superior: said of the ring or annulus when near upper end of stem.
Symbio'sis: living together of two organisms in mutual dependence.
Teleu'tospore: the thick-walled winter spore, or end-spore in a series of the life-cycle of polymorphic forms, for example, the winter spores of the Rusts.
Tes'selated: checkered in a regular manner.
Testa'ceous: brick-red.
Thal'lophyte: one of the lower plants whose body is a *Thallus* (not differentiated into stem, leaf, etc.).

[TO BE CONTINUED.]

Classification of the A-gar-i-ca'-les.—This order includes several families of the most interesting and the most conspicuous Mushrooms. The *hy-me'-ni-um* or spore-bearing layer is a smooth layer in the Hypoch-na'-ce-ae, The-leph-o-ra'-ce-ae and Cla-var-i-a'-ce-ae; in the Hyd'-na-ce-ae there are dependent spine-like processes on whose surface the ba-sid'-i-a are borne; in the Po-ly-po-ra'-ce-ae the *hy-me'-ni-um* consists of pores, the same also in the Bo-le-ta'-ce-ae, but here the layer of pores is separable from the pileus; and in the A-gar-i-ca'-ce-ae there are gills or lamellae to support the hy-me'-ni-um. The tabular synopsis would be as follows:

Order A-GAR-I-CA'-LES
- Family A-gar-i-ca'-ce-ae
- Family Bo-le-ta'-ce-ae
- Family Hyd-na'-ce-ae
- Fmaliy Po-ly-po-ra'-ce-ae
- Family Cla-var-i-a'-ce-ae
- Family The-leph-o-ra'-ce-ae
- Family Hy-poch-na'-ce-ae

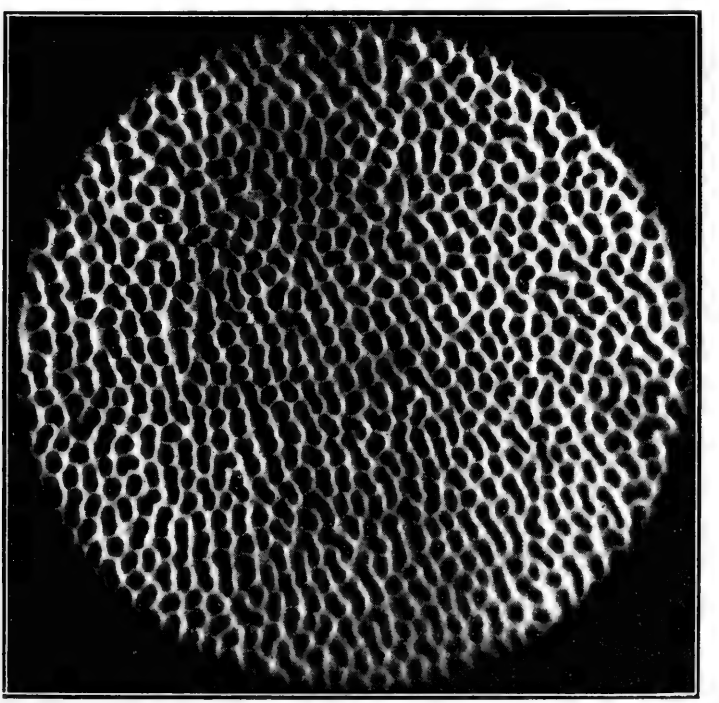

Fig. 105. Dae-da'-le-a am-big'-u-a. The pores magnified of the same plant shown in Fig. 104. The microphotograph was made by using a 2-inch ocular and a 3-inch objective. See explanation of Fig. 104.

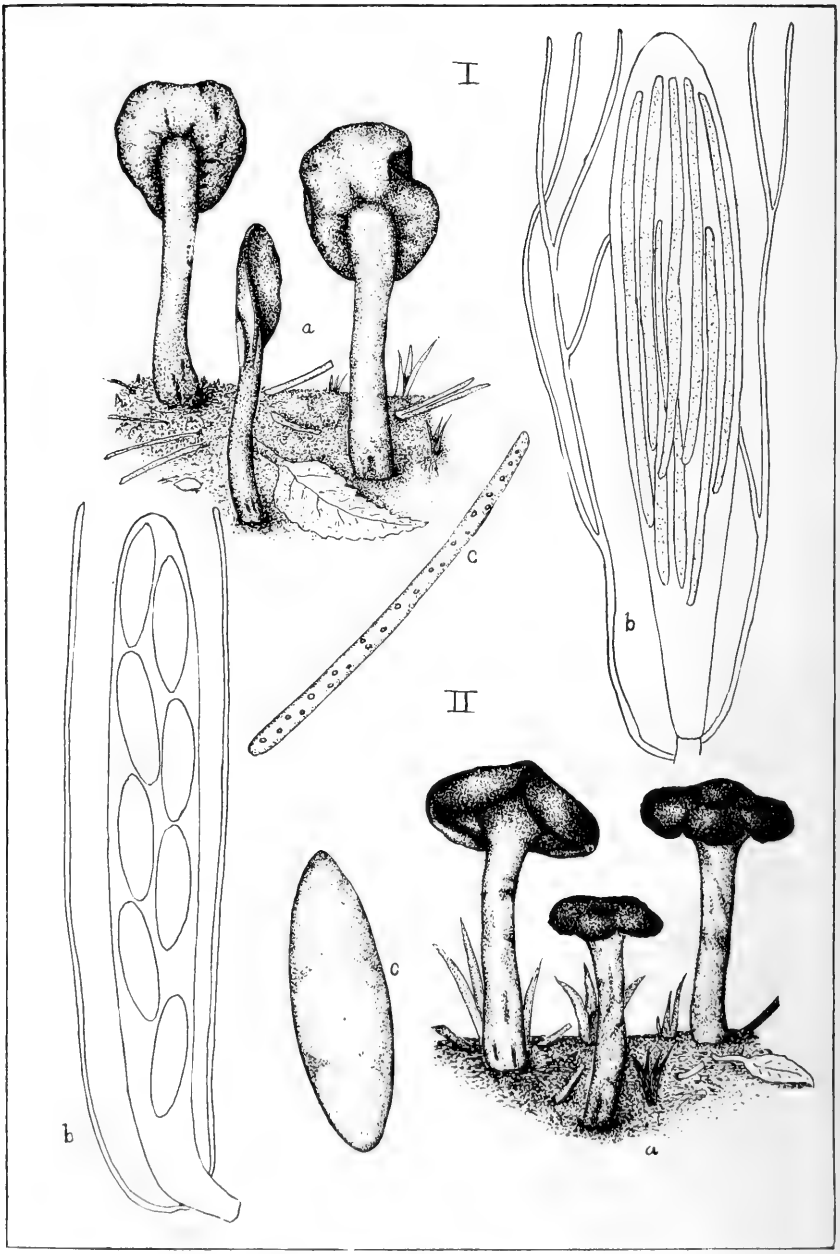

FIG. 106. SPATH-U-LA'-RI-A CLA-VA'-TA (I) and LE-O'-TI-A STI-PI-TA'-TA (II), by Fred. J. Seaver. See explanation on page 129.

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MYCOLOGICAL BULLETIN
No. 34

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio, May 15, 1905

ACKNOWLEDGMENTS.—The artists who contributed the photos and drawings for the accompanying figures are Dr. O. E. Fischer, of Detroit, and Mr. Fred J. Seaver, of the Iowa State University. Thanks are extended and the example commended.

EXPLANATION OF FIG. 109.—A plant of MOR-CHEL'-LA CON'-I-CA is shown at I, natural size; *b*, at the left, is a section showing the pits; at *c* an ascus with ascospores accompanied by one pa-raph'-y-sis, x 500; at *d* a sporidium, x 750, is figured. In II a specimen, natural size, of MOR-CHEL'-LA HY'-BRI-DA is given; a section to show the free pileus and pits is given at *b*; at *c* a mature spore-bearing ascus with a pa-raph'-y-sis, x 400; *d* is a single sporidium, x 800. Drawings by Fred J. Seaver.

VOL-VA'-RI-A.—A common species illustrated below. The name of this genus will be evident at once, namely the *vol'-va* bearing fungus. The plants belong to the *rosy-spored* Ag'arics. While the volva is present the an'-nu-lus, or ring, is absent, and the latter character separates the species from that of AM-A-NI'-TA. The stem is easily separable at its junction with the pileus, the same being true of its near relatives, namely, *Am-a-ni'-ta*, *A-man-i-top'-sis*, and *Lep-i-o'-ta*.

FIG. 107. VOL-VA'-RI-A BOM-BY'-CI-NA. Edible. Said to be of world-wide distribution, but not common; found on decayed logs, stumps, etc., during late summer and autumn. From photo by Dr. O. E. Fischer, Detroit, Michigan.

MYCOLOGICAL GLOSSARY.

Toad'stool: any one of the common conspicuous fungi; same as Mushroom; may be poisonous or non-poisonous, edible or inedible.
To'rose: swollen at intervals.
Tra'ma: the interior portion of the gills or pileus.
Tremel'loid: gelatinous or stiff jelly-like, as a *Tremella.*
Tu'mid: slightly swollen.
Umbil'icate: with a rounded pit or central depression.
Um'bo: central elevation as on the cap of some Mushrooms.
Um'bonate: with an umbo.
Unequal: applied to gills of unequal length.
Universal veil: a volva which entirely envelopes the plant when young.
Ure'do: the second stage in the life cycle of rusts; red Rust.
Ure'dospore: a thin-walled summer spore produced by the *Uredo,* or stage of the group of Rusts preceding the teleutospore-bearing.
Vaginate: having a sheath.
Veil: a covering of a part or all of the fungus; see *Partial Veil, Universal veil.*
Ven'tricose: swollen in the middle.
Ver'nicose: appearing as if varnished.
Ver'rucose: coveerd with warts or small elevations.
Verru'ciform: same as verrucose.
Ves'icle: a bladder-like cavaity, or a cell.
Vesicular, vesiculose: full of rounded cavities or vescicles.
Vol'va: a wrapper or envelope which at first covers the entire young plant; a universal veil; it may remain as a cup at the base of the Mushroom, or be broken up in fragments distributed over the cap and base of stem.
Zonate: marked with zones or concentric bands of color.

FIG. 108. PLU'-TE-US CER-VI'-NUS. Edible. Photo by Dr. O. E. Fischer, Detroit, Michigan. Previous figure of this species on p. 64, and explanation on p. 62.

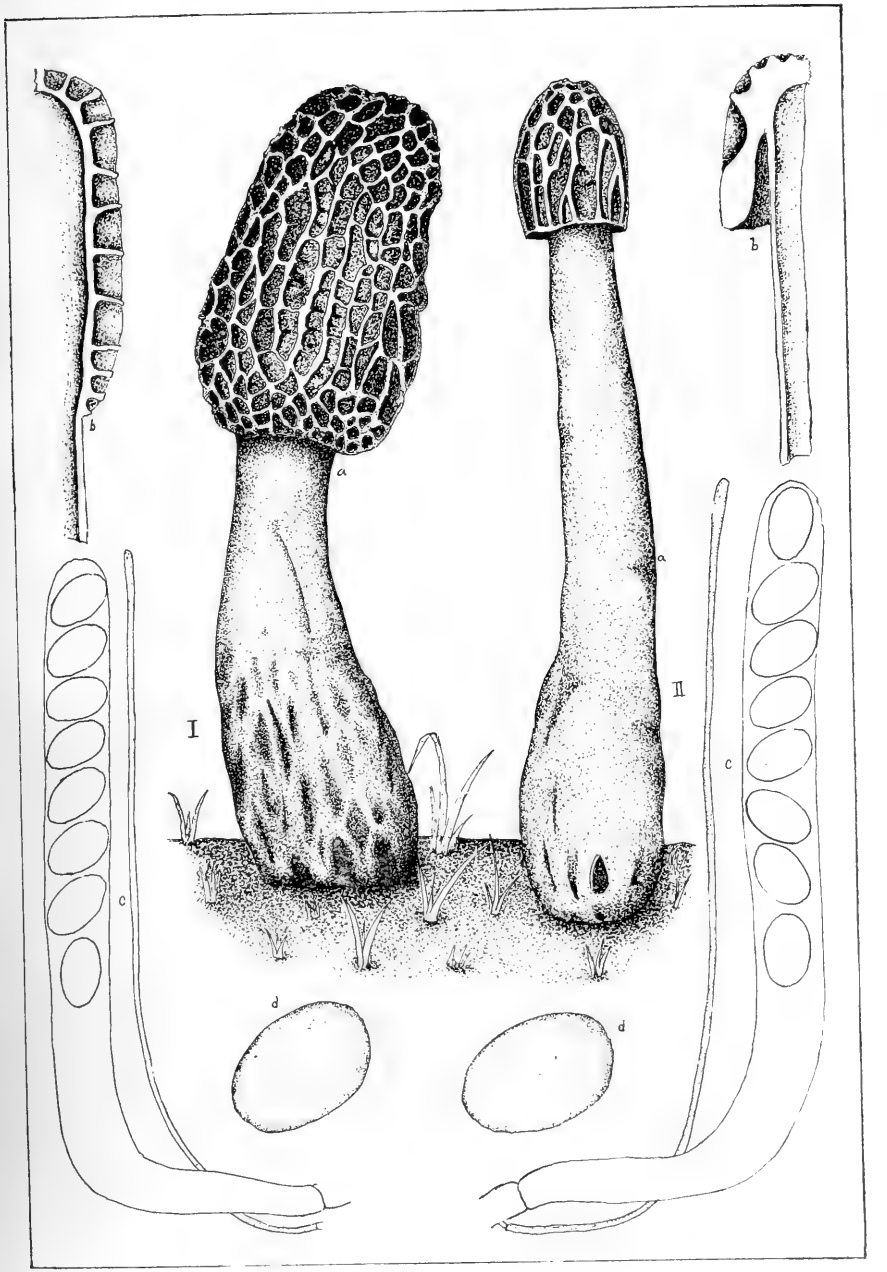

FIG. 109. MOR-CHEL'-LA CON'-I-CA AND MOR-CHEL'-LA HY'-BRI-DA. By Fred. J. Seaver. See p. 133 for explanation.

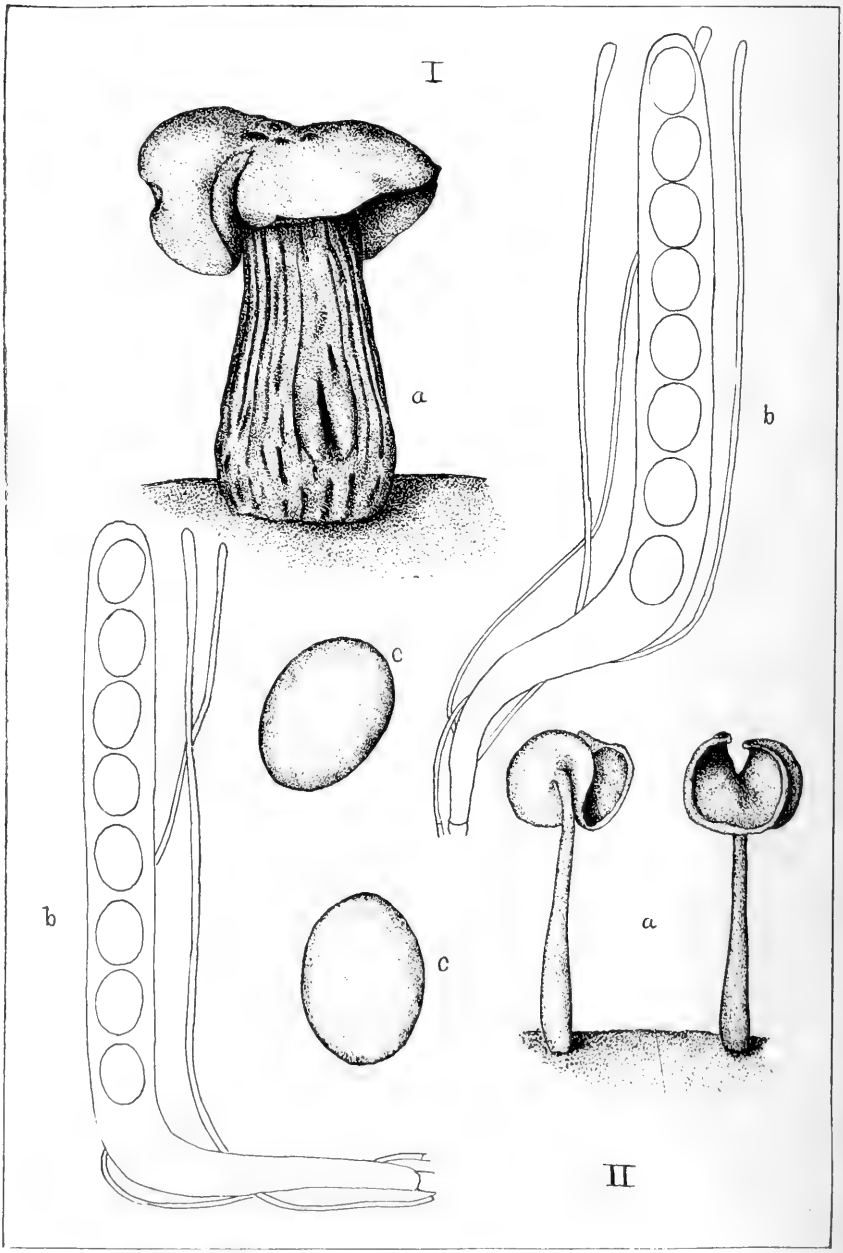

FIG. 110. HEL-VEL'-LA CRIS'-PA AND HEL-VEL'-LA E-LAS'-TI-CA. By Fred J. Seaver. See p. 137 for explanation.

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MYCOLOGICAL BULLETIN

No. 35

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio, June 1, 1905

EXPLANATION OF FIG. 110. The following are shown: HEL-VEL'-LA CRIS'-PA, one plant, natural size, at I *a*; an ascus and three pa-raph'-y-ses are shown in *b*, x 600; *c* is a sporidium, x 1400. In II *a* is shown a plant, natural size, of HEL-VEL'-LA E-LAS'-TI-CA; at *b* are two pa-raph'-y-ses accompanying the mature ascus; at *c* a single sporidium is given, x 1200. All figures drawn by Fred J. Seaver, Iowa State University.

TERMS ILLUSTRATED IN THE PLATE.—The following mycological terms are illustrated on the accompanying plate:

Adnate, Agaric, Annulus, Ascospores, Ascus,
Basidiospores, Basidium,
Cap, Capillitium, Cell, Conidiophores, Cystidium,
Decurrent,
Gills,
Hymenium, Hyphae,
Involute,
Lamella,
Mushroom,
Plasmodium, Protoplasm,
Revolute, Ring,
Sinuate, Spore, Sterigma, Superior,
Toadstool, Trama,
Umbilicate, Umbo, Umbonate,
Vesiculose, Volva.

FIG. 111. VOL-VA'-RI-A PU-SIL'-LA. The illustration was made from a photo sent by Dr. O. E. Fisher; the plants are represented very slightly enlarged; they were collected early this spring, at Detroit, Michigan.

University Bulletin, Series 9, No. 21. Entered as Second Class Matter, Post-office at Columbus, Ohio

A Plate to Illustrate the Slime Moulds.—A portion of a *plasmodium* highly magnified, and a single species more or less magnified of each of the common genera of *Myxomycetes* or Slime Moulds, are given. These are diagrammatic figures mostly adapted from plates in Macbride's North American Slime Moulds.

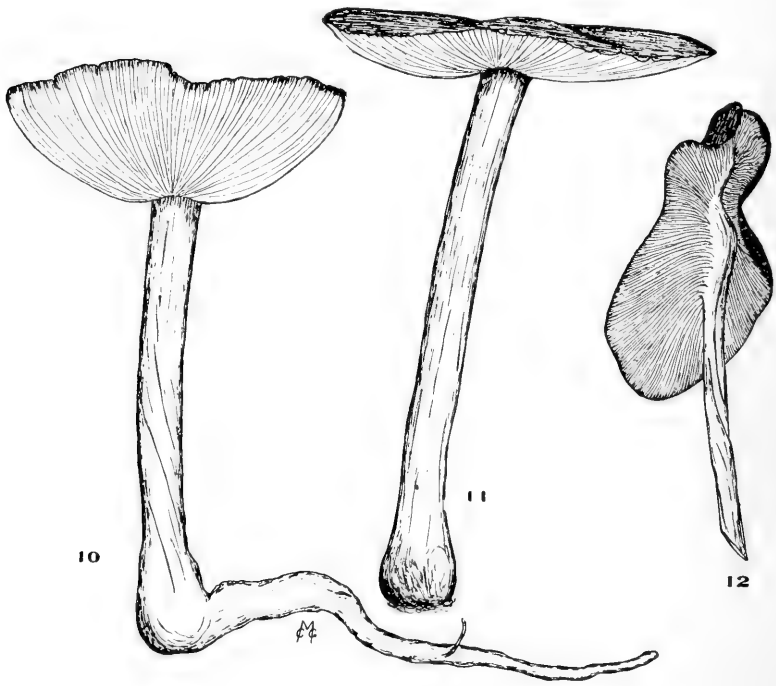

Fig. 112. Col-lyb'-i-a rad-i-ca'-ta. A sketch showing abnormal growth of this common edible Col-lyb'-i-a; the specimens were found on a rotten log, but the "root" was unable to peretrate the hard, less-rotten portions. In one case the "root" portion was not at all developed, as shown in the middle specimen, but a more energetic plant (sketch to the left) turned its course at right angles and grew to the usual length. A distorted cap is shown in the plant sketched at the right. These were collected near Sandusky, Ohio, last year.

The Glossary as a Separate Pamphlet.—It has been decided to reprint the Mycological Glossary which has appeared on successive pages in this Bulletin. A serviceable paper will be used—and the expense involved in this matter requires that the price per copy be placed at 25 cents. Beginners, amateurs, and students of Mushrooms will doubtless find this little dictionary of some advantage.

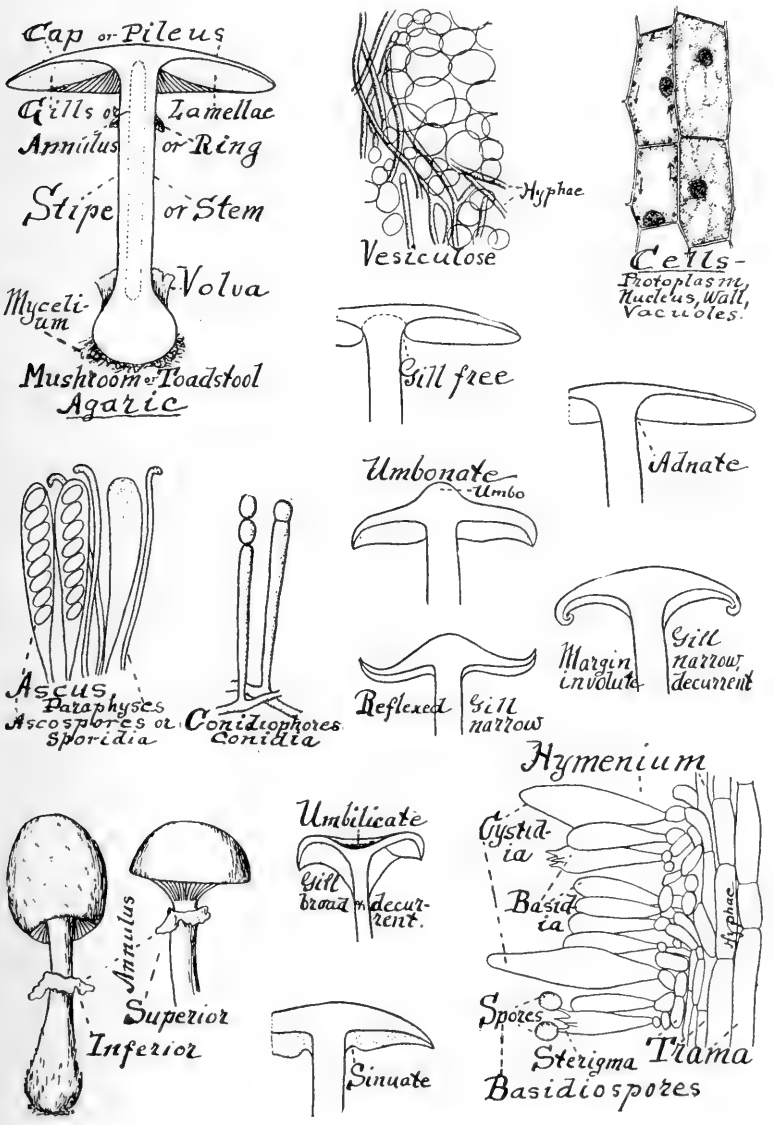

FIG. 113. ILLUSTRATIONS OF MYCOLOGICAL TERMS.

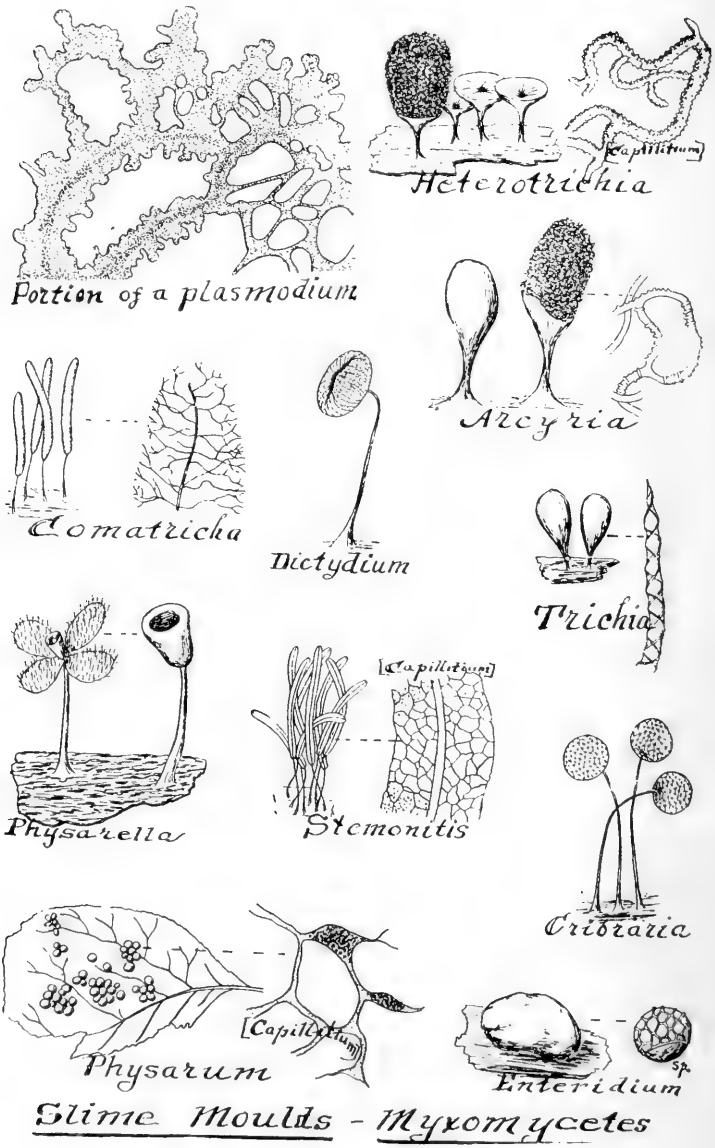

FIG. 114. ILLUSTRATIONS OF THE SLIME MOULDS.

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MYCOLOGICAL BULLETIN

No. 36

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio, June 15, 1905

THE ILLUSTRATIONS IN THIS NUMBER.—We have to thank Dr. O. E. Fischer for the photo of the elegant Peziza shown in Fig. 115. The etching in Fig 116 represents a saprophytic species of fungus found on old stems of the prickly lettuce. A common and abundant fungus, Cli-toc'-y-be mul'-ti-ceps, is shown in Figure 117. On the last page we give an illustration of Pho-li-o'-ta u-nic'-o-lor, also found near Columbus, a species perhaps not rare in this country.

THE GROUP NAMES.—Since plants are almost infinitely numerous one can readily see the necessity of grouping or classifying them, and therefore *names* of groups are a necessary evil, or rather a scientific necessity. Neither is it simply for convenience that botanists establish groups with appropriate names, but the verity of the groups and their proper arrangement exhibit plant affinities; and only by discerning these genetic relationships can we have any proper idea of the evolution of the plant kingdom, or conception of the unity and order in Nature that modern science has elucidated. A casual notice will show that there has been "order in this madness," for all the Ordinal names end with the syllables *a'-les*. In the next No. of the BULLETIN the Families constituting the Order *A-gar-i-ca'-les* will be given, and then it will be seen that the terminal syllables *ce-ae* suggest a family name. *Po-ly-po-ra'-ce-ae* is a case in point.

THE PEZIZAS AGAIN.—Some illustrations of these Cup-fungi have already been given; for example, Pe-zi'-za re-tic-u-la'-ta was shown in Figs. 20 and 21 (pp. 14 and 15); Sar-co-scy'-pha oc-ci-den-ta'-le and Sar-co-scy'-pha floc-co'-sa were illustrated in Figs. 36 and 37 (pp. 30 and 31); Bul-ga'-ri-a in-qui'-nans was given in Fig. 44 (p. 40); and Pe-zi'-za ba'-di-a in Fig. 61 (p. 66). These and related forms are readily referable to the family Pe-zi-za'-ce-ae. They are charming fungi—some of them extremely delicate, tiny and handsomely colored.

PE-ZI'-ZA, A LARGE GENUS.—As the earlier botanists used this generic term it included a very large number of species. In later times other genera have been carved out of it or formed to include special groups of

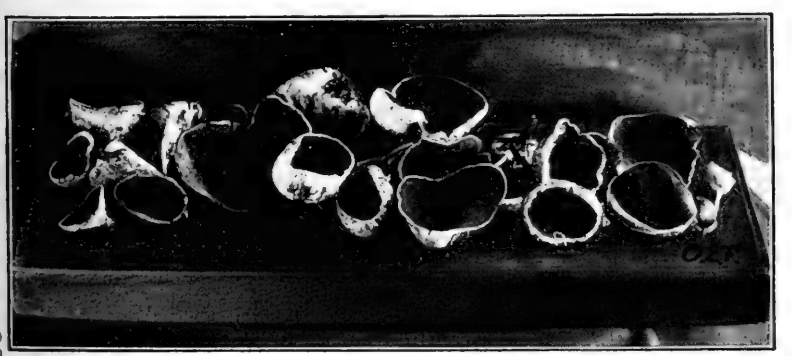

FIG. 115. PE-ZI'-ZA COC-CIN'-E-A (*Sar-co-scy'-pha coc-cin'-e-a*). Scarlet Pe-zi'-za. This beautiful plant appears very early in spring. It may be found in the woods growing on rotten logs or on decayed wood in the soil. The photo from which the cut was made was furnished by Dr. O. E. Fischer, Detroit, Michigan.

University Bulletin, Series 9, No. 22. Entered as Second Class Matter, Post-office at Columbus, Ohio

the species; thus we have Geophyxis, Acetabula, Otidia, Discina, Pyroneana, Humaria, Sarcoscypha, Lachnea and many others—and enough species left over to give Peziza a respectable standing as a genus.

The Name Pe-zi'-za.—This was given by Dillenius in 1819, taken from the Greek word, *Pezis,* used to designate "a mushroom without a stalk." Some botanists, seized with a zeal for pure classical terminology, say this ought to be therefore "*Pe'-zis,*" not "Pe-zi'-za." I am not competent to judge in the case, but at any rate this may be said, that *Pe-zi'-za* (*not "Pezis"*) was really the name given by Dillenius in 1819 and a good-enough name withal. Besides if this is to be changed to suit refined taste, then I suppose dozens if not hundreds of others may be drawn into the same category. Mycologists today are coining such names as Rehmiomyces, Eichleriella, Prachtflorella, and they seem to serve the purpose even if they are not classical Latin. The oldest name, that is, the first name given, illy or happily chosen, is the one to be used invariably, a rule which botanists call the *Principle of Priority.* A strict application of this perhaps will give, if anything will give it, stability in nomenclature, devoutly to be wished.

The Group of Dis'-co-my-ce'-tes.—The Pezizas serve well to illustrate the large group called Dis'-co-my-ce'-tes. These fungi have the spores in *as'-ci;* and the *hy-me'-ni-um,* or spore-bearing layer, forms the surface layer or bottom mostly of a *cup or saucer-shaped fruiting body.* The Helvellas, Gyromitra, Bulgaria, as well as Peziza, heretofore illustrated, belong to this group.

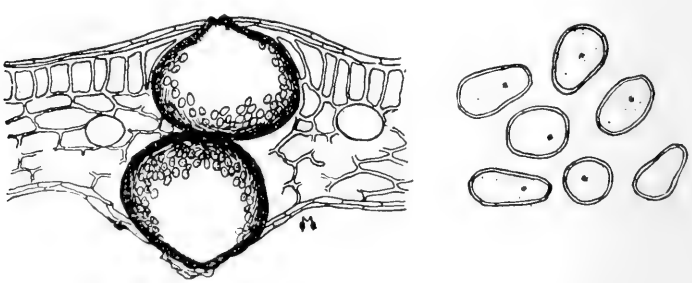

Fig. 116. Phy-lo-stic'-ta a-sim'-i-nae. A Leaf-spot Fungus of the Papaw. The figure shows a section through the leaf moderately magnified and at the right the spores (sporules) highly magnified. The spore-case is called the *pyc-nid'-i-um,* and this is formed, as shown in the figure, below the epidermis, though it is slightly erumpent when mature. Many of the pyc-nid'-i-a are clustered in a single dead spot on the leaf which may be of circular or irregular outline; the pycnidia can be easily seen with a hand lens—sometimes even distinctly by the unaided eye. This is a parasitic species and the dead tissue of the leaf is caused by the presence of the fungus.

Interesting Common Names.—To some of the conspicuous Pezizas fanciful names have been applied, and it will be interesting to put them on record. It is said for example that they are called "Blood-cups," "Fairy cups," "Flaps," "Bird's-nests," etc. The local names, if reported from various localities, will be listed; notice of special names in use of any or all kinds of Mushrooms is solicited.

FIG. 117. CLI-TOC'-Y-BE MUL'TI-CEPS. Edible. *Multiceps* means "many-headed"—and this species like some other Clitocybes is caespitose, that is to say, tufted or with many stems crowded together. The plants are found in great abundance in a partially cleared woods near Columbus. It flourishes from the middle of the season till late in autumn.

FIG. 118. PHO-LI-O'-TA U-NIC'-O-LOR. A common fungus growing on decayed wood. The plants are more or less clustered, bay, bay brown, or buff color, having ochraceous spores. This is not known to be edible, in fact we may look upon many Pholiotas with suspicion. MacIlvaine remarks, however, as follows: "Stevenson notes in his description of the genus: 'None are to be commended as edible.' My investigation shows that there are several delicious species, notably P. squarrosa and subquarrosa. Their lateness and plentifulness make them valuable food fungi. I have nothing but praise for the entire genus." The plants from which the photograph was taken occurred in a woods near Columbus, first brought in by H. H. York, in June.

IT BECOMES NECESSARY to call attention to the fact that Vol. I of the MYCOLOGICAL BULLETIN is exhausted. It is hoped that the set of Nos. (1-12) comprising Vol. I may be bought back from those who were but are not now subscribers. Any or all these Nos. are solicited—and perhaps present subscribers may be able in some cases to assist the editor in recovering the same, which would be a great accommodation to several parties.

The Mycological Bulletin is issued on the 1st and 15th of each Month, Price 25c. Copies of Vol. II (1904) may be had for 50 cents each, or cloth bound copies for 75 cents. No copies remain of Vol. I (1903). Address, W. A. Kellerman Columbus Ohio.

MYCOLOGICAL BULLETIN

No. 37

W. A. Kellerman, Ph. D., Ohio State University
Columbus, Ohio, July 1, 1905

HERE IS WHAT WE HAVE THIS TIME.—Professor Beardslee, of Asheville, N. C., has furnished an instructive article, accompanied with illustrative photographs, touching the common species of Cli-to-pi'-lus. We therefore devote this entire No. of the BULLETIN to this subject, and besides publish it in the Journal of Mycology.

THE ROSY SPORED AGARICS OR RHODOSPORAE.

H. C. BEARDSLEE.

The Rosy Spored Agarics form an interesting group and one so favorable for study that it is proposed to give in successive Numbers of this Journal an outline of the group which shall help the beginner to recognize the common species. Care will be taken to point out the features by which the different groups can be recognized and figures of some of the more conspicuous and interesting species of each group will be given. The rarer species and those which are not well understood will not be considered.

HOW TO RECOGNIZE THE RHODOSPORAE.

When a basket of fresh specimens has been collected, spore prints should first be secured by removing the caps from selected specimens and placing them on white paper. In a few hours, if the specimens collected are in a suitable condition, spores will have fallen in sufficient quantity so that the spore-colors will be plainly shown. All the specimens whose spores have a disinct red or flesh color may then be selected out. These

FIG. 119. CLI-TO-PI'-LUS NOV-E-BOR-A-CEN'-SIS. Photograph by H. C. Beardslee, Asheville, N. C.

University Bulletin, Series 9, No. 25. Entered as Second Class Matter, Post-office at Columbus, Ohio

belong to the *Rosy Spored Agarics.* After a little practice many of this group can be recognized at first sight. The spores are often formed in profusion and give a pink tint to the gills, and often collect in masses on the gill and stem so that their color is readily seen.

THE GENUS CLITOPILUS.

This genus has rosy spores and may be distinguished from other members of the group by its solid stem and its decurrent gills (*i. e.,* gills which run down on the stipe as described in an earlier Bulletin).

KEY TO THE COMMON SPECIES OF CLITOPILUS.

The four common species may be distinguished by the following key:

Pileus white 1
Pileus gray to brownish gray 2
1. Pileus firm, dry, with a delicate white bloom.....*C. prunulus*
1. Pileus soft, slightly viscid .....*C. orcella*
2. Pileus thick, fleshy .....*C. abortivus*
2. Pileus thin, spores pale flesh color .....*C. noveboracensis*

DESCRIPTIONS OF THE SPECIES.

CLITOPILUS NOVEBORACENSIS.—This species is abundant on the Asheville Plateau and may be found especially during wet weather. The pileus is dingy gray to pale gray in color, thin, with a distinct odor and a bitter unpleasant taste. The gills are crowded, pale, then dingy or yellowish. The stem is solid, pale gray, with an abundance of white mycelium.

It may be of value to add that this species is doubtless identical with *C. popinalis* of Europe. Specimens and photographs have been submitted to eminent European authorities and this opinion definitely verified. Bresadola also states in a recent publication that the latter species is also the same as the European *Clitocybe amarella.* I have preferred here, however, to use the common American name.

CLITOPILUS ABORTIVUS is one of our common species. It is usually found growing in colonies on the ground or on well rotted stumps and logs. It is 2-5 in. broad, gray to browninsh gray, not viscid, and is covered with a delicate tometum. The gills are pale gray, becoming rosy with the spores. The stem is solid and pale gray. Frequently clusters of plants are found which have not developed properly but have formed curious abortive masses from which the plant derives its name. The figure shows this peculiar feature well (Fig. 120). This species is edible, though not of the best quality.

CLITOPILUS PRUNULUS and CLITOPILUS ORCELLA are close relatives and resemble each other so closely that photographs of each do not need to be given. Both are white and have decurrent gills and may be easily recognized from the photograph

CLITOPILUS ORCELLA, as noted in the key, is slightly viscid, which is a convenient mark by which the species may be distinguished. Both are found in woods, especially along woodland roads. They are both edible species of excellent quality.

GY-RO-MI'-TRA ES-CU-LEN'-TA.—This belongs to the *Hel-vel'-la* Family which was briefly described on p. 15 and to this the reader may refer. In that connection (on p. 16) a half-tone illustration was given of *Gy-ro-mi'-tra brun'-ne-a,* a very common and interesting Mushroom which many regard as one among the best of the edible species. Through the kindness of Dr. Fischer, of Detroit, who were able to present another species of this genus, namely Gy-*ro-mi'-tra es-cu-len'-ta.* Its prominent characters have been stated as follows: It has a chestnut-red, irregularly rounded and lobed cap with brain-like convolutions. The margin of the cap is attached to the stem in two or three places. It is hollow within, and has a few prominent irregular ribs or ridges. The plant is two to four inches high, and the cap two or three inches broad; specimens have been found weighing a pound each. See Fig. 99, p. 123.

FIG. 120. CLI-TO-PI'-LUS A-BOR-TI'-VUS. The two lower plants show the fully developed form of the species; the upper figures are the common abortive form. Photographs by H. C. Beardslee, Asheville, N. C.

FIG. 121. CLITOPILUS ORCELLA. Photograph by H. C. Beardsley, Asheville, N. C.

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MYCOLOGICAL BULLETIN

No. 38

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio, July 15, 1905

THE TWO-SPORED MOREL, MOR-CHEL'-LA BIS'-PO-RA. Not until now could I adequately report in print in reference to some curious little Morels sent from Wisconsin by Mr. A. F. Lane. They were collected the 16th of April, under an oak tree in a piece of mixed woods near Milwaukee. They were sent because of "their early appearance in the season," and because "they have characteristics not common to any of the other well-known Morels." A microscopic examination of the spores settled the identity of the species at once. Only *two spores* are contained in each ascus, whereas in the other species there are eight spores. They are therefore the botanical species known as Mor-chel'-la bis'-po-ra. The photographs made from the specimens are reproduced in Fig. 122.

FIG. 122. MOR-CHEL'-LA BIS'-PO-RA. TWO-SPORE MOREL. The plants are shown natural size; two of the figures are vertical sections, and the attachment of the cap at the apex of the stem only is more or less distinctly seen, but the hollow stem is less clearly shown in the engraving. The photographs were made from plants sent from Wisconsin by Mr. A. F. Lane.

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Previous Discussion and Illustration of the Morels.—These plants are very interesting and naturally we expect much to be said about them in the Bulletin. Turning back, we find that the subject has been reported in print or engravings on the following pages: 2, 5, 6, 7, 11, 13, 14, 21, 27, 129, and 135. All this with what has been added in this No. will doubtless satisfy the most exacting patron—until the Morelle season opens again next year.

The Genus Om-pha'-li-a.—These white spored Agarics are tersely described as follows by Professor Atkinson: The Genus *Omphalia* is closely related to *Mycena* and *Collybia*. It differs from these mainly in the decurrent gills. In the small species of *Mycena*, where the gills are slightly decurrent, the pileus is not umbilicate as it is in the corresponding species of *Omphalia*. In some of the species of *Omphalia* the pileus is not umbilicate, but here the gills are plainly decurrent. The stem is cartilaginous."

The Species of Om-pha'-li-a.—There are between thirty-five and forty American species of this genus, some of them very common and abundant; they are usually small and occur mostly in the woods. One of the commonest and most widely distributed is Om-pha'-li-a cam-pa-nel'-la or Bell Omphalia. It may be found throughout the summer and autumn on rotten logs, stumps, etc., in shady moist woods. Its pileus is umbilicate, faintly striate and of a dull reddish color. The gills are narrow and connected by veins and decurrent on the stem. Another species is Om-pha'-li-a ep-i-chy'-si-um, distinguished by its smoky or dull gray color, the depressed or funnel-shaped pileus and short, slender stem. The species shown in this No. of the Bulletin is Om-pha'-li-a um-bel-lif'-er-a, whose characteristic cluster habit is amply illustrated in Fig. 125.

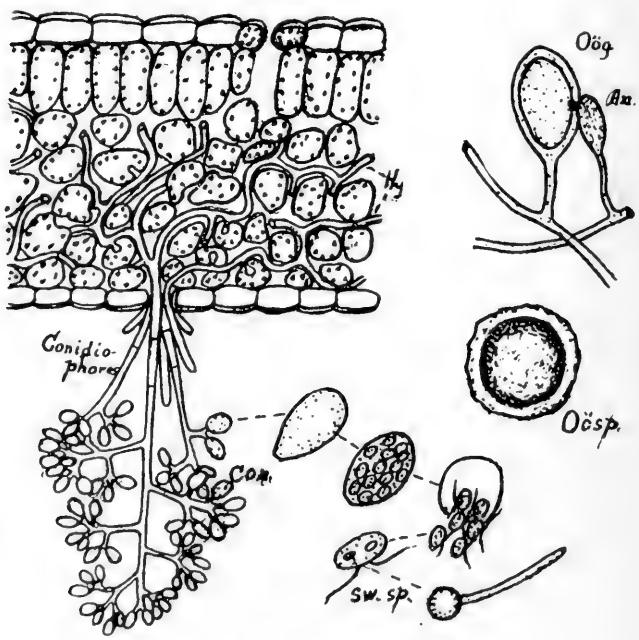

Fig. 123. Grape Mildew or Peronospora. See next page.

Are the Omphalias Edible?—For this phase of the subject we will quote a good author on mycophagy, McIlvaine, who says: "Raw, the writer has not found one that is objectionable in any way; a few have a woody taste. But two species have been found by him in sufficient quantity to make a dish. It is probable that all are edible.

Grape Mildew or Peronospora.—Again we interpolate a parasitic fungus that can not be called a Mushroom, but which nevertheless is very interesting both from the scientific and economic point of view. On the preceding page is given (Fig. 123) an etching which represents in a diagrammatic way, the well known enemy of the vineyards. The large figure to the left is intended to represent a magnified section through a grape leaf. The row of cells forming the protecting outer layer of the leaf above and below, is the epidermis. The cells between are full of protoplasm (not evident in the figure) and chlorophyll grains (leaf-green). Between these cells, and drawing nourishment from them, are the tube-like cells (called *hy-phae*) which form the body of the parasite. As seen it has developed upright (downright in this case) straight branching cells; all these are called *co-nid'-i-o-phores,* because they *bear* the *spores* which are called *co-nid'-i-a.* The latter are the summer spores; they germinate at once, infect other plants in the vineyard, and so multiply the parasite rapidly when climatic conditions are favorable. The remainder of the story must be told in a later No.

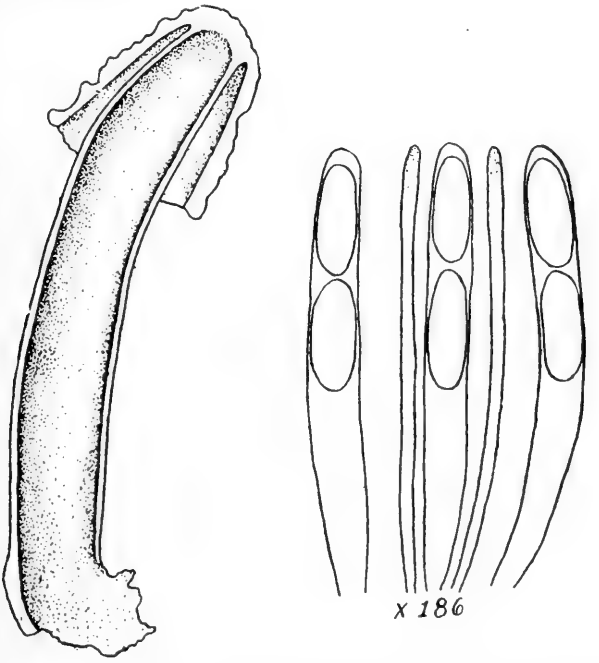

Fig. 124. Mor-chel'-la bis'-po-ra. Two-spore Morel. A vertical section through the middle of the plant shows the interior structure. It is seen that the stem is hollow and the cap attached only at its apex. The drawings to the right show the spore cases (*as'-ci*), each containing two spores, also slender cells accompanying the asci (which may perhaps be really immature or abortive asci), called the pa-raph'-y-ses. The plant is shown natural size, but the asci and spores are represented as magnified 186 diameters.

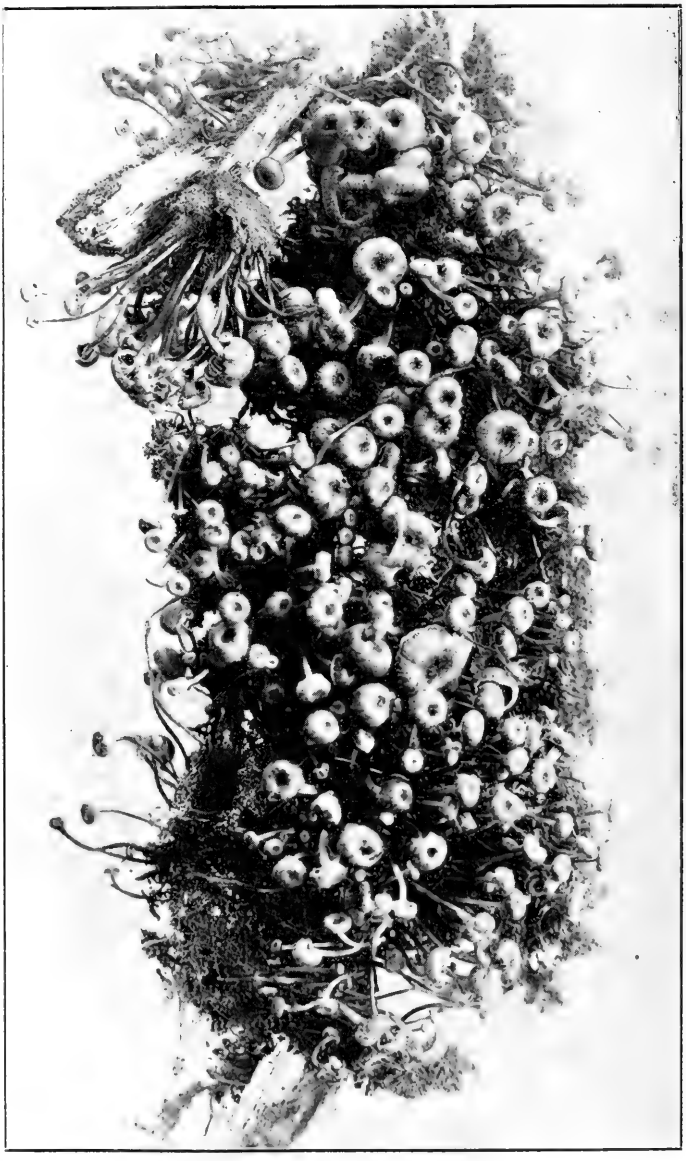

FIG. 125. OM-PHA'-LI-A UM-BEL-LIF'-ER-A. Umbellate Om-pha'-li-a. Growing on rotten wood in a moist, shady place near Columbus, O.

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MYCOLOGICAL BULLETIN

No. 39

W. A. Kellerman, Ph. D., Ohio State University
Columbus, Ohio, August 1, 1905

OM-PHA'-LI-A CAM-PA-NEL'-LA. BELL OM-PHA'-LI-A.—We have already commented briefly on Omphalias [see p. 150], quoting Atkinson's descrip-

FIG. 126. OM-PHA'-LI-A CAM-PA-NEL'-LA. BELL OM-PHA'-LI-A. See text.

University Bulletin, Series 9, No. 27. Entered as Second Class Matter, Post-office at Columbus, Ohio

tion of the genus. Additional remarks were made concerning the species on the same page. Besides, a half-tone representing the Umbellate Om-pha'-li-a was shown on p. 152. We give here an illustration of the common Om-pha'-li-a cam-pa-nel'-la, or Bell Omphalia—a charming little plant found on very rotten, wet logs in shady woods. It occurs throughout summer and autumn, often in enormous numbers spreading over an extended surface of its favorite matrix—a fallen, soggy, disintegrated log. The cap is convex and umbilicate, of dull reddish color or dirty white, having a watery appearance in damp weather.

LEP-I-O'-TA MOR-GAN'-I; MORGAN'S AGARIC.—This magnificent Mushroom was first collected by Professor Morgan; he sent it to Professor Peck, who named it as noted above. Though ordinarily placed in the white-spored section of the Agarics, it has pale *green* spores, as pointed out by its discoverer. The greenish spores and, when the plant is mature, the greenish gills in connection with its great size, readily identifies the species. The figures shown in this Number of the BULLETIN obviate the necessity of an extended description. It is pure white and often grows in huge fairy rings. It is a tempting subject for the amateur photographer. An additional illustration showing it in quantity in its natural habitat—especially as a fairy ring—is desired. The annulus is usually movable. As pointed out previously, the Lepiotas are botanically distinct from the Amanitas in not exhibiting a volva or sac at base of the stem.

It is shown in the two half-tones that the pileus is at first sub-globose or nearly globular; then it becomes expanded; in some old specimens it may be depressed. The usual size is six to eight inches high and five to nine inches broad.

IS LEPIOTA MORGANI POISONOUS?—McIlvaine says the only species of this genus known to be poisonous to some people is Lepiota morgani. Professor Stevens gave a detailed account of the symptoms of poisoning by this species, in the Journal of Mycology (Volume 9, pages 220-222). Vomiting and diarrhoea were severe. He says: The extreme violence of the symptoms produced by such a small quantity of the fungus makes one wonder what a meal of such might do! The conclusion of the whole matter is: exercise caution, and test with a small or moderate quantity if at all.

We close the comment by quoting, from One Thousand American Fungi, a statement by H. I. Miller: "I have recently measured several which were more than twelve inches across. . . . . Six families, here have eaten heartily of them. The experience is that one or two members of each family are made sick, though in two families, who have several times eaten them, no one was made sick. I enjoy them immensely, and never feel any the worse for eating them. I doubt if we have a finer-flavored fungus. The meat is simply delicious. One fairy ring yields a bushel."

Professor Morgan says: "I am this season (1879) finding elegant specimens of this remarkable Agaric, which was described in the March number of the Botanical Gazette. One plant measures 11 inches across the pileus and is 8½ inches high; the bulbous base of the stipe is 2 inches in diameter, tapering upward to one inch; the heavy movable ring is situated above the middle of the stipe. It is a much heavier and stouter plant than *A. procerus* Scop., though not as tall. It is stouter than any of the *Amanitas* and with a much greater expanse of pileus. It reminds me somewhat of *A. maximus* Fr., though with a much longer stipe and a more regular pileus. I am disposed to claim that it is the largest Agaric in the world. The remarkable thing about the plant, however, and the feature by which it differs from all other *Agarics* and by which it is readily recognied is its *green spores.* When first caught on white paper, the spores of mature specimens are a beautiful bright green; they soon change, however, to a dull green."

FIG. 127. LEP-I-O'-TA MOR-GAN'-I. MORGAN'S AGARIC. See text.

FIG. 128. LEP-I-O'-TA MOR-GAN'-I. MORGAN'S AGARIC. See text.

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MYCOLOGICAL BULLETIN

No. 40

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio, August 15, 1905

THE GENUS PLEU-RO'-TUS.—This interesting group of Gill-fungi, belonging to the series of white-spored Agarics, is concisely described by Professor Atkinson in his Mushrooms Edible and Poisonous, and we can advantageously transcribe his language, which is as follows: "The genus

FIG. 129. PLEU-RO'-TUS UL-MA'-RI-US ELM PLEUROTUS EDIBLE. The half-tone shows two specimens, natural size, taken from the clump illustrated in Fig. 130, where further explanation may be found.

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Pleurotus is usually recognized without difficulty among the fleshy, white-spored agarics, because of the eccentric (not quite in the center of the pileus) or lateral stem, or by the pileus being attached at one side in a more or less shelving position, or in some species where the upper side of the pileus lies directly against the wood on which the plant is growing, and is then said to be resupinate. The gills are either decurrent (extending downward) on the stem, or in some species they are rounded or notched at the junction with the stem. There is no annulus, though sometimes a veil, and the genus resembles both *Tricholoma* and *Clitocybe*, except for the position of the stem on the pileus. In *Tricholoma* and *Clitocybe* the stem is usually attached at the center, and the majority of the species grow on the ground, while the species of Pleurotus are especially characterized by growing on wood. Some species, at least, appear to grow from the ground, as in Pleurotus petaloides, which is sometimes found growing on buried roots or portions of decaying stumps which no longer show above ground."

PLEU-RO'-TUS UL-MA'-RI-US; ELM PLEU-RO'-TUS.—This species is described as usually growing on the Elm—whence the name—but also occurring on other trees. It may be found at wounds where there is decaying wood—but it may occur on the ground as stated in the paragraph below. The mark that distinguishes this large species from the Oyster fungus and other related species is its long stem, usually attached near the center of the cap, and by the gills being rounded or notched at their inner extremity. The pileus is convex, the margin incurved, then nearly expanded. It is smooth and white or whitish; it may be yellowish or brownish in the center.

WHAT THE AUTHORS SAY OF THIS SPECIES.—It may add to the interest of this subject if some quotations as to the Elm Pleu-ro'-tus are added. Atkinson says: "The elm pleurotus has been long known as an edible fungus, and is regarded as an excellent one for food on account of its flavor and because of its large size. It occurs abundantly during the late autumn, and at this season of the year is usually well protected from the attacks of insects. It occurs in the woods, or fields, more frequently on dead trees. On shade trees which have been severely pruned, and are nearly or quite dead, it sometimes appears at the wounds, where limbs have been removed, in great abundance. In some plants the stems are strongly curved because the weight of the cap bore the plant downward. Sometimes when the plant is growing directly on the upper side of a branch or log, the stem may be central."

McIlvaine says: "The historic elms of Boston Common have borne copious crops of this well-known and easily distinguished species from time immemorial. Every fall, about the first of September, if the season is favorable, later if not, copious crops appear decorating the trunks, and branches, sometimes at a height of thirty or forty feet. Growth takes place where branches have broken off or the trees have been wounded from other causes. They occur very generally on elms in the outlying districts of the city, but rare in the country, seeming to be distinctly urban in their tastes. No damage is apparent from their growth."

OUR ILLUSTRATION OF THE ELM PLEU-RO'-TUS.—The remarkable specimen shown in Fig. 130 differs much from the common type—but they may be representatives of Pleu-ro'-tus ul-ma'-ri-us, as kindly determined for me by Professor Morgan. He remarked concerning them: "Something near Pleurotus ulmarius—the spores of this species, but the form is not typical."

Excellent figures of the Pleurotus ulmarius are given in Atkinson's Mushrooms Edible and Poisonous (on pp. 102-3). He shows two specimens with long, strongly curved stems, as seen from above, from below, and in section. The other species which he illustrates by half-tones are Pleu-ro'-tus os-tre-a'-tus, Pleu-ro'-tus sap'-i-dus, Pleu-ro'-tus dry-i'-nus Pleu-ro'-tus sul-fu-roi'-des and Pleu-ro'-tus pet-a-loi'-des.

FIG. 130. PLEU-RO'-TUS UL-MA'-RI-US ELM PLEUROTUS. EDIBLE. Not the typical or common form; it grows mostly on trees--this clump, however, grew on the ground. It was a large cespitose mass, the size indicated by the scale at the margin of the cut. Two plants from the cluster are shown in Fig. 129. Collected by H. H. York, near Columbus, Ohio, June 1, 1905.

FIG. 131. BO-LE'-TUS FEL'-LE-US. BITTER BOLETUS. A conspicuous species, somewhat resembling the edible Boletus edulis, which is also common. Collected in the woods of the State Farm, Lancaster, Ohio.

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MYCOLOGICAL BULLETIN

No. 41

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio, September 1, 1905

AN AM-A-NI'-TA NUMBER.—The great interest attaching to this genus of Mushrooms, especially on account of numerous poisonous species, warrants further encroachment on our space. Hence this Number of the BULLETIN may be devoted to some figures and comments additional touching the same.

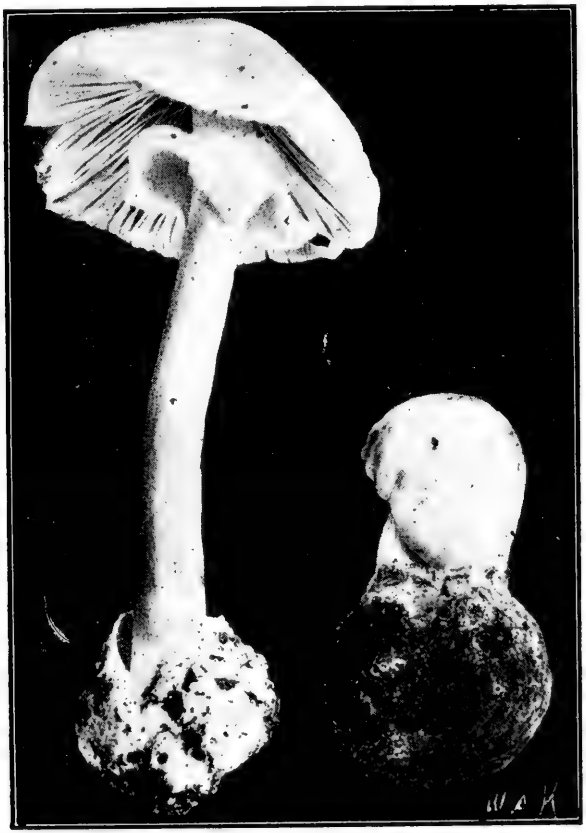

FIG. 132. AM-A-NI'-TA VER'-NA. POISONOUS. Because of its extremely virulent properties it has been called "Destroying Angel." It is pure white, and a beautiful species. Its annulus and volva are very conspicuous and these must always be synonomous with *danger* and *death*. The photo was made from a specimen collected in the woods of the State Farm, Fairfield Co., Ohio, Aug., 1903.

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THE NAME AMANITA.—Turning to Saccardo's Sylloge Fungorum we find this explanation of the name: "Nomen fungi a Galeno inditum, forte a monte *Amano*. (A name given by Galen to a fungus perhaps from mount Amano). As to syllabification and pronunciation of the name some authors put it thus: Am-a-ni'-ta; and others so: A-man'-i-ta. Take your choice.

SIZE OF THE GENUS.—In Saccardo's compilation 44 species are enumerated for the entire world: to this might be added 25 species of Amanitopsis—the species of the later genus formerly being included under Amanita. Perhaps there are two or three dozen of the American species. Professor Morgan enumerates and gives the description of 28 species in the Journal of Mycology, 3: 25-33, March, 1887. Professor Peck gives 14 species in Report of the New York State Museum, 33: 38-49, 1879. C. G. Lloyd has the same number of species in his Compilation of the Volvae of the United States, 2-7, 1893.

TECHNICAL DESCRIPTION OF THE GENUS.—It was the European mycologist, D. C. H. Persoon, who first used the name *Amanita* in modern botany, in his "Synopsis Methodica Fungorum," printed in Goettingen, Germany, in 1801. We will however quote the accurate description as given by the eminent mycologist Fries, which is as follows: "Spores white. Veil or volva universal, at first continuous, distinct from the cuticle of the pileus. Hymenophorum distinct from the stem. All terrestrial."

A GENERAL ACCOUNT OF THE AMANITAS.—In Professor Peck's Thirty-Third Report we find a popular description exactly suited to our purpose; we therefore transcribe the same, regretting only that his excellent Reports the earlier ones especially cannot be in the hands of all my subscribers. Here is his language:—

"The species of Amanita grow on the ground in the woods, groves and copses. They rarely occur in open fields, unless in the vicinity of trees or near the margin of the woods. Thin, open woods and copses afford the most favorable localities. In the early condition the plant is wholly enveloped in its volva, but as it increases in size the volva is necessarily ruptured. In some species, *A. caesarea*, for example, the volva is distinctly membranous, and includes the young plant as if in an oval sack. At length the upper part of the volva is ruptured, and the pileus and stem are exserted. Sometimes one or more irregular and unequal fragments of the ruptured volva adhere to the surface of the pileus for a time, and are carried up by it in its growth. But usually in these species the surface of the pileus is smooth, and the remains of the ruptured volva wholly adhere to the base of the stem or its bulb like a membranous margin, a sheath or a lacerated cup.

(Continued in the next Number.)

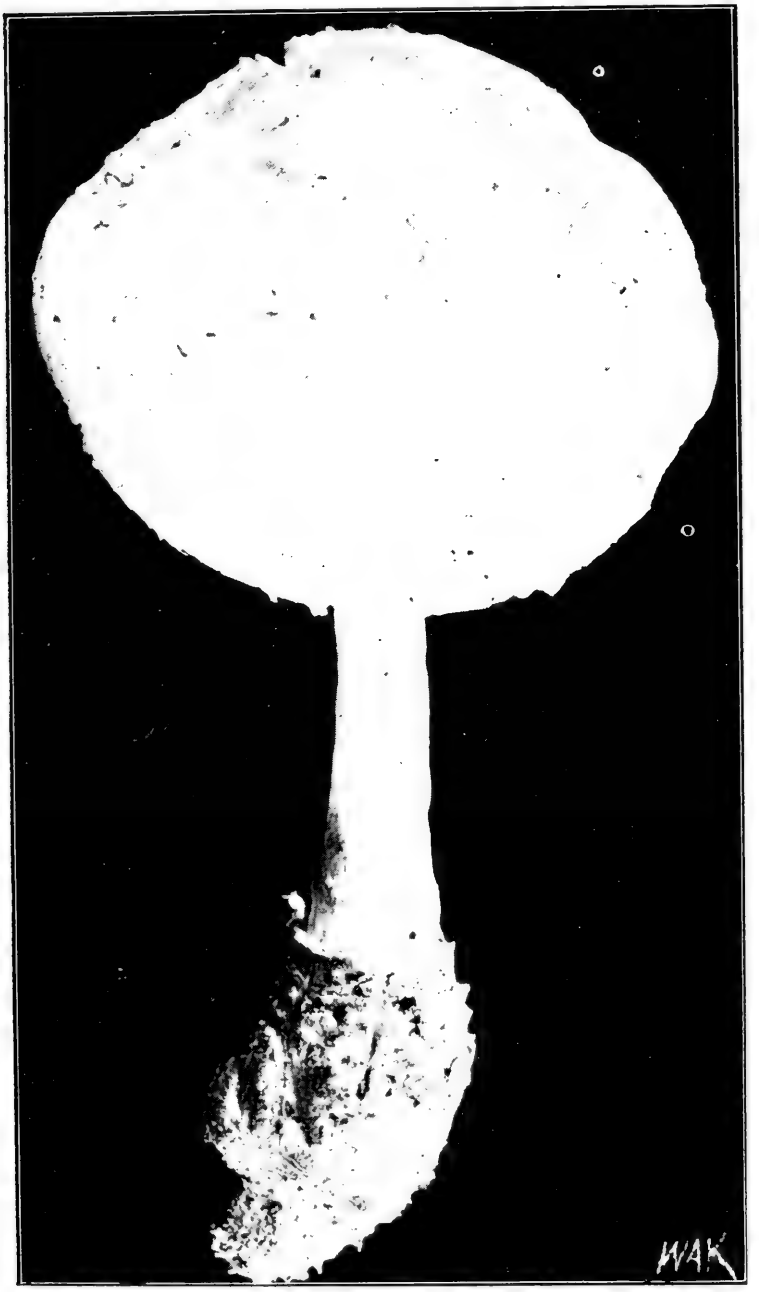

FIG. 133. AMANITA SOLITARIA. POISONOUS. SEE FIG. 134.

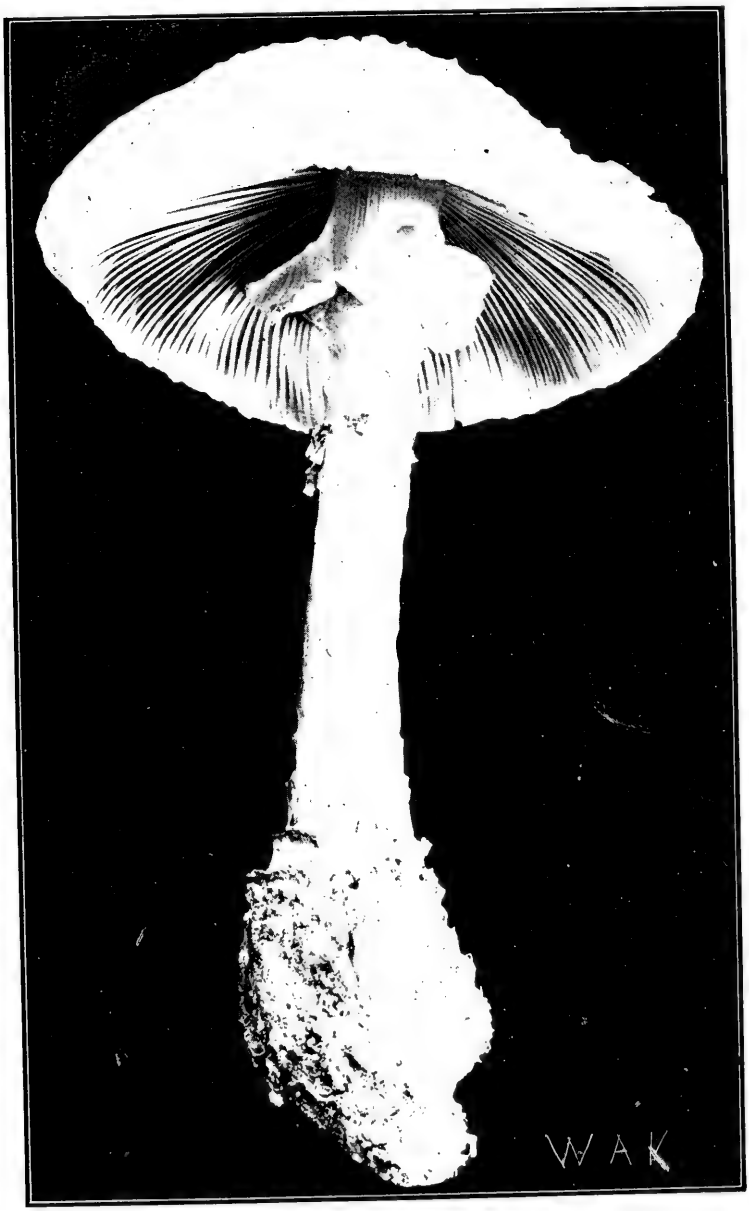

FIG. 134. AM-A-NI'-TA SOL-I-TA'RI-A. POISONOUS. Another of the beautiful white species, *said to be* edible, but I prefer not even to test it. Please use caution. FIG. 133 shows the top of the cap of the same specimen. It was collected in the open woods, sandy soil, of the State Farm, Fairfield Co., Ohio, Aug., 1905.

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MYCOLOGICAL BULLETIN

No. 42

W. A. Kellerman, Ph. D., Ohio State University
Columbus, Ohio, September 15, 1905

(Professor Peck's account of the Amanitas, continued.)

"In other species the volva is not distinctly membranous, but is more floccose or scaly and friable in its character. It envelopes the young plant, but the distinction between the pileus and bulbous base of the stem is soon manifest, and as the stem elongates the upper part of the volva is separated from the lower part, and persistently adheres to the surface of the pileus.

Fig. 135. Hyd'-num zo-na'-tum. A species with a tough almost leathery texture, having a surface of beautiful brown silky lustre, somewhat zoned and with radiating striæ. The spore-bearing spines are shown in the upper figures; two of them show coalesced caps though the stems are separate. The photo was made from specimens collected by the roadside in the woods of the State Farm, located in the sandstone hills of Fairfield Co., Ohio, Aug., 1905.

University Bulletin. Series 9. No. 30. Entered as Second Class Matter. Post-office at Columbus, Ohio

As this expands its covering or calyptra breaks up into superficial scales or warts. These are often angular or pyramidal in form, and sometimes unlike the pileus in color, and afford a beautiful ornamentation. The part that remains at the base of the stem often breaks up into mealy or floccose scales, and sometimes wholly disappears when the plant matures. Generally a smooth pileus indicates a perfect membranous volva, and a warty one an imperfect floccose or evenescent one. Sometimes, especially after heavy rains, specimens, which normally have the pileus warty, are found with a smooth pileus; but these are only occasional, and probably mostly accidental cases, the warts having been washed off by the rain.

"Most of the species are solitary or gregarious and of moderate or large size. The pileus, when fully expanded, is nearly plane and quite regular, so that these Agarics are among the most noble and attractive in their appearance. Many of them have a thin pellicle or cuticle, which, in the young or moist plant, is slightly viscid.

"The lamellae in nearly all the species are white or whitish, and free from the stem. Usually they are narrow toward the stem, and cease just before reaching it, thus leaving a small free space around its apex. In many species the short ones that intervene between the long ones are abruptly terminated at their inner extremity, as if truncated or cut square off.

"The stem is usually long and well formed, and in most species is more or less thickened or bulbous at the base. In some species it is hollow or stuffed with cottony fibrils; in others it is solid. In the greater number of species it is furnished with a membranous ring or annulus, that surrounds it near the top like a flabby collar. In the young plant this is stretched from the stem to the margin of the pileus, and wholly conceals the lamellae. As the pileus expands the annulus breaks loose from its attachment to the margin, and remains adhering to the stem. In some species this rupture is not always clean and even, small portions remaining attached to the margin. The annulus then has a lacerated or torn appearance."

Portraits of Amanita.—In the Bulletin we have given heretofore the following species:—Amanita strobiliformis (from Atkinson) p. 56; and A. rubescens. Here we give Amanita verna and A. solitaria. Professor Atkinson figures, in Mushrooms Edible and Poisonous, Amanita muscaria, A. phalloides, A. verna, A. floccocephala, A. velutipes, A. cothurnata, A. spreta, A caesarea (colored), A. rubscens (colored) McIlvaine gives in his book on mushrooms One Thousand American Fungi, colored plates of Amanita spreta, A. phalloides, A. muscaria, A. frostiana, A. chlorosoma, A rubescens, A. strobiliformis, and a half-tone of A. muscaria. In Nina L. Marshal's Mushroom Book there are given half-tones of Amanita phalloides and A. muscaria. Professor Peck's Reports contain colored plates of some species, as Amanita caesarea, A. rubscens, A. phalloides, A. verna, A. muscaria.

Time for the Bo-le'-ti.—At an early opportune time we must say something in extenso for the numerous species of Boletus. This is the season to study them in the field. Photographs are desired,—but the specimens should be identified by such authorities as Peck, Morgan, Atkinson or Beardslee.

FIG 136. CAN-THA-REL'-LUS AU-RAN-TI'-A-CUS. Orange Cantharelle. Edible. A common and easily recognized bright orange-colored species that occurs from summer to late autumn. It grows on the ground or on very rotten wood. The yellow decurrent gills are forked, and the pileus is funnel-shaped, at least depressed. The margin is strongly inrolled when young. The color may vary from deep orange to ochre-yellow, often brownish at the centre. Plants from which the illustration is made were collected in open, moist, shady, rich woods near Columbus, Ohio, Aug., 1905.

FIG. 137. BO-LE'-TUS EDU'-LIS. EDIBLE BOLETUS. This is one of the very large species of Boleti, growing in open woods along their borders, and in open places. It is abundant in warm, wet weather of summer and early autumn. The color of the cap may be dull reddish, reddish-brown, tawny-brown or yellowish. The tubes are white at first, then become greenish-yellow, or yellow when mature. The flesh is white or tinged with yellow. The short stem may or may not be enlarged at the base. The half-tone was made from a photograph of a specimen collected on the State Farm, margin of woods, Fairfield Co., Ohio, August, 1905.

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MYCOLOGICAL BULLETIN

No. 43

W. A. Keilerman, Ph. D., Ohio State University
Columbus, Ohio, October 1, 1905.

ACKNOWLEDGEMENT.—The four half-tones in this No. of the BULLETIN were kindly loaned by the Connecticut Geological and Natural History Survey, to whom we extend thanks for the privilege of using them. They were made from photographs by Professor Edward Albert White of the Connecticut Agricultural College.

PROFESSOR WHITE'S HYMENALES OF CONNECTICUT.—This is Bulletin No. 3 of the Survey referred to in the foregoing paragraph, which is given as a Preliminary Report. It is an annotated list of the Mushrooms of Connecticut accompanied by forty beautiful half-tones printed on heavy plate paper, four samples of which we give in this Number.

FIG 138. HY-GROPH'-O-RUS CON'-I-CUS.—Conical Hygrophorus. Natural size. Cap conical, acute, often lobed, yellow or tinged with crimson. Photograph by Edward Albert White, Connecticut. Cut taken by permission from the Bulletin of the Connecticut Geological and Natural History Survey.

FIG. 139. CLI-TOC'-Y-BE O-DO'-RA.—Fragrant Clitocybe. Natural size. Cap pale, dingy green. From the Connecticut Geological and Natural History Survey. Photograph by Professor E. A. White.

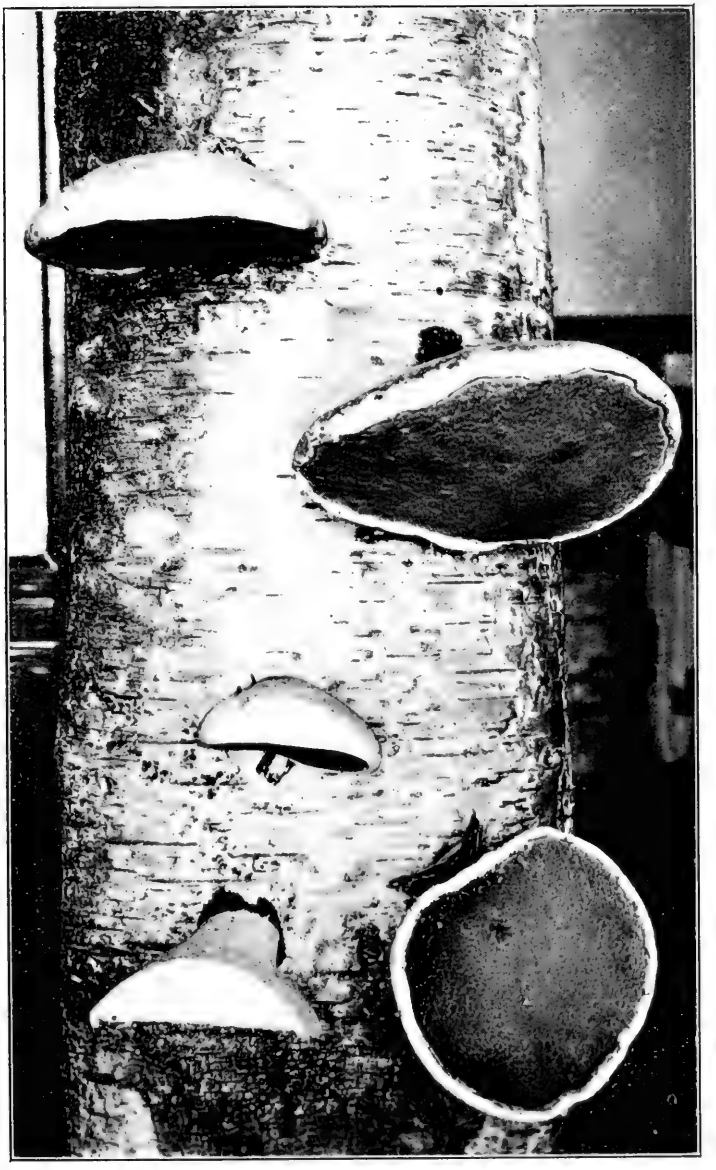

FIG. 140. PO-LY'-PO-RUS BET-U-LI'-NUS. Birch Polyporus. Reduced one-half.
Acknowledgement page 169.

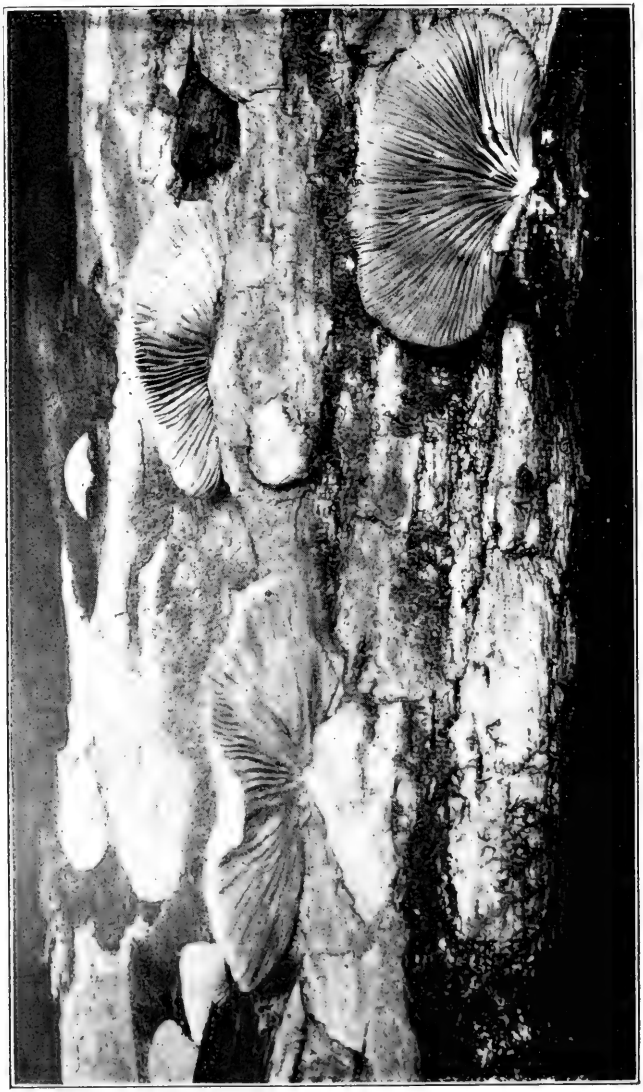

FIG. 141. CREP-I-DO'-TUS MAL-A'-CHI-US. Natural size. Acknowledgement page 169.

THE HALF-TONES in this Number of the BULLETIN are to be found in the Report referred to above, the originals being found as here indicated, namely,

Our Figure 138 is Plate XIII, l. c., page 34.
Our Figure 139 is Plate XVII, l. c., page 37.
Our Figure 140 is Plate XXXVIII, l. c., page 65.
Our Figure 141 is Plate XXII, l. c., page 43.

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MYCOLOGICAL BULLETIN

No. 44

W. A. Kellerman, Ph. D., Ohio State University
Columbus, Ohio, October 15, 1905

THIS IS A POLYPORUS NUMBER.—We find an excellent mycological glossary and classified list of descriptive terms by Dr. Wm. A Murrill, N. Y. Bot. Garden, published in Torreya, which has particular advantages to the student of the Polyporaceae—hence we present it below.

Moreover, Murrill's key to the perennial species of Polyporaceae will prove of value to many of the BULLETIN readers—that also we copy with acknowledgements to the author, and magazine from which it is taken.

It will be noticed that Dr. Murrill has wisely or unwisely split up the old genus *Polyporus*, and, therefore, several new generic names will be encountered in the key.

The two illustrations show one of our commonest species of Polyporus; others of these conspicuous fungi will be given in future Numbers.

KEY TO THE PERENNIAL POLYPORACEAE.

(Adapted from Murrill in Torreya, Nov. 1904)

Hymenium at first concealed by a volva .....*Cryptoporus.*
Hymenium free from the first (*a*).
(*a*). Surface covered with reddish varnish, context corky.... ..... *Ganoderma.*
(*a*). Surface not colored with reddish varnish, or, if so, context woody (*b*).
(*b*). Context and tubes white or pallid.....*Fomes.*
(*b*). Context and tubes brown or dark red (*c*).
(*c*) Hymenophore subsessile, caespitose, arising from a common trunk or tubercle.....*Globifomes.*
(*c*). Hymenophore truly sessile, dimidiate or ungulate, simple or imbricate (*d*).
(*d*). Pileus covered with a horny crust, context punky ..... *Elfvingia.*
(*d*). Pileus not covered with a horny crust or if encrusted, context woody, ferruginous..*Pyropolyporus.*
(*b*). Context dark purple or black.....*Nigrofomes.*

TERMS APPLIED TO THE SURFACE AND SURFACE APPENDAGES OF FUNGI.

(Copied from Murrill, in Torreya, April 1905.)

For words not explained here, see the Mycological Glossary previously published in this BULLETIN.

1. Relating to form:—applanate, *plane,**[1] glabrous, smooth, *even,* depressed, concave, expanded,[2] explanate, contorted, convex, compressed, resupinate, crustaceous.

2. Relating to texture:—mucedinous, confervoid, fibrous, gelatinous, *tremelloid,** soft, waxy, *sebaceous, ceraceous,* fleshy, *carnose,* membranous, *membranaceous,* spongy, bibulous, hygrometric, scariose,[3] *scarious,* papery, *papyraceous, chartaceous,* crustaceous, carbonaceous, cartilaginous, leathery, *coriaceous,* corky, *suberose,* woody, *lignous,* indurated, bony, *osseous,* horny, *corneous,* rigescent,[4] rigid, elastic, anoderm,[5] tunicate, pelliculose,[6] corticate, encrusted, pellicle, cortex, peridium.

*Terms printed in *italics* are practically synonymous with those preceding them.

NOTE.—1, flat; 2. spread out; 3, dry and membranous; 4, nearly rigid; 5, without a crust or skin.

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3. Relating to color due to texture:—opaque, pallid, *pallescent*,* hygrophanous, polished, unctuous,[7] translucent, *hyalescent, pellucid*, hyaline, *diaphanous, lucid, transparent*, vitreous.

TERMS APPLIED TO THE MARGIN.

Immarginate, truncate, *abrupt*,* obtuse, *rotund, tumid*, acute, patent,[8] recurved, *reflexed*, revolute, involute, undulate, striatulate,[9] striate; entire, repand, sinuate, determinate,[10] diffuse, *effuse, indeterminate*, byssoid,[11] *byssaceous*, penicillate, ciliate, fimbrillate, fimbriate, laciniate, lacinulate, *lacinulose*, pectinate, cirrhose,[12] appendiculate; serrulate, serrate, denticulate, dentate, crenulate, crenate, erose,[13] *eroded, premorse*, lacerate, fissile,[14] lobulate, lobed, *lobate*, incised, dissected, multifid, proliferous,[15] merismoid.

TERMS APPLIED TO SURFACE MARKINGS.

1. Rounded Markings.

(a). Dots:—punctate, guttulate, guttate, maculate, *maculose*,[16]

(b). Depressions:—umbilicate, pitted, *foveate*,* foveolate, alveolate,[17] favose, lacunose, scrobiculate,[18] porose, cribrose,[19] latticed, *clathrate*.

(c). Elevations:—papillate, *papillose*,* postulate, tuberculate, verruculose,[20] verrucose, nodulose, colliculose,[21] callose, bullate,[22] intumescent, tumid, gibbous, strumose,[23] subumbonate, *umbonulate*, umbonate, *bossed*.

2. Elongated Markings.

(a). Irregular:—sinuous, flexuose, tortuous, nebulose,[24] marbled, rivulose,[25] rugulose,[26] rugose, *wrinkled*.* labyrinthine, corrugated; rimulose,[27] rimose.

(b). Regular:—confluent, anastomosing, radiating, *radiant*,* *radiate*, concentric, circinate; reticulate, *areolate*, tessellate, *tesselated;* plicatulate, plicate, virgate,[28] vittate,[29] costate; grooved, channeled, *canaliculate;* annulate, zonate, *zoned*, fasciated,[30] sulcate, gyrose, *gyrate*.

TERMS APPLIED TO SURFACE COVERINGS.

1. Mucilage:—viscid, *glutinous*,* glairy, slimy, *mucilaginous*, varnished, *vernicose, laccate*.

2. Powder:—pruinose, *glaucous*,* dealbate,[31] farinose, pulverulent, *pulveraceous*, granular.

3. Scales:—furfuraceous, chaffy, micaceous, squamulose, squamose, *scaly*,* imbricate, *imbricated*, squarrulose, squarrose

4. Hairs

(a). Kinds of hairs:—obsolete, evanescent, fugacious, persistent, appressed, innate, filamentous, arachnoid, flaccid. *lax*,* fascicled, ramose.

(b). Fine hairs:—glabrate, glabrescent, naked, *calvous*,* hoary, *canescent, incanous, incanescent*, satiny, silky, *sericeous*, puberulent,pubescent, *downy*, velvety, *velutinous*.

(c). Coarse hairs:—fibrillose, villose, pilose, *piliferous*,* tomentose, *tomentous*, hirtellous, hirsute, shaggy, stupose,[32] wooly, *lanate*, flocculose, floccose, *flocculent*, comose.[33]

(d). Stiff hairs:—hispidulous, septulose, barbulate, strigose,[34] bearded, *barbed*,* setose, *setigerous, setaceous, bristly*, hispid, echinate.

5. Sharp elevations:—scabridous,[35] *scabrid*,* scabrous, *scabrate, asperate, exasperate, muricate*, aculeolate aculeate, spinose.

NOTE.—6, covered with a thin layer; 7, of oily appearance; 8, spreading (of margin); 9, minutely striate; 10, having a distinct outline (of margin); 11, cobwebby; 12, with a wavy, thread-like appendage; 13, edge ragged as if torn or bitten; 14, may be split; 15, producing offshoots; 16, spotted; 17, like a honey-comb; 18, deeply and irregularly pitted; 19, perforated; 20, with minute wart-like elevations; 21, with hillock-like elevations; 22, blistered; 23, swollen on one side; 24, clouded; 25, with fine, wavy grooves; 26, minutely wrinkled; 27, minutely cracked; 28, streaked; 29, longitudinally striped of ridged; 30, with broad parallel stripes; 31, covered with a white bloom; 32, with matted tow-like hairs; 33, with a tuft of hairs; 34, covered with small bristles; 35, somewhat rough with minute points or short hairs.

*Terms printed in *italics* are practically synonymous with those preceding them.

FIG. 142. POLY'-PO-RUS VER-SIC'-O-LOR. A common easily recognized Polypore, the under surface of specimens growing on a rotten branch. The upper side of same is shown in Fig 143.

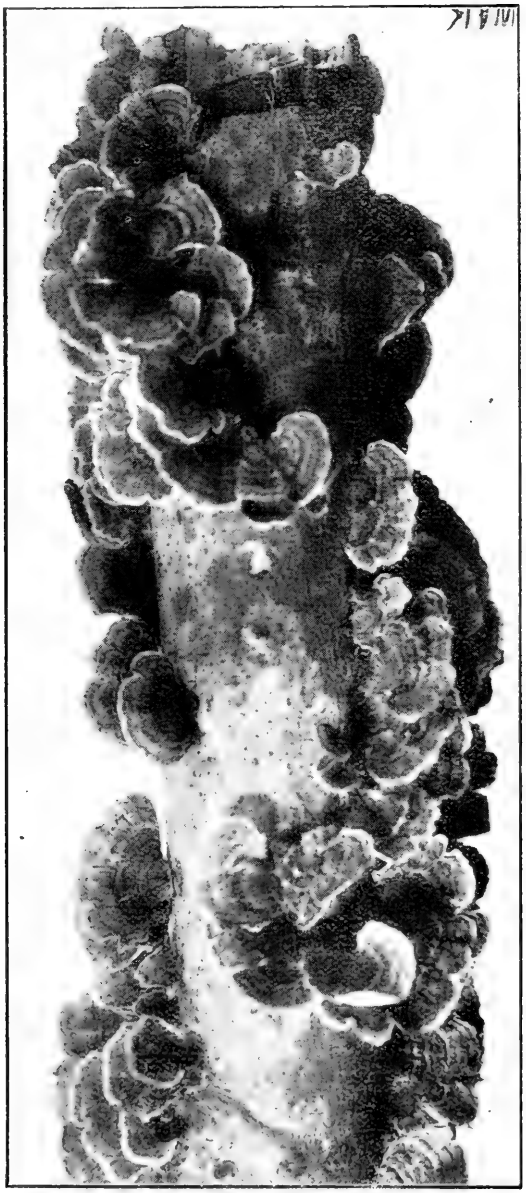

FIG. 143. POLY'-PO-RUS VER-SIC'-O-LOR. Upper side. See also Fig. 142.

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MYCOLOGICAL BULLETIN

No. 45

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio, November 1, 1905

A BACTERIA NUMBER—Though these plants would not be called Mushrooms or Toadstools, the Bacteria are fungi and very interesting besides. The group is very large and only a few species are pathogenic—that is, disease-producing. The great majority are harmless to man, but that is telling only half the truth; they are in fact directly or indirectly most beneficial to us. In the Economy of Nature their role is most significant because they disintegrate organic matter and hand back the elements to the mineral kingdom; they prepare the bountiful supply of plant food—thus indirectly making our existence possible. But no space can here be spared to discuss these important organisms or to describe their life cycle. Suffice it to add that many if not most plant diseases are caused by Bacteria. The important publication mentioned in the next number has suggested that this matter be taken up incidentally and some illustrations furnished.

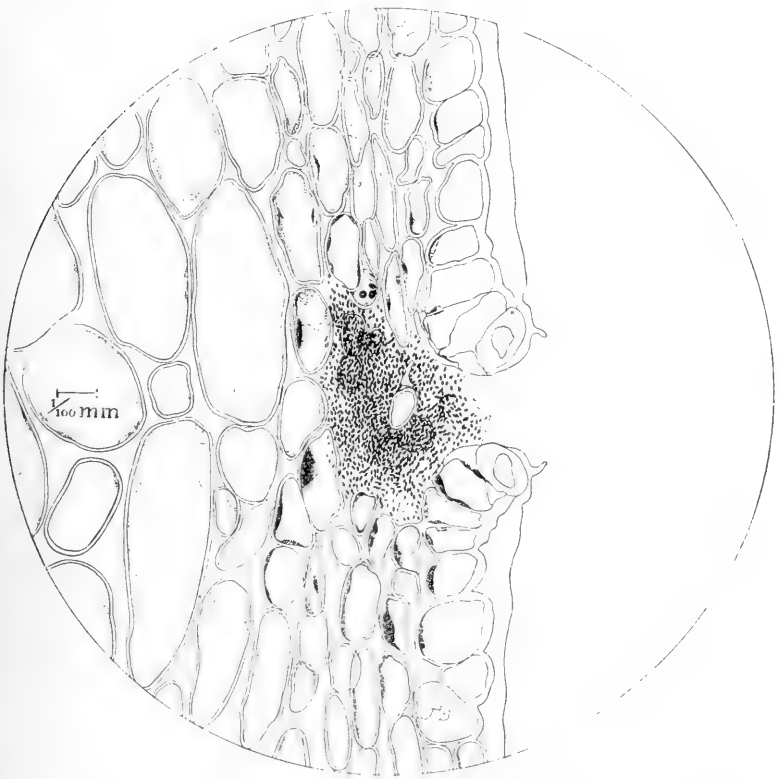

Fig. 144. BAC-TE'-RI-UM PRU'-NI—This is the earliest stage of fruit spot on green plums. The bacteria have entered through the stomate as the section of the fruit highly magnified shows. From Erwin F. Smith's Bacteria in Relation to Plant Diseases.

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LIST OF MUSHROOM KEYS.

This list includes the commoner accessible keys which beginners, amateurs and students of Mushrooms will ordinarily desire to use. It includes practically all of the conspicuous fungi—at any rate those which are generally spoken of as Mushrooms.

Amanita.
Lloyd; Volvae of U. S. 3, 4, 5, 6. 1898.
McIlvaine; One Thousand American Fungi, 6. 1900.
Morgan; Journal of Mycology, 3:25. March 1887.
Peck; Rep. N. Y. State Mus. 23:68, 1873; 33:40-1, 1880; 48:310, 1895.

Amanitopsis.
Beardslee; Notes on the Amanitas of So. Appalachians. Part I. Lloyd Library, Sept. 1902.
Lloyd; Volvae of the U. S., 8, 9. 1895.

Agaricaceae (Genara).
Atkinson; Mushrooms, Edible, Poisonous, etc., 308.
Nina L. Marshall; Mushroom Book, 32, 1901.
Underwood; Moulds, Mildews and Mushrooms, 1899.
(Genera). White; Conn. Geol. & Nat. Surv. Bull., 3:17, 1905.

Agaricales (Families).
Nina L. Marshall; Mushroom Book, 30, 1901.
Underwood; Moulds, Mildews and Mushrooms, 98, 1899.

Agaricineae (Sections).
Peck; Rep. N. Y. State Mus., 48:231, 1895.

Agaricini (Genera).
Morgan; Jour. Cin. Soc. Nat. Hist., 6:55, 1883.
Peck; Rep. N. Y. State Mus., 23:67, 1873.

Agaricus.
(Natural tribes). Lloyd sec W. G. Smith; Volvae of the U. S., 19.
McIlvaine; One Thousand American Fungi, 332, 1900.
Peck; Rep. N. Y. State Mus., 48:231., 1895.

Armillaria.
(Tribes). McIlvaine; One Thousand Am. Fungi, 52, 1900.
Peck; Rep. N. Y. State Mus., 43:41, 44, 1890.

Ascomycetes.
(Orders). Nina L. Marshall; Mushroom Book, 18, 1901.
(Genera). Nina L. Marshall; Mushroom Book, 20, 1901.
(Orders). Underwood; Moulds, Mildews and Mushrooms, 35, 1899.

Auriculariales (Families).
Underwood; Moulds, Mildews and Mushrooms, 94, 1899.

Basidiomycetes (Orders).
Nina L. Marshall; Mushroom Book, 22, 1901.
Underwood; Moulds, Mildews and Mushrooms, 94, 1899.

Black-spored Agarics [Melanosporae] (Genera). See Agaricaceae. Agaricini.

Bolbitius (See Coprineae).

Boletaceae (Genera).
Nina L. Marshall; Mushroom Book, 44, 102, 1901.
Peck; Bull. N. Y. State Mus., 2:74, Sept. 1889.
Underwood; Moulds, Mildews and Mushrooms, 106, 1899.

Boletinus.
Nina L. Marshall; Mushroom Book, 103, 1901.
McIlvaine; One Thousand Am. Fungi, 398, 1900.

Boletus.
McIlvaine; One Thousand Am. Fungi, 406, 421, 423, 430, 436, 438, 444, 453, 459, 466, 471, 1900.
(Tribes). McIlvaine; One Thousand Am. Fungi, 404, 1900.
Peck; Rep. N. Y. State Mus., 23:127, 1873; 37:58, 1884; 48:292, 1895 Bull. N. Y. State Mus., 1:58, May, 1887; 2:82, 83, 106, 114, 123, 131, 138, 145, 151, Sept, 1889.

CONTINUED IN NEXT NUMBER.

Bacteria in Relation to Plant Diseases.—This is the title of a work of 285 pages—the same (Volume I) being devoted to methods of work and literature. We show some of the illustrations by permission of the author; the electros were kindly placed at our disposal by the Carnegie Institution of Washington, taken from the work issued as their "Publication No. 27."

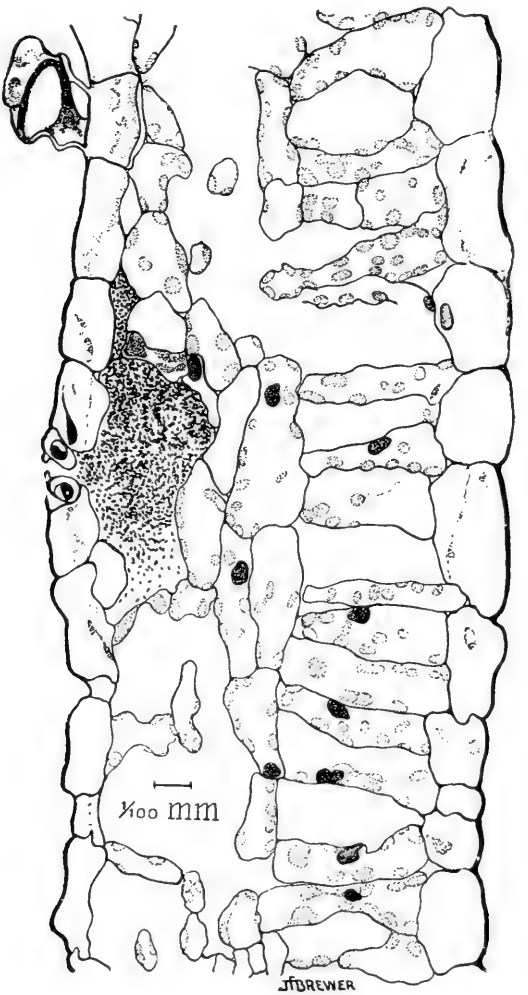

Fig. 145. Bac-te'-ri-um mal-va-ce-a'-rum—Early stage of infection through a stomate of a leaf of the Cotton plant. From Erwin F. Smith's Bacteria in Relation to Plant Diseases.

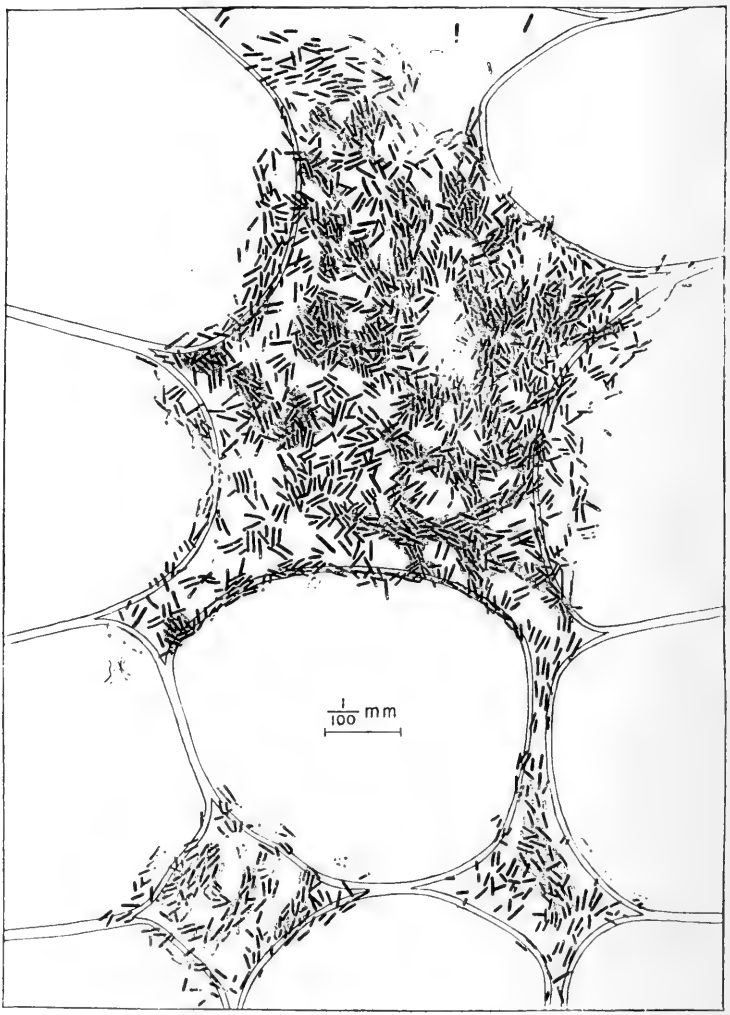

Fig. 146. BA-CIL'-LUS CA-RO-TO-VO'-RUS—This shows the Bacteria between cells in the carrot, very highly magnified. From Erwin F. Smith's Bacteria in Relation to Plant Diseases.

To those not familiar with the classification of the Bacteria it may be said that there are several genera recognized by botanists. In a general way we may say the spherical forms are called *Micrococcus*, the oval or short forms are called *Bacterium*, the oblong or elongated forms are *Bacillus*, and the spiral forms belong to the genus *Spirillum*.

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MYCOLOGICAL BULLETIN

No.46

W. A. Kellerman, Ph. D., Ohio State University
Columbus, Ohio, November 15, 1905

THE HALFTONES PRESENTED—They are designed to call attention to publications that may be interesting to many parties. The cut showing Bacteria pertains to what was mentioned in the previous Bulletin. The figures of Collybia and Mycena are taken from an edition of the MUSHROOM BOOK dated 1905. The publishers, Doubleday, Page and Co., apparently now include this volume in their Natural History Library. It differs from the early edition only in having about one and a half dozen additional halftones. These are good figures as the two samples testify which we here show through the kindness of the publishers. The list of additional figures is as follows: Amanitopsis strangulata, Mycena galericulata. Lepiota granosa, Collybia maculata, Collybia platyphylla, Clitocybe illudens, Agaricus campestris, Cortinarius caninus, Cortinarius armillatus, Hydnum coralloides, Clavaria ligula, Strobilomyces strobilaceus, Boletus felleus, Boletus scaber, Polyporus fomentarius, Calostoma (four species) Leotia lubrica, Tremellodon gelatinosum, Peziza aurantia, Peziza odorata, and Panus strigosus.

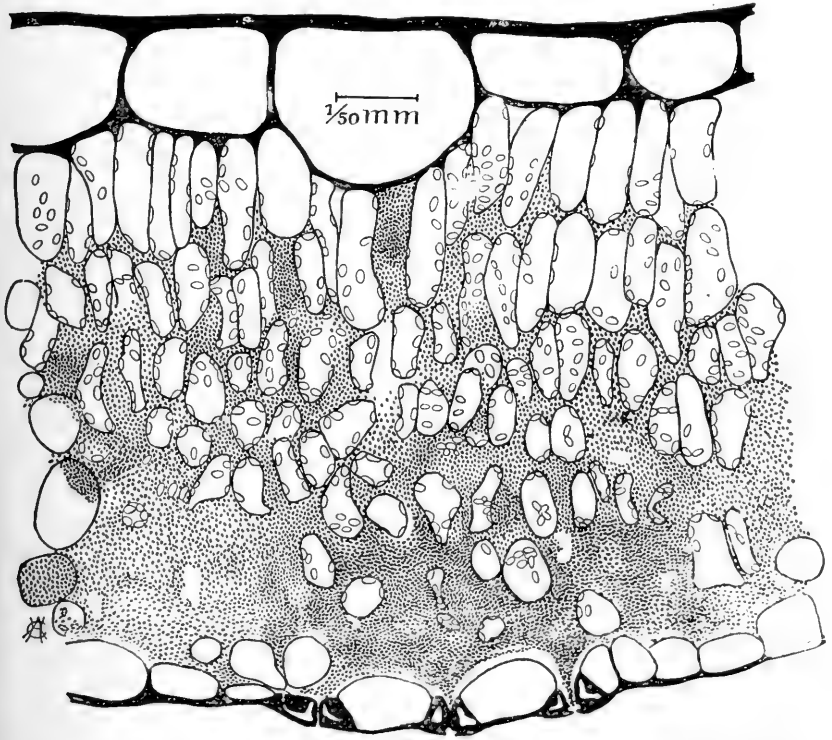

Fig. 147. BAC-TE'-RI-UM PRU'-NI. This represents a stage in the innoculation of the tissue of the plum somewhat more advanced than that shown in Fig. 144. The Bacteria here abundant in the mesophyll are supposed to have entered through the stomates, three of which appear in the section. The figure is taken from Erwin F. Smith's Bacteria in Relation to Plant Diseases.

University Bulletin. Series 9. No. 34. Entered as Second Class Matter. Post-office at Columbus, Ohio

LIST OF MUSHROOM KEYS.

CONTINUED FROM PRECEDING NUMBER.

Bovistae.
Lloyd; Myc. Notes [200] No. 12:114, Dec., 1902.

Brown-spored Agarics. (Same as purplish or brown-spored Agarics.)

Catastoma.
Kellerman; Jour. Mycol., 9:239, Dec. 1903.
Lloyd; Myc. Notes [214] No. 13:121, Feb., 1903.

Cantharellus.
(Tribes). McIlvaine; One Thousand Am. Fungi, 215, 1900.
Peck; Rep. N. Y. State Mus., 23:121, 1873; 37:35, 1884. Bull. N. Y. State Mus., 1:35, May, 1887.

Clathraceae (Genera).
Underwood; Moulds, Mildews and Mushrooms, 132, 1899.

Claudopus.
McIlvaine; One Thousand Am. Fungi, 266, 1900.
Peck; Rep. N. Y. State Mus., 39:67, 1886.

Clavaria.
(Tribes). McIlvaine; One Thousand Am. Fungi, 513, 1900.
Peck; Rep. N. Y. State Mus., 24:104, 1873.

Clavariaceae (Genera).
McIlvaine; One Thousand Am. Fungi, 511, 1900.
Underwood; Moulds, Mildews and Mushrooms, 102, 1899.

Clitocybe.
(Tribes). McIlvaine; One Thousand Am. Fungi, 83, 1900.
Morgan; Jour. Cin. Soc. Nat. Hist., 6:67, 1883.
Peck; Rep. N. Y. State Mus., 23:76, 1873; 48:270, 1895.

Clitopilus.
Beardslee; Jour. Mycol. 11:109, May. 1905; Mycol. Bull., 3:146, July, 1905.
McIlvaine; One Thousand Am. Fungi, 255, 1900.
Peck; Rep. N. Y. State Mus., 42:40, 1889.

Collybia.
Lloyd; Mycol. Notes, 34, 37, 41, Dec., 1900.
(Tribes). McIlvaine; One Thousand Am. Fungi, 112, 1900.
Morgan; Jour. Cin. Soc. Nat. Hist., 6:70, 1883.
Peck; Rep. N. Y. State Mus., 23: 78, 1873.

Coprinarii. (See Black-spored Agarics.)

Coprineae.
Earle; Torreya, 2:37-40, March, 1902.

Coprinus.
(Tribes). McIlvaine; One Thousand Am. Fungi, 369, 1900.
Peck; Rep. N. Y. State Mus., 23:103, 1873; 48:241, 1895.

Coprinus. (See Coprineae.)

Cortinarius.
Earle; Torreya, 2:169-172, 180-3, Nov., Dec., 1902.
(Tribes). McIlvaine; One Thousand Am. Fungi, 307, 1900.
Peck; Rep. N. Y. State Mus., 23:105, 107, 108, 110, 112, 1873; 48:245, 1895.
Kauffman; Bull. Torr. Bot. Club, 32:303, 318, June, 1905.

Craterellus.
Peck; Rep. N. Y. State Mus., 37:45, 1884. Bull. N. Y. State Mus. 1:45, May, 1887.

Dermini [Ochre-spored] (Genera).
Morgan; Jour. Cin. Soc. Nat. Hist., 6:100, 1883.
See also Agaricaceae, Agaricini.

Discomycetes (Genera).
Peck; Rep. N. Y. State Mus., 48:221, 1895.

Entoloma.
(Tribes). McIlvaine; One Thousand Am. Fungi, 250, 1900.
Morgan; Jour. Cin. Soc. Nat. Hist., 6:99, 1883.
Flammula (Tribes).
McIlvaine; One Thousand Am. Fungi, 287, 1900.
Peck; Rep. N. Y. State Mus., 23:90, 1873.
Fomes.
Murrill; Bull. Torr. Bot. Club, 30:225-6, April, 1903.
Fungi (Classes).
Nina L. Marshall; Mushroom Book, 16, 1901.
Morgan; Jour. Cin. Soc. Nat. Hist., 6:54, 1883.
Galera.
Peck; Rep. N. Y. State Mus., 23:92, 1873; 46:62, 1893.

CONTINUED IN NEXT NUMBER.

LIST OF MUSHROOM KEYS—We began in the preceding No. of the BULLETIN a list of accessable KEYS which in many cases will doubtless prove useful to students of Mushrooms. It is not intended to be a complete list, but it is hoped that not many important groups have been omitted. The list will be continued through several Numbers.

Fig. 148. COL-LY'-BI-A PLAT-Y-PHYL'-LA—Broad-gilled Collybia. A white-spored edible Agaric of easy recognition by the very broad gills. There is no volva and no ring in any of the Collybias. This mushroom is whitish, varying to grayish brown or dark brown. Atkinson says the plant somewhat resembles certain species of Tricholoma and care should be used in selecting it in order to avoid the suspected species of Tricholoma. The figure is taken with permission of the publishers from Nina L. Marshall's Mushroom Book.

Fig. 149. MY-CE'-NA GA-LER-IC-U-LA'-TA.—This is said to be a common species of summer and autumn growing on dead logs, stumps, branches, etc., in the woods. It is usually clustered; the slender hollow stems are hairy at the base. The caps are gray or brown. The figure is taken by permission of the publishers from Nina L. Marshall's Mushroom Book.

The Mycological Bulletin is issued on the 1st and 15th of each Month, Price 25c. Copies of Vol. II (1904) may be had for 50 cents each, or cloth bound copies for 75 cents. No copies remain of Vol. I (1903). Address, W. A. Kellerman Columbus Ohio.

MYCOLOGICAL BULLETIN

No.47

W. A. Kellerman, Ph. D., Ohio State University
Columbus, Ohio, December 1, 1905

C. G. Lloyd's Mycolcgical Notes.—Only beginners need be told that Mr. C. G. Lloyd of Cincinnati knows all about Puffballs and some other things too, and that he publishes and distributes gratis to the devoted a periodical under the above name. Twenty Nos. have been issued. To show what he is doing in the way of half-tone illustrations we have borrowed some cuts and show them on two pages of this Number. They are figs. 150, 151 and 152.

Fig. 150 Ly-co-per'-don tes-sel-la'tum. From Lloyd's Myc. Notes.

Fig. 151 Ly-co-per'-don gem-ma'-tum. From Lloyd's Myc. Notes.

 Entered as Second Class Matter. Post-office at Columbus. Ohio

LIST OF MUSHROOM KEYS.

CONTINUED FROM PRECEDING NUMBER.

Gasteromycetes.
(Families). McIlvaine; One Thousand Am. Fungi, 569, 1900.
(Orders). Nina L. Marshall; Mushroom Book, 24, 1901.
(Orders). Morgan; Jour. Cin. Soc. Nat. Hist., 12:143, Jan., 1889.
Gomphidius. (See Hygrophoreae.)
Hebeloma.
(Tribes). McIlvaine; One Thousand Am. Fungi, 283, 1900.
Peck; Rep. N. Y. State Mus., 23:95, 1873.
Helvellaceae (Genera).
McIlvaine; One Thousand Am. Fungi, 534, 1900
Helvellales (Families and Genera).
Underwood; Moulds, Mildews and Mushrooms, 63, 1899.
Hydnaceae (Genera).
Underwood; Moulds, Mildews and Mushrooms, 103, 1899
Hydnei (Genera).
Morgan; Jour. Cin. Soc. Nat. Hist., 10:7, 1887.
Hydnum (Tribes).
McIlvaine; One Thousand Am. Fungi, 494, 1900.
Hygrophoreae.
F. S. Earle; Torreya, 2:53-4, 73-4, Apr., May, 1902.
Hygrophorus.
(Tribes). McIlvaine; One Thousand Am. Fungi, 148, 1900.
Peck; Rep. N. Y. State Mus., 23:112, 1873.
Hymeniales (Families).
White; Conn. Geolog. and Nat. Hist. Surv. Bull., 3:12, 1905.
Hymenogastrales (Genera).
Underwood; Moulds, Mildews and Mushrooms, 135, 1899.
Hymenomycetes (Families).
Atkinson; Mushrooms, Edible, Poisonous, etc., 307.
Atkinson and Stoneman; A Provisional Key to the Genera of Hymenomycetes, 1-16, Oct., 1898.
McIlvaine; One Thousand Am. Fungi, 1, 1900.
Morgan; Jour. Cin. Soc. Nat. Hist., 6:55, 1883.
Peck; Rep. N. Y. State Mus., 48:230, 1895.
Hypholoma
McIlvaine; One Thousand Am. Fungi, 353, 355, 1900.
Peck; Rep. N. Y. State Mus., 23:98, 1873.
Hyphorodii [Rosy-spored Agarics] (Genera).
Morgan; Jour. Cin. Soc. Nat Hist., 6:97, 1883.
See also Agaricaceae, Agaricini.
Inocybe.
Earle; Torreya, 3:168-170, 183-4, Nov., Dec., 1903.
Morgan; Jour. Cin. Soc. Nat. Hist., 6:104, 1883.
Lactarius.
F. S. Earle; Torreya, 2:139-41, 152-4, Oct., 1902.
(Tribes). McIlvaine; One Thousand Am. Fungi, 162, 1900.
Peck; Rep. N. Y. State Mus., 23:114, 1873; 38:113, 1885.
Lepiota.
(Tribes). McIlvaine; One Thousand Am. Fungi, 34, 1900.
Morgan; Jour. Cin. Soc. Nat. Hist., 6:60, 1883.
Peck; Rep N. Y. State Mus., 23:70, 1873.
Lentinus.
Earle; Torreya, 3:35-8, March, 1903.
(Tribes). McIlvaine; One Thousand Am. Fungi, 229, 1900.
Peck; Rep. N. Y. State Mus., 23:126, 1873.
Leucosporae [White-spored Agarics] (Genera).
Peck; Rep. N. Y. State Mus., 48:252, 1895.
See also Agaricaceae and Agaricini.

Lycoperdaceae (Genera).
McIlvaine; One Thousand Am. Fungi, 577, 1900
Morgan; Cin. Soc. Nat. Hist., 12:9, April, 1889.
Underwood; Moulds, Mildews and Mushrooms, 138, 1899.
Lycoperdales (Genera).
Nina L. Marshall; Mushroom Book, 28, 1901.
Lycoperdon.
McIlvaine; One Thousand Am. Fungi, 590, 1900.
Morgan; Cin. Soc. Nat. Hist., 13:6, April, 1891.
Marasmius.
(Tribes). McIlvaine; One Thousand Am. Fungi, 221, 1900.
Peck; Rep. N. Y. State Mus., 23:124, 1873.
Melanosporae [Black-spored Agarics] (Genera).
See Agaricaceae, Agaricini.
Mitremyces.
Lloyd; Myc. Notes (218) No. 13:125, Feb., 1903.
Morchella.
Kellerman; Myc. Bull., 1:6, March 25, 1903.
Nina L. Marshall; Mushroom Book, 102, 1901.
Peck; Rep. N. Y. State Mus., 48:222, 1895.
Mycena.
(Tribes). McIlvaine; One Thousand Am. Fungi, 224, 1900.
Morgan; Jour. Cin. Soc. Nat. Hist., 6:73, 1883.
Peck; Rep. N. Y. State Mus., 23:80, 1873.
Naucoria.
(Tribes). McIlvaine; One Thousand Am. Fungi, 294, 1900.
Peck; Rep. N. Y. State Mus., 23:91, 1873.
Nidulariaceae.
(Genera). Underwood; Moulds, Mildews and Mushrooms, 142, 1899.
V. S. White; Bull. Torr. Bot. Club, 29:254, May, 1902.
Ochre-spored Agarics [Ochrosporae] (Genera).
See Agaricaceae, Agaricini, Dermini.
Ochrosporae [Ochre-spored] (Genera).
See Agaricaceae, Agaricini, Dermini.
Omphalia.
(Tribes). McIlvaine; One Thousand Am. Fungi, 133, 1900.
Morgan; Jour. Cin. Soc. Nat. Hist., 6:75, 1883.
Peck; Rep. N. Y. State Mus., 23:84, 1873; 45:33, 1893.
Panaeolus.
Peck; Rep. N. Y. State Mus., 23:100, 1873.
Panus.
Earle; Torreya, 3:86-7, June, 1903.
Paxillus.
(Tribes). McIlvaine; One Thousand Am. Fungi, 326, 1900.
Peck; Rep N. Y. State Mus., 37:30, 1884. Bull. N. Y. State Mus., 1:30, May, 1887.
Periconia.
F. S. Earle; Bull. N. Y. State Bot. Garden, 2:(332), 25, April, 1902.
Peziza (Tribes).
McIlvaine; One Thousand Am. Fungi, 552, 1900.
Pezizales (Families).
Underwood; Moulds, Mildews and Mushrooms, 51, 1899.
Phallaceae (Genera).
Underwood; Moulds, Mildews and Mushrooms, 132, 1899.
Phallales.
(Families and Genera). Nina L. Marshall; Mushroom Book, 26, 1901.
(Families). Underwood; Moulds, Mildews and Mushrooms, 132, 1899.
Phalloideae (Genera).
McIlvaine; One Thousand Am. Fungi, 570, 1900.
Morgan; Cin. Soc. Nat. Hist., 12:144, Jan., 1889.

CONTINUED IN NEXT NUMBER.

FIG. 152 LY-CO-PER'-DON PI-RI-FOR'-ME. From Lloyd's Myc. Notes.

The Mycological Bulletin is issued on the 1st and 15th of each Month, Price 25c. Copies of Vol. II (1904) may be had for 50 cents each, or cloth bound copies for 75 cents. No copies remain of Vol. I (1903). Address, W. A. Kellerman Columbus Ohio.

MYCOLOGICAL BULLETIN

No. 48

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio, December 15, 1905

End of Volume III.—The plan and scope of the Bulletin as exhibited by the successive current Numbers seem to have the approval of those interested. The year 1905 then will require no change. Subscribers will receive notice of their dues annually. While the subscription price is 25 cents a year, 50 cents each will be charged for the few remaining copies of preceding volumes; when bound in cloth the price is 75 cents.

Frontispiece.—It is a pleasure to present the portrait of one of England's pioneer Mycologists, Dr. M. C. Cooke. Though living yet and interested in Mushrooms, his most important work was done over a quarter of a century ago.

LIST OF MUSHROOM KEYS.

CONCLUDED FROM PRECEDING NUMBER.

Phallus.
McIlvaine; One Thousand Am. Fungi, 571, 1900.

Pholiota.
(Tribes). McIlvaine; One Thousand Am. Fungi, 269, 1900.
Morgan; Jour. Cin. Soc. Nat. Hist., 6:101, 1883.

Pleurotus.
(Tribes). McIlvaine; One Thousand Am. Fungi, 135, 1900.
Morgan; Jour. Cin. Soc. Nat. Hist., 6:77, 1883.
Peck; Rep. N. Y. State Mus., 39:59, 1886; 48:275, 1895.

Pleuteolus.
Earle; Torreya, 3:124-5, Aug. 1903.
Peck; Rep. N. Y. State Mus., 46:59, 1893.

Pluteus.
McIlvaine; One Thousand Am. Fungi, 243, 1900.
Morgan; Jour. Cin. Soc. Nat. Hist., 6:97, 1883.
Peck; Rep. N. Y. State Mus., 25:61, 86, 1873; 38:134, 1885.

Polyporaceae (Subfamilies).
Murrill; Bull. Torr. Bot. Club, 32:353, 1905.

Polyporaceae (Genera).
Atkinson; Mushrooms, Edible, Poisonous, etc., 171.
McIlvaine; One Thousand Am. Fungi, 396, 1900.
Nina L. Marshall; Mushroom Book, 42, 1901.
Murrill; Bull. Torr. Bot. Club, 32:353, 364, 370, 469, 485, 490, 491, 1905.
Underwood; Moulds, Mildews and Mushrooms, 104,1899.

University Bulletin, Series 9, No. 36. Entered as Second Class Matter, Post-office at Columbus, Ohio

Polyporaceae.
Murrill; Bull. Torr. Bot. Club, 29:601, 1902; 30:109, 225, 297, 426, 1903; 31:30, 326, 234, 342, 416, 427, 594, 1904; Torreya, 4:165, Nov., 1904; 5:28, 43, Feb., March, 1905.

Polyporus.
(Tribes.) McIlvaine; One Thousand Am. Fungi, 479, 1900.

Pratelli [Purplish or Brown-spored Agarics] (Genera).
Morgan; Jour. Cin. Soc. Nat. Hist., 6:111, 1885.
See Agaricaceae, Agaricini.

Psalliota.
Peck; Rep. N. Y. State Mus., 23:97, 1893; 36:42, 1883.
See also Agaricus.

Psathyrella.
Peck; Rep. N. Y. State Mus., 23:102, 1873.

Psilocybe.
Peck; Rep. N. Y. State Mus., 23:99, 1873.
Purplish or Brown-spored Agarics [Porphyrosporae] (Genera).
See Agaricaceae, Agaricini, Pratelli.

Rhodosporae [Rosy-spored Agarics] (Genera).
See Agaricaceae, Agaricini.

Rosy-spored Agarics [Rhodosporae] (Genera).
See Agaricaceae, Agaricini, Hyporhodii.

Russula.
Earle; Torreya, 2:101-3, 117-9, July, Aug., 1902.
(Tribes). McIlvaine; One Thousand Am. Fungi, 186, 1900.
Peck; Rep. N. Y. State Mus., 23:120, 1873.

Sclerodermatales (Genera).
Underwood; Moulds, Mildews and Mushrooms, 143, 1899

Stropharia.
Earle; Torreya, 3:24, Feb., 1903.
(Tribes). McIlvaine; One Thousand Am. Fungi, 349, 1900.

Thelephoraceae (Genera).
McIlvaine; One Thousand Am. Fungi, 506, 1900.
Underwood; Moulds, Mildews and Mushrooms, 100, 1899.

Thelephorei (Genera).
Morgan; Jour. Cin. Soc. Nat. Hist., 11:188, 1888.

Tremellaceae (Genera).
McIlvaine; One Thousand Am. Fungi, 526, 1900.

Tremellales (Families and Genera).
Underwood; Moulds, Mildews and Mushrooms, 95, 1899.

Tricholoma.
(Tribes). McIlvaine; One Thousand Am. Fungi, 59, 1900.
Morgan; Jour. Cin. Soc. Nat. Hist., 6:65, 1883.
Peck; Rep. N. Y. State Mus., 23:73, 1873; 44:39, 40, 44, 52, 56, 61, 1891; 48:266, 1895.

Tuberales (Families).
Underwood; Moulds, Mildews and Mushrooms, 51, 1899.

Tylostomeae (Genera).
Lloyd; Myc. Notes (233) No. 14:133, March, 1903.

Volvaria.
Lloyd; Volvae of U. S., 10, 1898.
McIlvaine; One Thousand Am. Fungi, 239, 1900.

White-spored Agarics [Leucosporae] (Genera).
See Agaricaceae, Agaricini, Leucosporae.

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SUBJECTS.

ILLUSTRATIONS.

End of Volume III.

Mycological Bulletin

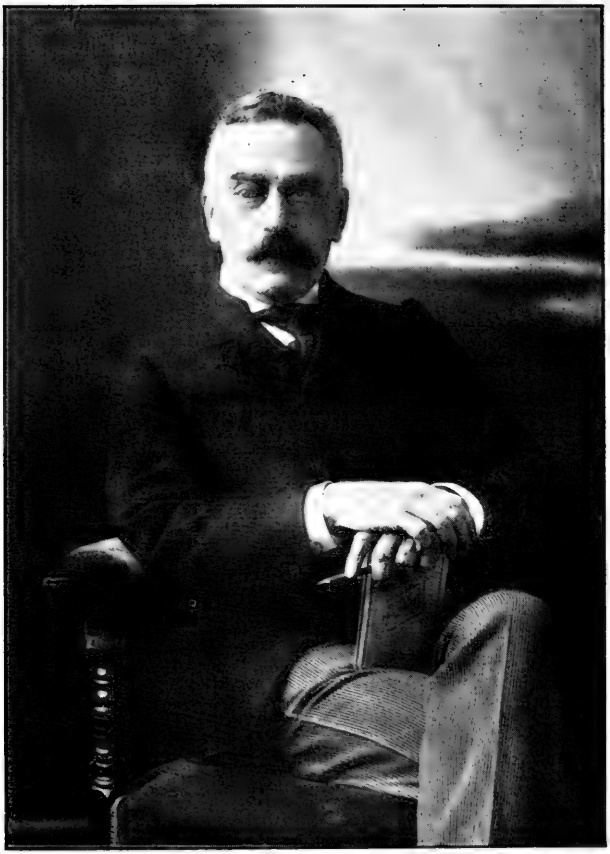
(Nos. 49 to 72)

Volume IV.

1906

W. A. Kellerman, Ph. D.
Ohio State University

COLUMBUS, OHIO
Press of Vance-Poland Co.
1906



Yours truly
M. G. Farlow

THE EMINENT MYCOLOGIST OF HARVARD UNIVERSITY.

Mycological Bulletin

No. 49

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio, January 1, 1906.

ANOTHER NOTION.—For a few months we will devote regularly a page, or as much thereof as may seem fitting, to quotations from various authors touching on matters of mycological interest. Many of course will get these articles in other journals that come regularly to their tables or encounter them in mushroom books, but I aim in spite of this to maintain the established character of the BULLETIN, to-wit, that is designed first and foremost for the benefit of beginners and amateurs who presumably have not large libraries nor files of all the botanical journals. The illustrations will be the prominent feature as heretofore and two or three

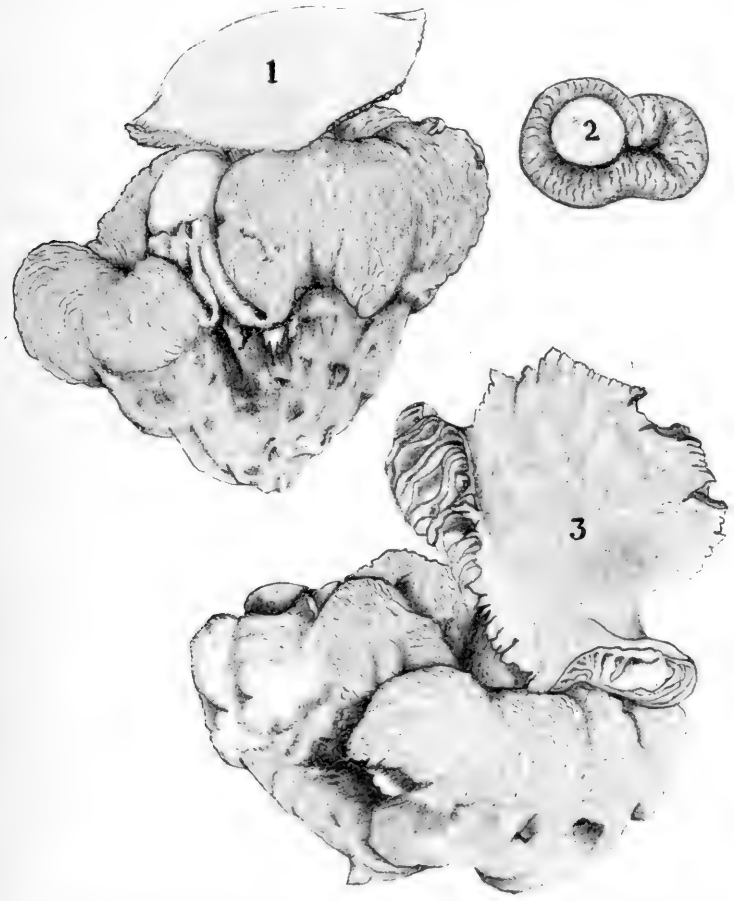


FIG 153—PAN-AE'-O-LUS EP-I-MY'-CES PECK, see text of Bulletin No. 49 ["Quotation"] for explanation of this Mushroom. Drawings by Helen Shooman, Wisconsin University.

University Bulletin, Series 9, No. 37. Entered as Second Class Matter, Post-Office at Columbus, Ohio

halftones will be presented in each issue. My patrons are assured that contributions both in the way of notes and photographs will be received with pleasure. It is hoped that portions of letters pertaining to Mushrooms may occupy a conspicuous place on the "quotation" page.

PHOTOGRAPHS.—Being the merest amateur in photography I appreciate the ludricous pose assumed when suggestions are offered—yet (never let on!) it may be remarked that the photos should be natural size or even enlarged unless the Mushrooms are of great size. If one would remember also that the printed page is only four inches wide the illustrations doubtless would be in most cases advantaged. The height is seldom restricted by page limits. The engraver can reduce the pictures when necessary and in that way obviate loss in reproduction. Enlargement is out of the question unless the photo is unusually sharp and presents sharp contrasts. Characteristic "attitudes," strange habitats, abnormal forms, plants in situ, and other "original" illustrations of mushrooms will be most acceptable.

WITH A LONG ARM.—The editor will land in that enchanting tropical region of Guatemala the day this Number reaches the subscribers, and therefore the BULLETIN will be edited at a disadvantage for three or four months. Some one at home will be commissioned to examine my mail—so the mistakes made in the distribution or other various concerns of this Leaflet, will have attention, if you will kindly send in your suggestions and criticisms. Reception of the BULLETIN will indicate to new subscribers that the annual fee is received—and old subscribers will receive a dun on my return if.. ...

"QUOTATION PAGE."

QUOTATION.—The following interesting article appeared in the Journal of Mycology, and shoud be copied here since the plate has been reproduced in the BULLETIN, see page 193.

"THE HOST PLANTS OF PANAEOLUS EPIMYCES, PECK.—Panaeolus epimyces, first discovered and described by Peck, has been found from time to time more or less abundantly in the vicinity of Madison, Wis. The same species has been reported near London, Ontario, from when it was sent by Dearness to the Lloyd Mycological Museum. Neither Peck nor Dearness mentioned the host plant of this fungus.

"Peck's description is as follows: Pileus fleshy, at first sub-globose, then convex, white, silky-fibrillose, flesh soft, white or whitish; lamellae rather broad, somewhat close, rounded behind, adnexed, dingy white becoming brown or blackish with a white edge; stem short tapering upward, strongly striate and minutely mealy or pruinose, solid in the young plant, hollow in the mature plant, but with the cavity small, hairy or substrigose at the base; spores elliptical black, .0003'-.0003' long, .0002'-.00025' broad Plant 1'-1.5' high, pileus 8"-12" broad, stem 3"-4" thick. Parasitic on fungi.

"North Greenbush, November.

"Specimens found in this region agree with this description quite closely. The only points of difference are that the pileus and spores are larger. The pileus is sometimes over 2 in. broad and the spores run up to .0004' long by .00028' broad.

"McKenna, in 1900, studied the material collected at Madison and identified the host of all the specimens found up to that time as Coprinus atramentarius (Bull.) Fr. His material was always found growing in close connection with uninfected clumps of C. atramentarius. Upon sectioning the thickened edges of the hypertrophied mass of the host, he found the gills and hymenium well developed. He also found mature spores which were identical with those of C. atramentarius. From one to seven of the parasitic fruit bodies were found on a single host.

"On October 6, 1904, four very perfect and well developed specimens of Panaeolus epimyces were found on a shady lawn apparently parasitic on Coprirus comatus Fr. Several large healthy specimens of the latter were found not more than 5 in. distant from any one of the infected forms and no other Agaric was or has since been found growing in that vicinity.

(Continued in No. 50).

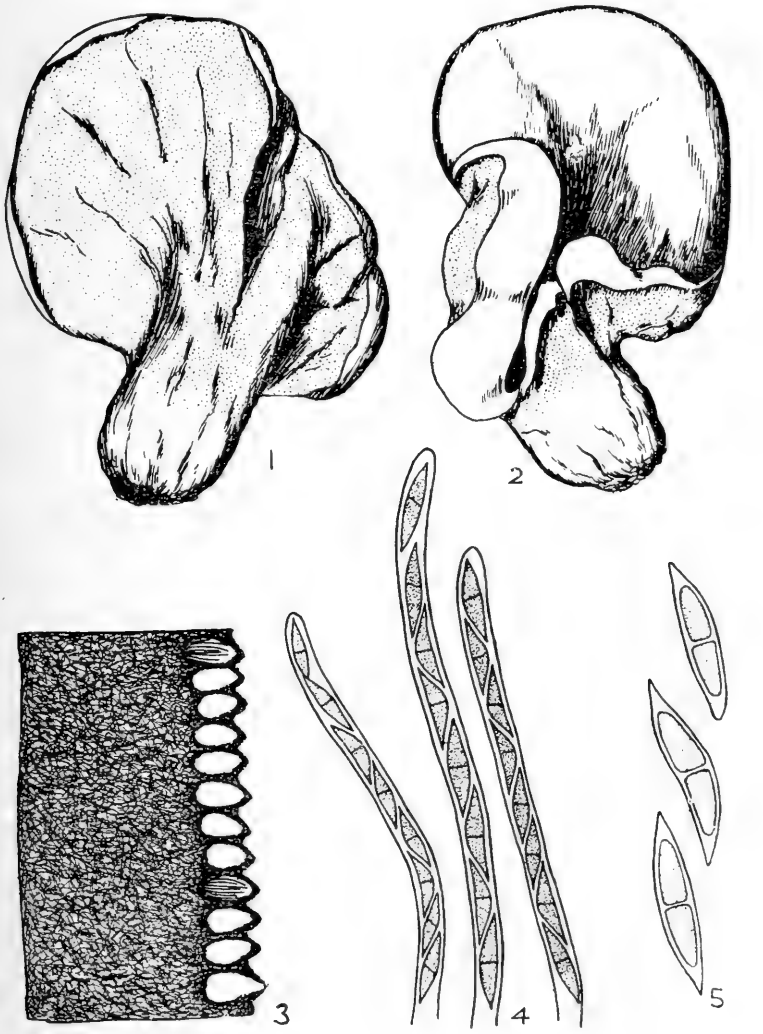


FIG. 154.—HY-POM'-Y-CES LAC-TI-FLU-O'-RUM. A parasitic fungus which has attacked a gill-fungus, in consequence of which the latter was aborted and unable to develop the lamellae or gills The illustrations 1 and 2 show such hosts. No. 3 represents a section through the aborted mushroom and shows the microscopic fruiting portion of the attacking Hypomyces. Each of the receptacles contains very many asci, as they are called, that is to say, large cells in which the bilocular spores are developed: they are both shown at Nos. 4 and 5. Illustrations 1 and 2 are shown natural size; No. 3 is somewhat magnified; No. 4 shown on a larger scale and No. 5 very highly magnified.

FIG. 155—LY-CO-PER'-DON ECH-I-NA'-TUM (a, b, c, d); LY-CO-PER'-DON IES-SEL-LA'-TUM (e); LY-CO-PER'-DON UM-BRI'-NUM (f); taken from Lloyd's Myc. Notes.

The Mycological Bulletin is issued on the 1st and 15th of each Month, Price 25c. Copies of Vol. II (1904) and Vol. III 1905) may be had for 50 cents each, or cloth bound copies for 75 cents. No copies remain of Vol. I (1903), Address, W. A. Kellerman Columbus Ohio.

Mycological Bulletin

No. 50

W. A. Kellerman, Ph. D., Ohio State University
Columbus, Ohio, January 15, 1906.

THE ILLUTRATIONS PRESENTED.—The first and last illustrations in this Number are very common fungi—the first a Cor-ti-na'-ri-us and the last a Hy-groph'-o-rus. It must be admitted, however, that the species of these two genera are not readily determinable by the beginner—in fact only specialists comprehend the situation. The illustration on the third is out of the ordinary for this Leaflet. But it is so conspicuous and this

FIG. 156—COR-TI-NA'-RI-US CIN-NA-MO'-ME-US.—A very dark colored common Cor-ti-na'-ri-us (this genus has an arachnoid, *i. e.* a cabwebby veil) which was collected by Supt. M. E. Hard and the writer in the woods near Chillicothe, O., Oct. 30, 1905.

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parasitic fungus is so common that it can not be neglected by the wide-awake amateur or the beginner. It is the *first of the three stages* in the life-cycle of a Black Rust. The second and third stages of this species are found (associated) on a Sedge, or Slough Grass (Carex). See explanation under figures.

"QUOTATION PAGE."

(*Quotation continued from page* 194).

"These specimens resembled the herbarium specimens of those parasitic on C. atramentarius (as identified by McKenna), but with some variations. They are considerably larger, but the greater size is only proportional to the greater size of C. comatus as compared with C. atramentarius. The pileus in one specimen is 3.5′ broad. Here and there portions of the veil adhere to the pileus, forming a fringe on the young cap. The surface of the cap is roughened by reticulate umber colored areas, especially at the margin, which latter become elevated and flaky, breaking up into recurved umber patches. The stipe is cylindrical 1.5′ long by 5″ in diameter in the largest specimen. The spores vary in size from .0003′-.0004′ by .0002′-.00028′.

"The hypertrophied host resembles that described by McKenna, but is larger, becoming from 2 to 3 inches in diameter by 2 inches high. It forms a cup-shaped or cushion-like mass with swollen edges and a deep indentation at the top. Sometimes a single large carpophore arises from the center of this indentation. In other cases two or more are present in various stages of development. The mass of the host is scarcely distinguishable as stipe and pileus. It is merely narrowed below and is connected directly with thick mycelial strands ramifying in the substratum. The outside is striate and covered with brownish fibres, especially that portion which corresponds to the pileus. The thickened edges of the hypertrophied host were examined, and although the gills, basidia and sterigmata could be distinctly made out, the fungus was apparently not sufficiently matured to produce spores.

"The reasons for believing the host in this case to be Coprinus comatus are as follows: The fungi in question are accompanied by growths of C. comatus only, and the host resembles closely the form identified from its spores as C. atramentarius by McKenna, but is as much larger than that form as Coprinus comatus is larger than Coprinus atramentarius.

"So called abortive forms very similar to these parasitized Coprini have been described for Clitopilus prunulus Scop, Clitopilus abortivus B. & C. and Armillaria mellea Vahl, but the cause of these formations is still unexplained. Clitopilus prunulus produces aborted forms singly or in tufts. They are very variable in shape and are white tinged with brown on ruptured surfaces.

"Peck in describing the aborted forms of Clitopilus abortivus B. & C. says they are irregular or sub-globose fleshy white masses occurring in company with normal forms and apparently under the same conditions of soil, moisture and temperature. These forms are common here and are found in various stages of development. Some show marked characteristics of the normal form of C. abortivus, while others are hypertrophied and contorted into masses resembling closely the forms described above for the Coprini. They are smaller, however, the largest not being over 1-1½ in diameter The gills show plainly on sectioning.

"The abortive forms of Armillaria mellea Vahl are also common in this region are very similar to those of the two Clitopili just mentioned. Peck states in his description of this from that the masses are of cellular matter without any distinction of stem, pileus or lamellae. 'Without positive proof,' McIlvaine says, 'no one would suspect either of these odd formations to be abortive of either Clitopilus abortivus or Armillaria mellea or any other fungus.' In view of other resemblances to the parasitized Coprini described above, it is quite possible that these monstrosities are due also to the presence of some parasitic agaric which for some reason is unable to produce carpophores." [Helen Sherman, Journal of Mycology.]

FIG. 157.—YELLOW CLUSTER-CUPS, or the *Ac-cid'-i-um* that grows on the Elder and distorts the branchlets and leaves. At *b* a ripe "cup" is shown; one of the germinating spores more highly magnified is figured at *c*.

FIG. 158.—HY-GROPH'-O-RUS E-BUR'-NE-US.—A common white Hy-groph'-o-rus, occurring in Europe and America. The gills in this species are strongly decurrent—and Atkinson says of the gills of all the species of this genus that "they are usually rather distant, the edge is acute or sharp, and gradually thickened toward the junction with the cap, so that a section of the gill is more or less triangular." The half tone was made from specimens collected by Supt. Hard and the writer at Chillicothe, Ohio, in woods by Paint Creek, Oct. 30, 1905.

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Mycological Bulletin

No. 51

W. A. Kellerman, Ph. D., Ohio State University
Columbus, Ohio, February 1, 1906.

THE HALF-TONES IN THIS NUMBER.—The first illustration here given is of a fungus not of course important from an epicure's point of view, but what is more interesting and beautiful than these little double-walled Puff-balls! The outer *peridium* (*i. e.* layer of the covering) splits somewhat regularly from the top, becomes strongly reflexed, and hence the name *Ge-as'-ter* or Earth Star is an appropriate one. They retain their shape when mature and can be kept in small boxes for study or compari-

FIG. 159.—EARTH-STAR. GE-AS'-TER- TRIP'-LEX.—A rather common plant here shown in natural size. The cut was made from specimens sent by Supt. M. E. Hard, who collected them near Chillicothe, Ohio, November 9, 1905.

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son. The Polypore shown on the third page is nearly as ornamental as any of these species become—and the cut falls far short of doing the plant justice. The ma-ras'-mi-us is perhaps one of the most common—certainly, most beautiful— of the hundreds of Ma-ras'-mi-i. Aside from lack of natural color the half tone does not malign this interesting and charming little plant.

"QUOTATION PAGE."

QUOTATION.—The phalloid, usually called stink-horn, for obvious reasons, is so common that the item below relating to variability may well receive our attention for a moment at least. The article was published in the Journal of Mycology, by A. H. Christman.

"VARIABILITY IN OUR COMMON SPECIES OF DICTYOPHORA.—Considerable uncertainty has existed as to the identification of our common species of Dictyophora. Fischer remarks that nowhere among the Phalloideae is the confusion in the nomenclature so great as in the case of this genus and he believes that this confusion has been brought about by the naming of isolated specimens which have been given new specific names on the ground of some slight lack of agreement with descriptions already given

* * * The occurrence of this common Dictyophora—in unusual numbers in the neighborhood of Madison during the summer of 1903, made it possible to make some interesting observations on the variability of the characteristic parts of the fungus. The specimens were found in the region lying along the south shore of Lake Mendota and extending a mile west of the city. The soil of this region is covered with a sod shaded at places by growths of trees and is at other places completely open. Along a drive, leading through this tract, young forest trees had been planted from year to year. There is also a plot of about four acres on the University farm planted about eight years ago with various young forest trees. All of these young trees had been liberally mulched yearly, from the time of planting, with a fertilizer composed of equal parts of shavings and dung, and it was in and beneath this mulch that the fungi were most abundant.

So numerous were the plants on the entire region that for a period of six weeks specimens could be found every day. As many as two dozen were often taken on a single morning. Probably as many as three hundred specimens were handled during the season. These were examined and types of all sizes and proportions were carefully measured and then preserved by drying or in alcohol. When it was desired to get a series of plants belonging to the same mycelium, certain clusters of the eggs were marked and specimens gathered from day to day as they matured.

In making the measurements it was aimed to secure specimens showing all possible variations. The following table gives the dimensions of twenty plants including specimens showing the extreme variations in all of the characteristic parts of the plant. The specimens are arranged in the table according to height. [Table omitted].

It will be seen that the extremely tall and extremely short specimens are not so numerous in the above table as are the more nearly average ones. As these are about equally scarce also in nature the above averages may safely be taken as approximately correct for all the specimens found during the season.

There is a fairly complete series from the shortest (5.6 cm.) to the tallest (21.2 cm.). Careful observations were made to determine, as nearly as possible, what conditions might be responsible for the height of the specimen. It was found that without exception the tall plants were solitary, were taken from sod, and, in almost every case, were in a fairly shaded, moist locality. Numbers 1 to 6 of the table, and many others, were found so located. The smaller specimens were found where the plants occurred in large clusters and were often taken after several plants in the cluster had matured. When a plant in the egg stage was found on a substratum, such as the mulch already mentioned, that readily became dry,

CONTINUED IN NEXT NUMBER.

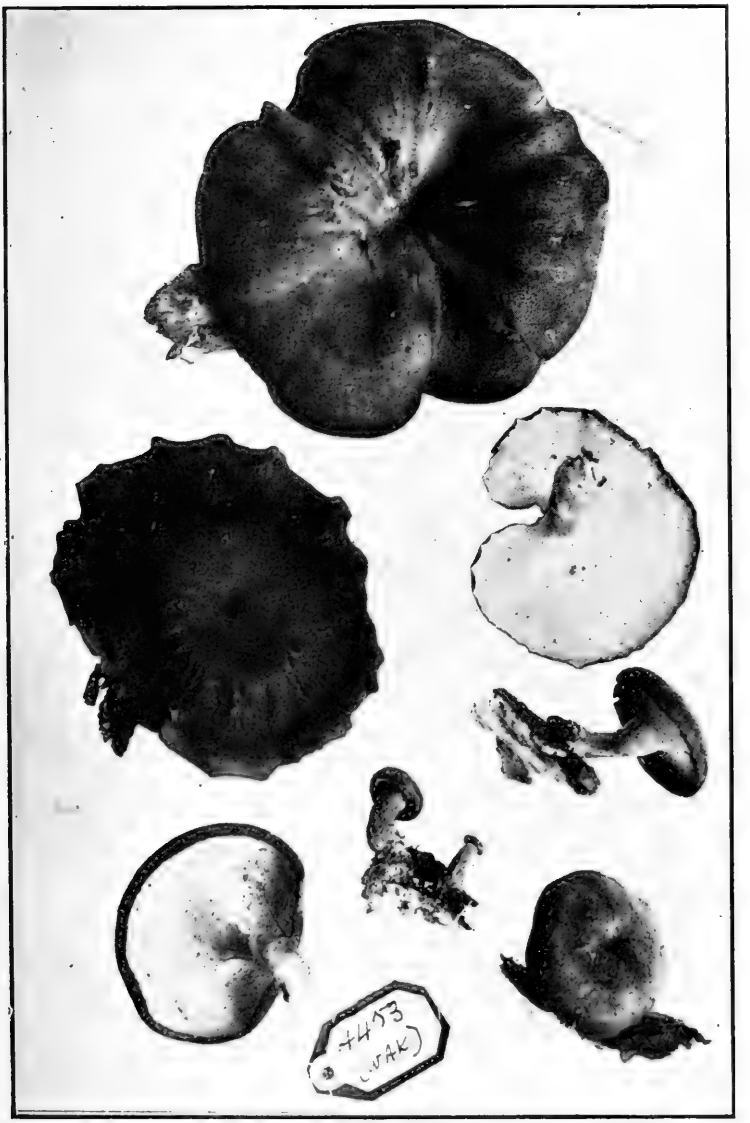

FIG. 160.—PO-LY'-PO--RUS BRU-MA'-LIS.—A Polypore very common in the middle and latter part of the season having rather small pores; it is more or less smoky on the cap above, below nearly white. From specimens collected by A. L. Smith, Columbus, Ohio.

FIG. 161.—MA-RAS'-MI-US CAM-PAN'-U-LA-TUS.—A beautiful ochraceous-red cap delicately poised on slender shining black stems—no trouble to recognize from this figure. Specimens collected at Columbus, Ohio.

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Mycological Bulletin

No. 52

W. A. Kellerman, Ph. D., Ohio State University
Columbus, Ohio, February 15, 1906.

OUR ILLUSTRATIONS.—The *Boletus Americanus* shown on this page needs little or no comment, but the outline illustrations on later pages require further explanation. That on the third page is an *Aecidium* much like the species shown on page 199; the figure on the last page shows a *Smut;* the Aecidium will be briefly explained below, and the Smut will be commented on in the next Number.

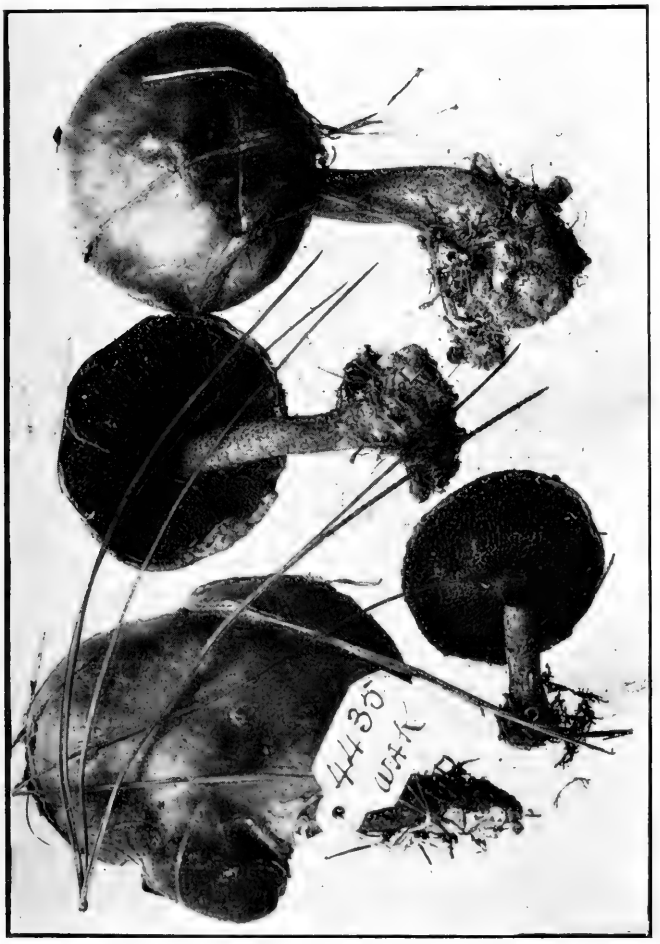

FIG. 162.—BO-LE'-TUS A-MER-I-CA'-NUS.—A yellow-cap slimy Boletus occuring in woods and open places. The specimens from which the photograph was made were sent by Supt. M. E. Hard, Chillicothe, Ohio, Oct. 30, 1905.

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AE-CID'-I-UM, OR CLUSTER-CUPS.—As already explained this represents a stage, usually marked as "I," of a Black Rust. The second or so-called Red-rust is indicated by "II" and the third stage or Black-rust is numbered "III." The remarkable thing about an Aecidium is that its spores do not grow on the host on which they are produced but often on germinating enter a grass or sedge or some other host and there the stages "II" and "III" unfold. This was not at first known, but each Aecidium was supposed to be a complete plant and of course each received a scientific name. It was a German botanist, DeBary, who nearly a half century ago proved by culture in his laboratory that the aecidium on Barberry was the first stage of one of the Red and Black Rusts that grow on wheat. Later experiments have shown the connection of many of our common Yellow Cluster-Cups with Red and Black Rusts on various hosts—yet the life cycle of very many of our common species remain to be worked out.

"QUOTATION PAGE."

(*Continued from page* 202)

it could be predicted with certainty that the resulting fungus would be small. Very immature eggs (½ to ¾ size) were often separated from their mycelial connections and taken into the greenhouse. These often decayed. A good share of them, however, developed after several days producing very small specimens. This indicates that food and moisture, together with the habit of growing singly or in clusters are important factors in determining size.

The volvae varied in size from 5.5 x 6 cm. to 2.4 x 3 cm. Where the eggs were in large groups they were often flattened against each other. A peculiar lobing was often caused in this way and also by foreign objects lying in contact with the eggs. Eggs lying free in sod were spherical and smooth. The color of the eggs varied from white to pink or dirty brown.

The size and shape of the pileus was as variable as the other characteristics. the taller plants in general had the larger pilei. The shape varied from a broadly campanulate pileus, 2.7 cm. high by 3.7 wide at the lower margin in No. 16, to the tall conical pileus 4.2 cm. high by 2.6 in diameter at the base as in No 11. There is no correlation between the shape of the pileus and the size and structure of the other parts. Some very tall specimens had campanulate pilei while others had the conical form, the same was true of the small specimens. The outer surface was always conspicuously reticulated, the edge of the ridges being acute and toothed. The ridges always extended to the pore at the apex. The pits enclosed by the ridges were in general deeper midway between the apex and the margin of the pileus and often became elongated in the vertical direction near the margin. * * *

There is no other part of the whole plant that shows as great variation in both size and structure as does the veil. The veil of a given specimen may vary with the age of the specimen when collected, or with the surrounding conditions. It was often observed that the veil expanded after the stipe had fully elongated. In other specimens the expansion of the veil was more rapid than the elongation of the stipe. In such cases the veil protruded from between the pileus and the volva as a large fold, which later straightens out and hangs free when the stipe is fully extended. When a specimen had been exposed to a dry atmosphere for a short time the veil became much shrunken. The measurements given in the table were taken from specimens gathered at about ten o'clock in the forenoon. Care was taken to measure the length of the veil when it was most fully expanded. While the outside conditions in which the plant is found, may modify the dimensions of the veil, there is no doubt that the actual amount of material which enters into it is as variable as any other feature of the plant.." [A. H. Christman, Journal of Mycology].

FIG. 163.—AE-CID'-I-UM IM-PA-TI-EN'-TIS.—The Yellow Cluster-cups of *Impatiens*, the Wild Touch-me-not, or Jewel-weed. At *b* is shown a ripe "cup" and at *c* one of its germinating spores.

FIG. 164.—U-RO-CYS'-TIS CAR-CI-NO'-DES.—The Smut found on *Cimicifuga*, the Black Snake-root or Bugbane.

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Mycological Bulletin

No. 53

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio, March 1, 1906.

SOMETHING ABOUT SMUT.—In the preceding number we gave an illustration (Fig. 164) of a kind of parasitic fungi which are very common, namely, the Smuts. The figure referred to shows a plant, the common Bugbane or black snake root (*Cimicifuga*) distorted by a Smut-fungus. The plant became abnormal in consequence of the attack of this parasite and when the mass of spores of the latter became nearly or quite ripe, they ruptured the epidermis and the black powdery mass escaped. When examined under the microscope the "smut" proves to be a multitude of little round bodies as shown in the figures (*b, c* and *d*). These germinate—showing that they are reproductive bodies of plants multiplying the species as do seeds in case of the higher plants. They are much simpler in structure than are seeds and are called *spores*. At *d* in figure 164 is shown a spore that has germinated.

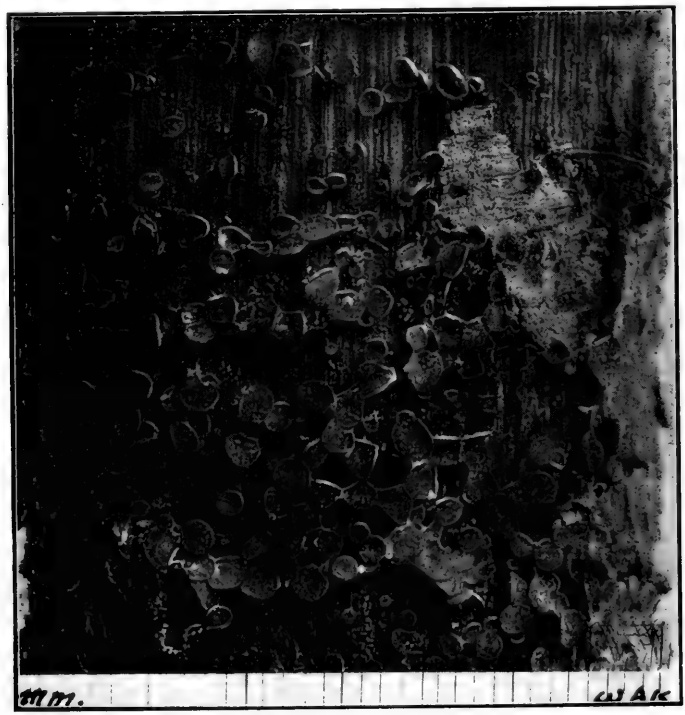

FIG. 165.—HE-LO'-TI-UM CI-TRI'-NUM.—An attractive little Disc-fungus, yellow in color, growing on rotten logs in very damp places. The scale at the bottom shows the extent of the slight magnification. The spores are not borne on gills, pores, spines, etc., as in the case of those called Ba-sid-i-o-my-ce'-tes, but the cups (or saucers) contain a compact layer of large cells *within which the spores are borne.* It belongs to the *Dis-co-my-ce'-tes* (which is a large group of the As-co-my-ce'-tes).

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"QUOTATION PAGE."

QUOTATION—In the introductory part of the Mushroom Book we find the following readable paragraphs by Nina L. Marshall:

"Although for centuries it has been known that some fungi contain most virulent poisons, still, through ignorance of those points which distinguish the poisonous from the edible, frequent cases of poisoning occur in all classes of society. The mistakes resulting in death have been frequent enough to inspire the timid with an overpowering dread of all fungi, while the damp and grewsome places in which many fungi flourish have caused them to be despised by others. The following lines from Shelley very aptly express the general sentiment:

"And plants, at whose names the verse feels loath,
Fill'd the place with a monstrous undergrowth,
Prickly and pulpous, and blistering and blue,
Livid, and starr'd with a lurid dew.
"And agarics and fungi, with mildew and mould,
Started like mist from the wet ground cold;
Pale, fleshy, as if the decaying dead
With a spirit of growth had been animated."

Shelley: "The Sensitive Plant."

"To many people the only growths known as fungi are toadstools and mushrooms. They give the name mushrooms to the species known to them as edible, and regard all other similar growths as toadstools, things uncanny or poisonous.

"The grisly todestool grown there mought I see,
And loathed paddocks (toads) lording on the same."

Spenser's "Faerie Queene."

"This distinction has no scientific basis, and in fact most of the species called toadstools are edible. Fungi are not always the grewsome things of Shelley and Spenser. In their ranks are many which delight the eye with their colouring and the symmetry of their forms. They are the grotesques of nature; nests, hoods, cups, umbrellas, shells, and clubs are represented, together with spheres, hemispheres, cones, and many other geometrical figures. The mildew on the linens, the mould on food, the rusts and smuts which blight our fields of grain, and the dry rot which crumbles our lumber to dust and which causes old wood in dark places to glow with a wierd, pale, flickering light, are all forms of one group or another of these plants which prey upon living or dead organic matter. In ordinary observation, only the simpler and more noticeable fungi are taken into account, but they are in reality met with in almost every situation imaginable. They are found in damp cellars and in rooms shut off from the light; in fact, some form of fungus will be found in every place and on everything which is not exposed to a circulation of fresh air.

"In woods and open fields the attractive forms are found. In shady woods the beautiful white 'bear's head' hangs on stately tree trunks, and the 'destroying angels' gleam white in the shadows on the ground. Shelving brackets, green or red or brown, encircle old stumps, or stand out stiff and white from the crumbling trunks of fallen moss-grown monarchs of the forest, while wood-brown toadstools huddle in groups among the fallen leaves. On the outskirts of the wood, green and red Russula vie with the flowers in the brilliancy of their colouring. Pink or violet Clavarias, dainty corals, border the wood path, and golden Clavarias lighten up the somber wood tints with their yellow branches. In dry pastures and along wood roads, puff-balls, large and small, send up their puffs of brown smoke, to the delight of every passing child who strikes them with a wand. On lawns and hillsides the Oreades cause fairy rings to grow. The fairy rings are circles, or parts of circles, of impoverished grass of a lighter colour and less luxuriant growth than that of the grass immediately surrounding the circle. Before the existence of fairy folk came to be doubted, it was firmly believed that these fairy rings were the dancing grounds of the fairies.

"The nimble elves
That do by moonshine green sour ringlets make
Wherof the ewe bites not; whose pastime 'tis
To make these midnight mushrooms."

Rev. Gerard Smith.

[Nina L. Marshall, the Mushroom Book].

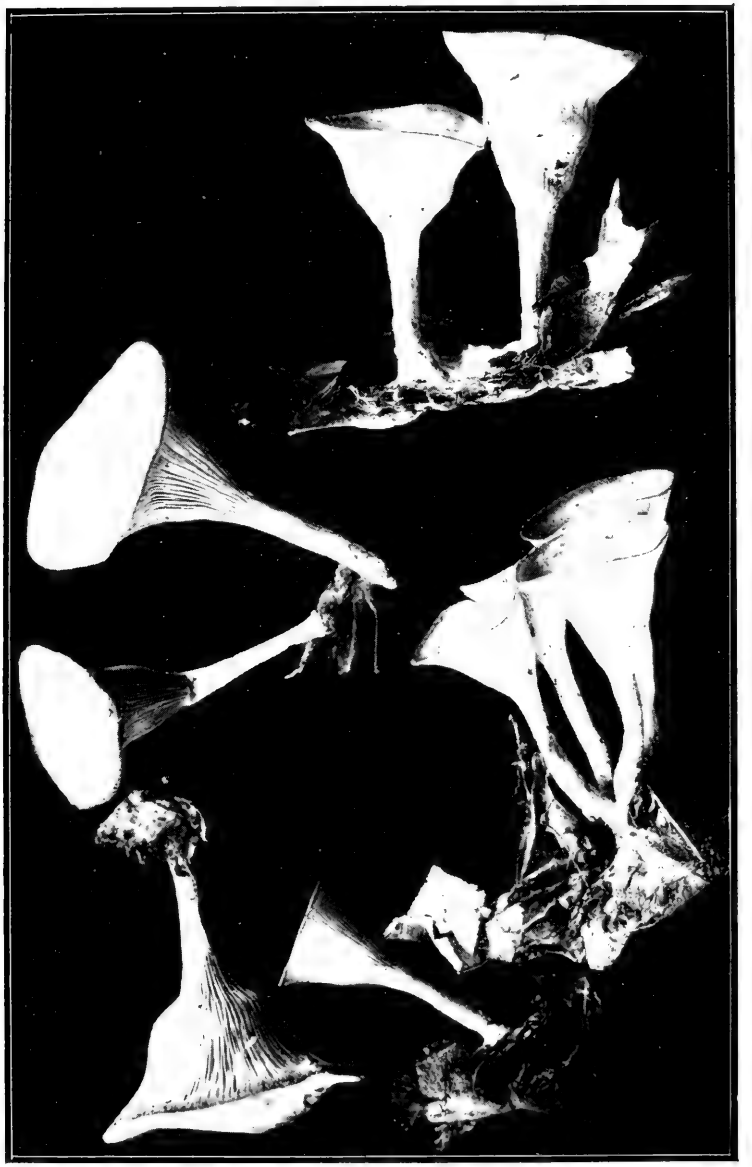

FIG. 166.—CLI-TOC'-Y-BE FLAC'-CI-DA.—A small white-spored white Mushroom, rather firm in texture growing in shady places in moist woods. See also next figure.

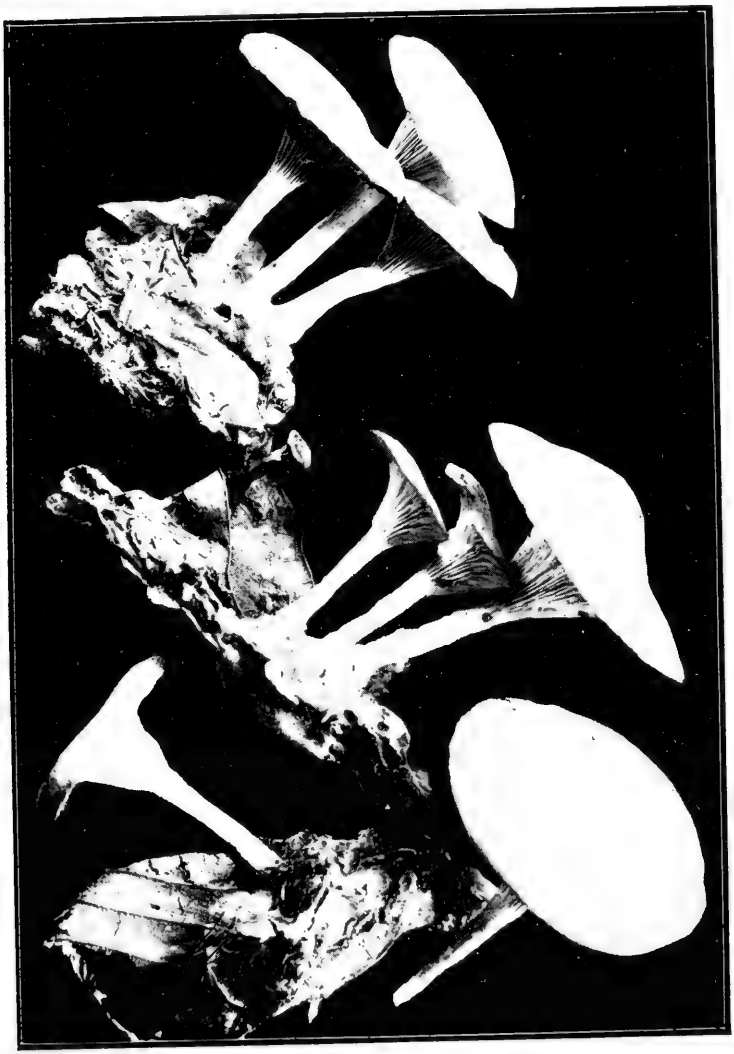

FIG. 166.—CLI-TOC'-Y-BE IN-FUN-DIB-U-LI-FOR'-MIS.—Very much like the preceding (Fig. 166); in fact, they may represent the same species. This and the preceding were made from photographs of specimens collected near Columbus, Ohio.

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Mycological Bulletin

No. 54

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio, March 15, 1906.

A GUATEMALAN FUNGUS.—We give below an illustration of a large Shelf-fungus found in abundance in Guatemala. It is a dirty white color and of size varying from an inch or two to eight inches or more in width. The upper surface is often somewhat honey-combed, and altogether a striking form. It is somewhat peculiar according to Dr. W. A. Murrill to whom speciments have been sent for study. Fig. 169 shows a portion of 168 under side, somewhat magnified.

FIG. 168.—TRAM'-E-TES EL'-E-GANS (or Dae-da'-le-a el'-e-gans). A shelf-fungus of tough almost woody texture collected at Livingston, Guatemala. The larger specimen and the one to the right exhibit the upper side, the one to the left the under side All much less than natural size. See Fig. 169.

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"QUOTATION PAGE."

QUOTATION.—We find a popular article in an eastern newspaper that is not devoid of interest for would-be mycophagists. The author is Mr. Edward B. Sterling, Trenton, New Jersey:

"MUSHROOMS OR TOADSTOOLS; RULES.—For years the following apothegms have been handed down by those who should know better, and are still believed by many a housewife and mushroom gatherer.

"If you eat it and live, it is a 'mushroom;' otherwise die, because it is a 'toadstool.'

"If it grows in a 'dark place,' or on 'wood,' reject it.

"If your mushroom turns a silver spoon 'black,' it is unfit to eat. Throw it away.

"If 'salt' changes the 'color,' it must be poisonous. Drop it.

"If the skin 'peels' off easily, it certainly is an edible mushroom.

"Such nonsense has repeatedly been uttered in my presence. I have also heard, 'You will yet find a toadstool that will send you to the other world.' I have certainly found the 'other world' variety, but I have the power of discrimination developed sufficiently to reject such varieties as food.

"To prove the fallacy of the apothegms above mentioned, many varieties of toadstools have been enjoyed that immediately on fracture or touch have changed from a delicate orange, yellow, crimson and red to a dull blue, thence to a jet black. In fact, toadstools having all the colors of the rainbow have been tested and freely eaten.

"The peeling of the skin from the ordinary mushroom (Agaricus campester) is not only a waste of time, but the strength and aroma of the flesh is lost. The deadly toadstool (Amanita phalloides) can be peeled with ease. The delicious varieties of the showy Boleti family, which covers every tint known to nature, cannot be peeled. Many of those on the slightest touch or pressure of the finger show their delicate construction by immediately changing color, yet the delight of a fresh Boletus to a Mycophagist (toadstool eater), is the reward of a trip that should well repay the finder.

"Many varieties of toadstools, such as the Lactarius family (L. piperatus), (L. deceptivus), contain a white, hot, acrid milk, which in the raw state would soon raise a blister on the tongue. Many of the members of the Russula family (R. emetica) (R. fragilis) are hot as pepper, and in the raw state would cause vomiting, yet when any of the four mentioned varieties are properly cooked the acridity and peppery qualities depart and the food becomes edible and digestible.

"Botanists we have in every high school and college teaching the youth how plants grow, but how few of the professional class of botanists ever touch upon the subject of the value of food producing toadstools belonging to the lower order of plant life. Mycology should be taught in every school in this city and country. A botanist should be fully equipped for such duties. Specimens of the deadly amanita and of several of the edible species of fungi should be on exhibition in the class room. Education is greatly needed in this matter, and with such a rich amount of

fungoid growth in the vicinity of Trenton there is no valid reason why the subject should not have long since received proper attention.

"The foreign element, largely composing the laboring classes in this city, can be seen season after season scouring the woods in search of toadstools. While these foreigners are not able to give the names of that which they gather, they are brought up in their native countries to hunt for food. On one of my rambles through the woods adjoining Cadwalader park, one Sunday afternoon during the past summer, I counted no less than ten men and boys, with bags and baskets, gathering the hot and peppery forms of toadstools, which, when dried, they use for soups, gravies and seasoning. Not one of these ten persons could speak English fluently enough to give me the name of a single specimen, yet they knew what to take and what to avoid.

"Physicians should be mycologists. Outside of the Amanita muscaria (fly agaric) and Amanita phalloides (death cup), how many in this profession are able to identify the variety of fungi when called upon to treat supposed cases of toadstool poisoning? Ninety out of every one hundred cases of supposed toadstool poisoning reported in this country, if traced to the direct source and variety eaten established, would prove the fact that the patients have simply overloaded the stomach.

"Mushrooms should be used for a side dish and not the main feature of any meal. Eaten in proportion to the amount of other varieties of food upon the table they are a luxury, delicate, digestible and nourishing." [Edward B. Sterling, Hunterdon County, N. J. Democrat].

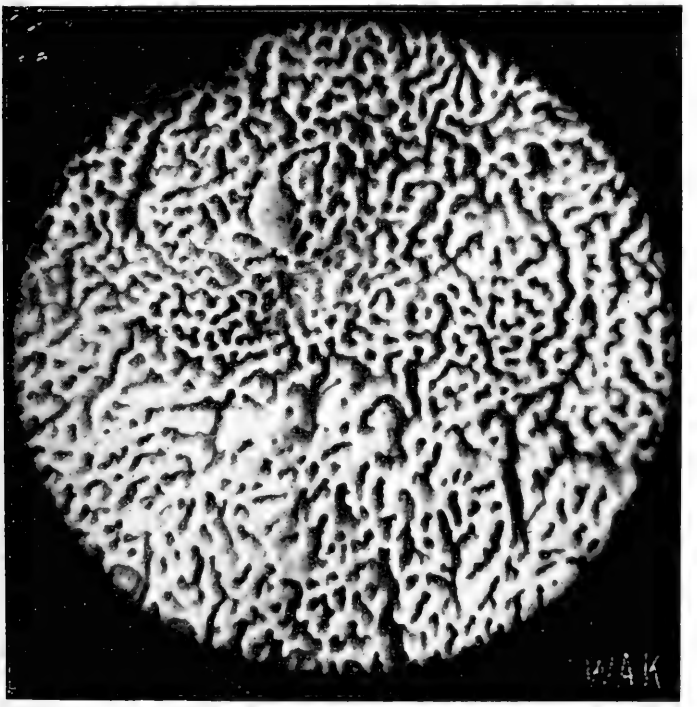

FIG. 169.—TRAM'-E-TES EL'-E-GANS.—The under side much magnified of specimen shown in Fig. 168.

FIG. 170.—HY-GROPH'-O-RUS LAU'-RAE.—A fine species collected in the rich woods along Paint Creek near Chillicothe by Supt. M. E. Hard, Oct. 30, 1905.

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Mycological Bulletin

No. 55

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio, April 1, 1906.

ACKNOWLEDGEMENT.—We are indebted to Mr. Carl Krebs of Cleveland for the photograph of specimen shown in Fig. 171, which represents one of the Stink-horn fungi or Phalloids. It differs from Dictyophora and Phallus (which we illustrated on pages 71 and 83) in the pileus being wholly adnate to the summit of the stipe, the gleba occupying its outer surface. The stipe is hollow within.

WHITE RUST.—This name is given to a group of parasitic fungi which are not real Rusts at all. They belong to a distinct group called the Phyco-my-ce'-tes or Algal-fungi. We hardly need go into the botanical details which would weary a beginner—but suffice it to say that the family to which the fungus shown on page 220 belongs is that to which the Grape Mildew belongs, namely, *Per-o-nos-po-ra'-ce-ae.* We have selected this particular one, growing on the wild Potato-vine (*Ipomoca pandurata*) because it produces conspicuous distortions of the host; see *a* in Fig. 173. An interesting thing is this that the parasite produces two kinds of spores—*summer spores* and *winter spores.* The former are shown in the figure at *c* and one of the latter embedded in the tissue of the leaf, at *b.* The summer spores are white or nearly so, and a waxy white covering is to be seen just before they break through the epidermis for dissemination. The winter spores lie dormant till spring.

FIG. 171.—MU-TI'-NUS CA-NI'-NUS.—One of the Phalloids or Stink-horn fungi. See the first paragraph above. Photograph by Carl Krebs, Cleveland, Ohio.

University Bulletin, Series 9, No. 43. Entered as Second Class Matter, Post-office at Columbus, Ohio

"QUOTATION PAGE."

QUOTATION.—The item we give below appeared in the Journal of Mycology and pertains to an interesting observation by Prof. Sturgis on the unseasonal occurrence of the Morelle:

"REMARKABLE OCCURRENCE OF MORCHELLA ESCULENTA (L.) Pers.—During a recent hunting trip in southwestern British Columbia the writer came across this fungus growing in such abundance and in a location and at a season of the year so unusual that the circumstances seem worth recording. Usually one expects to find *Morchella* in the Spring growing on the borders of meadows or other grassy places. In the present instance the plants were found in September on a steep mountain side which had, within a little over a year, been subjected to a destructive forest fire.

"On September 11th the writer was skirting the precipitous side of a mountain at an altitude of about 7,000 feet and while passing through what had been a fairly good growth of aspens and small spruces, a few fine specimens of *Morchella* were noticed. Further search revealed the presence of these plants literally in hundreds. A fire had passed across the mountain in June 1904, leaving only the skeletons of the trees standing and charring the ground to such a depth that no trace of green vegetation has since appeared. Under these unfavorable circumstances and at a season when snow had already fallen not far from the locality a bushel of *Morchellas* might have been gathered within a radius of one hundred yards. The specimens were exceptionally fine, in some cases attaining a height of seven inches and a circumference around the pileus of ten inches. In such specimens the pileus usually showed a great variety of form, from conical and flattened to nearly spherical. In other cases the pileus more nearly resembled that of *M. conica* Pers. The base of the stipe was in all cases much swollen and consisted of a mass of mycelium and soil cemented into a sclerotoid mass. Specimens were secured from which the identity of the fungus was later determined.

"The interesting question arises whether, on the western slopes of the Rocky Mountains, *Morchella* usually occurs in the Autumn rather than in the Spring as elsewhere, and also how the presence of the particular specimens is to be accounted for. It is hardly possible that the spores could have been carried to the locality in sufficient quantity to have produced in one season so large a growth of plants, and it is almost equally inconceivable that a subterranean mycelium could have resisted a degree of heat sufficient to destroy permanently all surface vegetation and leave the ground a desolate waste of charred clay." [W. C. Sturgis, Journal of Mycology.]

QUOTATION.—An extremely interesting letter was received during the summer from Mr. Pierson L. Halsey, secretary of the Wisconsin Mycological Society, Milwaukee. We reproduce such parts as make plain the matter referred to:

"I enclose with this mail a small package and specimens of a common mushroom in gardens. * * * *

"On Saturday, July 8, 1905, the family of J—— E——, of our city, was reported in the press as seriously poisoned by eating toadstools from their garden. I forthwith investigated yesterday morning, getting the remains of specimens, the cut-off stems, one of the enclosed, and whatever were left, which was very few. Also the reports of the two attending physicians in full. There is no possible doubt as to this being the only mushroom eaten.

"They were cut, something over a pound, from the kitchen garden beneath potato vines, rich, sandy loam, highly fertilized, and immediately fried gills up with butter, salt and pepper, in a large dripping pan, full. Mr. E—— ate very heartily (he says he ate a pound, which is questionable). Mrs. E——and two little girls, aged 10 and 8, ate only a few, the girls not over ten caps each. About ten minutes after their meal Mr. E—— came in feeling very dizzy and found his wife resting on the table complaining of being queer; in about ten minutes the girls complained of dizziness and tired feeling in the limbs and arms. Mrs. E——'s arms and hands were trembling and she had 'no strength' and she couldn't 'see

plain;' they called the doctor by phone, Dr. C. H. Lewis and Dr. Hankwitz both coming within five minutes of each other and within forty minutes after their meal., i. e., at about 7:45. Mrs. E—— had meanwhile given a teaspoonful of raw mustard to Mr. E.——and less amount to the children and self. All drank much fresh milk.

"Dr. Lewis arriving, found Mr. E—— prostrated, too dizzy to walk; he had vomited some, as had the little girl. All were dizzy, trembling, and Mr. E—— frightened. Both Mr. and Mrs. E——perspired profusely; pulse not much above normal. No griping or pain; only weakness and vertigo, except that the mustard and excessive draughts of milk distressed somewhat.

"Treatment—Teaspoonful of fluid extract ipecac (and one-half to girls) in warm water, followed in Mr. E——'s case with hypodermic 1-150 gr. atropin with strychnia. The dizziness continued all the day and following night, but all felt well yesterday morning except for headaches, and are well to-day. As the caps were small, and placed close in the dripping pan, there may possibly have been 75 or thereabouts, his hat full. Their breakfast at about 7 o'clock consisted of coffee, bread and butter, these fried mushrooms and strawberries (with sugar), freshly picked from their garden. No paris green or other insecticide had been used in the garden. * * * " [Pierson W. Halsey, letter, July 10, 1905.]

[The specimens, or part of them at least, were Amanita verna.—Ed.]

FIG. 172.—LAC-TA'-RI-US VO-LE'-MUS.—A species with abundant milky juice though "distinguished for its edible qualities." This specimen of deep lavendar color, was sent from Chillicothe by Supt. M. E. Hard.

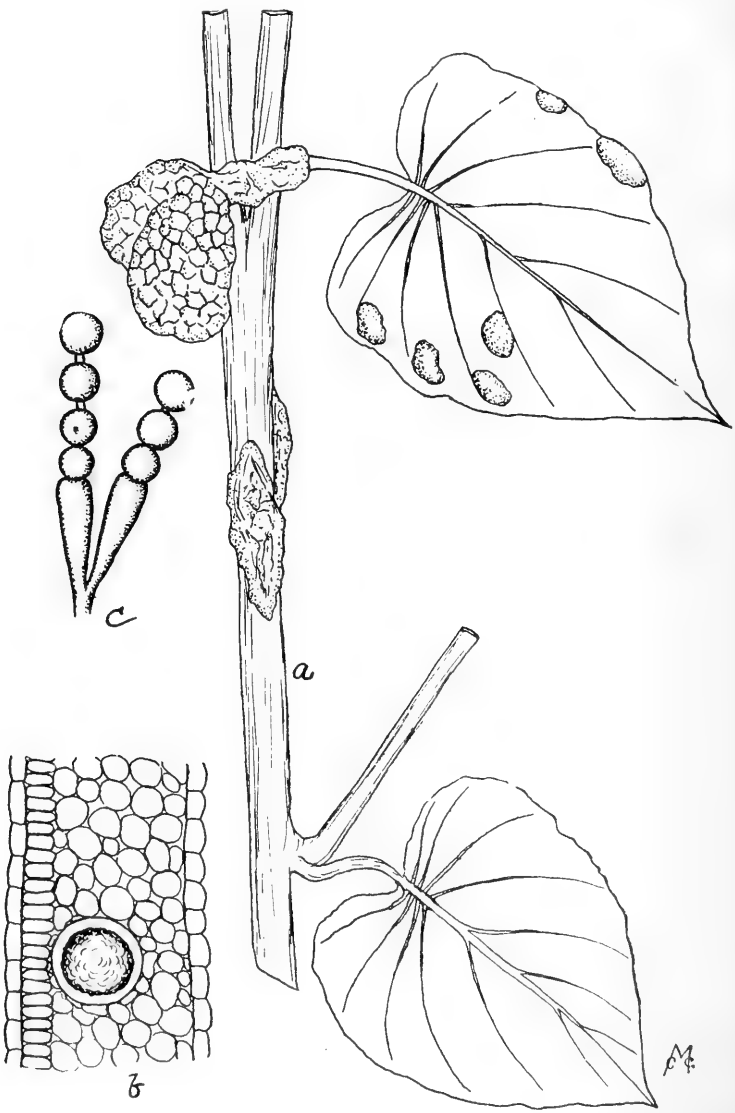


FIG. 173.—AL-BU'-GO IP-O-MOE'-AE-PAN-DU-RA'-TAE.—A "White Rust" causing distortions of the Wild Potato-vine. The summer and winter spores are shown at *c* and *b* respectively.

The Mycological Bulletin is issued on the 1st and 15th of each Month, Price 25c. Copie of Vol. II (1904) and Vol. III (1905) may be had for 50 cents each, or cloth bound copies for 75 cents. No copies remain of Vol. I (1903), Address, W. A. Kellerman Columbus Ohio.

Mycological Bulletin

No. 56

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio, April 15, 1906.

ACKNOWLEDGEMENT.—The photograph was furnished by Supt. M. E. Hard from which we made the cut below. The plant is a near relative of the Polyporus or Trametes, but the "gills" or "tubes" are in *concentric circles.* The name Cy-clom'-y-ces means: circular (*cyclos*), fungus (*myces*).

FIG. 174.—CY-CLOM'-Y-CES GREENE'-I.—A rare "Polypore," with concentric "lamellae" or "tubes." Supt. M. E. Hard, Chillicothe, Ohio.

University Bulletin, Series 9, No. 44. Entered as Second Class Matter, Post-office at Columbus, Ohio

"QUOTATION PAGE."

QUOTATION.—Notes on Fungi were published by Dr. John W. Harshberger in the *Journal of Mycology,* and certain parts are here transcribed:

"BOX TORTOISES AND TOADSTOOLS.—The common box tortoise (*Cistudo virginica*) of our eastern woodlands is extremely fond of a rather frequent toadstool, *Russula virescens* Fr. A number of caps of this fungus, found in the woods at Primos, Delaware Co., Pa., on August 7, 1901, were gnawed in a rather jagged manner. Later, a tortoise was found immediately in front of a large light green Russula. It stopped work upon the approach of the observer, and although it was watched for some time, it remained perfectly quiet and alert. An inspection of its horny beak, however, revealed torn fragments of the toadstool smeared over the horny surface. I, therefore, succeeded in connecting the tortoise with the torn aspect of the fungus.

"PEZIZA REPANDA WAHLENB. IN PENNSYLVANIA.—McIlvaine in his book, 'One Thousand American Fungi' (p. 558), gives the distribution of this fungus, as: New York, Ellis; Minnesota, Johnson; Ohio, Lloyd; Pennsylvania, Miller. It occurs, according to him, on the ground, or on decaying wood. M. C. Cooke (Handbook of British Fungi II, p. 669) mentions it as one of the British funguses occurring on the ground and on stumps. It was discovered by the writer at Sherwood, near Angora, Philadelphia on an old rotten log in very considerable abundance. The specimens collected, some two or three hundred in number, varied in size from the diameter of a ten cent piece to one or two, or three inches across. The individuals were clustered, or disposed singly; some were saucer-shaped, others deeper and more bowl-shaped. The color was nearly white on the outer surface and a light, yellowish-brown color on the concave inner side.

"SPORE DISCHARGE IN PEZIZA BADIA PERS.—A considerable amount of this ascomycete was found at Crum Creek, Penna., May 20, 1901. When gathered in the hand and held for a moment, a discharge of the spores took place with a puff, like the curling smoke at the muzzle of a discharged gun. At intervals of several minutes, the same phenomenon took place until apparently all of the spores had been set free from the asci.

"CLITOPILUS ABORTIVUS B. & C.—The statement is made in an authoritative work on the fungi of North America, that 'the fungus is so named because of the abortive form of it frequently found associated with it.' From this sentence, one would infer, that the normal form is more abundant than the aborted one which is found with it. Nevertheless in the season of 1901, the aborted plants were by far the most abundant in the neighborhood of Philadelphia. A search through several woods was rewarded by the collection of many specimens of the rounded, egg-shaped, aborted form and only a few examples of the normal gill-bearing fungus." [John W. Harshburger, Journal of Mycology.]

ANOTHER FLY AGARIC.—The following interesting Note we owe to Supt. D. R. Sumstine, of Wilkinsburg, Pa.:

"*Amanita muscaria* is called the fly agaric because infusions of it are poisonous to flies. It has now however a keen rival for this reputation in another species of this same genus. Last summer while drying specimens of *Amanita solitaria* Bull., a number of flies was attracted to them. After the flies had remained on the plants for a short time they fell over apparently dead. This continued until thirty-nine fly mycophagists had become the victims of some narcotic contained in the mushrooms. The box with flies and plants was then set aside for future study. After two hours the box was again examined but the flies which once were dead were now alive and had departed with no more serious results possibly than a severe headache from their mycological "booze."

Several experiments were made with other specimens of the same species and the same results were obtained. It seems that this plant has some property that acts as an intoxicant or soporific to flies. It is reported by some writers as edible and by others as poisonous." [D. R. Sumstine, Journal of Mycology]

Quotation.—A Polypore on a leaf we would never expect, but perhaps there is something new under the sun. We quote from W. A. Murrill in Torreya:

"A New Polyporoid Genus from South America.—An interesting pore-fungus was collected a few years ago in Columbia by Mr. C. F. Baker. It is the only species of Polyporaceae known to me which occurs parasitic on living leaves. I have erected upon it the new genus *Phylloporia,* a description of which follows:

"Phylloporia gen. nov. Hymenophore small, tough, annual, attached by the vertex to the lower surface of living leaves; context brown, fibrous, tubes thin-walled, mouths polygonal; spores globose, smooth, pale ferruginous.

"The distinguishing feature of this genus is its habit of growing upon living leaves. It is based upon the following species:

"Phylloporia parasitica sp. nov. Pileus circular, thin, attached by its vertex to the under surface of living leaves, 5-8 mm. in diaemter, 0-2-1mm. thick; surface minutely tomentose, fulvous, margin thin, entire, ochraceous to ferruginous; context membranaceous, fibrous, ferruginous; tubes 0.5 mm. or less in length, 3-7 to a millimeter, isabelline, polygonal, irregular, edges thin, entire or coarsely dentate; spores globose, smooth, very pale ferruginous, 3-4 μ; hyphae concolorous.

"Collected by C. F. Baker near Bonda, Colombia, Nov. 16, 1898, on living leaves of *Bignonia* (?). Numerous sporophores in various stages of development are found on the lower surface of the leaf, usually attached to a vein. This species is the only one of its family in America that occurs on living leaves. Looked at from above, the host appears to be attacked by a leaf-parasite and it is quite surprising to find on the lower surface the sporophores of one of the Polyporaceae." [William Alphonso Murrill, Torreya].

Fig. 175.—Hy-pho-lo'-ma sue-lat-er-i'-ti-um, in its native habitat, as photographed by Supt. M. E. Hard, Supt. S. Lawrence and the writer, near Ashville, Ohio, Oct. 14, 1905.

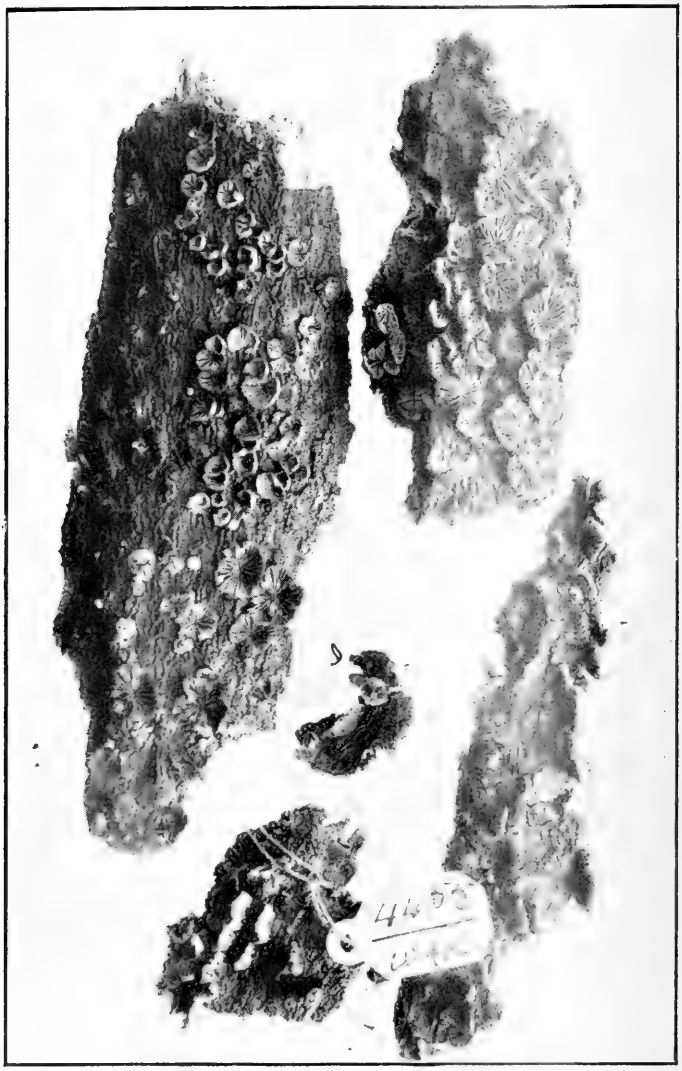
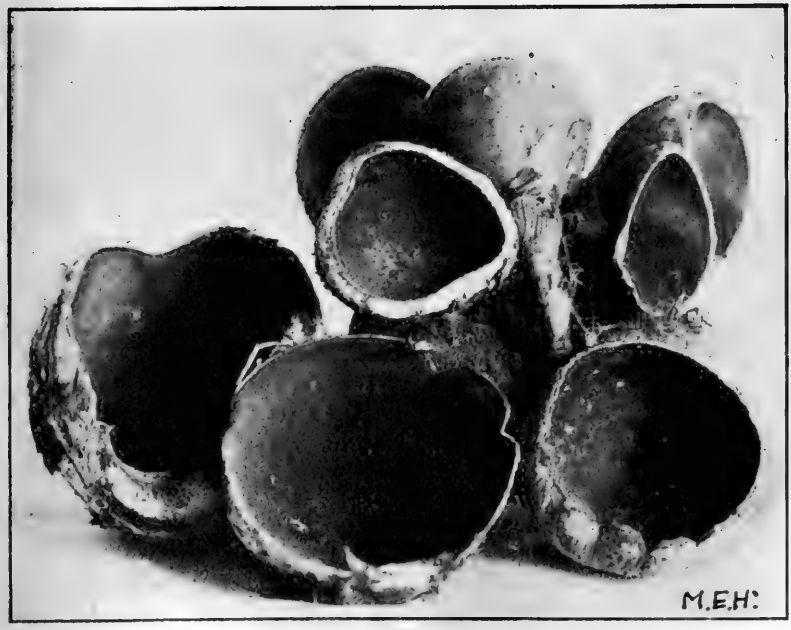


FIG. 176.—PLEU-RO'-TUS AP-PLI-CA'-TUS.—One of the neatest of all tiny gray sessile mushrooms,—a near relative of the Oyster Mushroom. It is shown natural size in its natural habitat, that is to say, on old bark of fallen logs. It thrives only in moisture; these specimens were found on the narrow neck of land hemming in a cove at Cedar Point, near Sandusky, Ohio. The large log was well shaded and these little plants throve in swarms.

VOL. IV. MAY, 1906 NOS. 57-58

MYCOLOGICAL BULLETIN

W. A. KELLERMAN, Ph. D. OHIO STATE UNIVERSITY



COLUMBUS, OHIO Press of VANCE-POLAND CO.

Mycological Bulletin

Nos. 57-58

W. A. Kellerman, Ph. D., Ohio State University
Columbus, Ohio, May, 1906

THE EDITOR'S UNEASY CHAIR.

The conspicuous change in the MYCOLOGICAL BULLETIN as witnessed in this number may raise the question, "What does it mean?" I despair of giving an adequate answer—but let us hope at least that it means progression—we will say "mutation," for you know, my dear reader, that the "mutation theory" (sudden strides) is now replacing the "evolution theory" (slow changes)—which we all had begun to think explained the universe so nicely!

Perhaps we would better say in simple plain, current language that the editor concluded he was not "the whole thing," in short, he was not "it," and so he yields nearly all the space now and henceforth to other writers, to authors who know much about their subject, who have information to spare, and who kindly write for the joy of the working. This paragraph, then, is one of felicitation and congratulation, because we will have a better MYCOLOGICAL BULLETIN than heretofore. What an advantage it was that we were "held up" by the—(see the next paragraph.)

But the immediate and efficient cause for this change has not yet, as just hinted, been exposed. It is to be found in the gentle, kindly, peremptory notice from the postal authorities, that "second class entry" is for newspapers, for literary and scientific magazines, for technical journals, containing articles written by various persons," &c., and consequently the copies of the BULLETIN were not sent out in the manner heretofore in vogue. A delay was therefore caused, since the editor was hunting mushrooms in a foreign country all winter, and consequently prompt measures could not be taken for distribution in other manner—stamping each copy (and herein consists the apology or explanation of an irregularity that presumably will not occur again).

Then we make the "new announcement," namely, that the BULLETIN will be continued on the plan so far exemplified in the successive Numbers; but it is advantageous to mail monthly instead of fortnightly as heretofore. Double numbers will be issued the remainder of the year, thus giving a total of twenty-four for the twelve months as promised. The use of a *cover* to the magazine will, it is surmised, add to its appearance, besides serving well for protection. A wide circulation would be desirable—to the end that the expense may be met by subscriptions. The price, 25 cents a year, will remain unchanged.

THE GENUS PEZIZA AND PEZIZA COCCINEA.

By Supt. M. E. Hard, Chillicothe, Ohio.

This is a very large genus, and will be met by the mushroom hunter frequently. Many are so small that they will easily escape detection unless special pains are taken to find them. They are found on leaves, on partially buried sticks, on decayed logs, on dung, in cellars, about barns and outhouses, on the stems of herbaceous plants, especially on the nettle.

There are about 150 species found in this country, and many reported in Europe not as yet found here. They belong to the true cup fungi. Many are sessile, while others have stems. They are usually fleshy and soft and of a variety of colors.

They have a peculiar explosive apparatus for hurling out the spores so that the wind can better scatter them abroad.

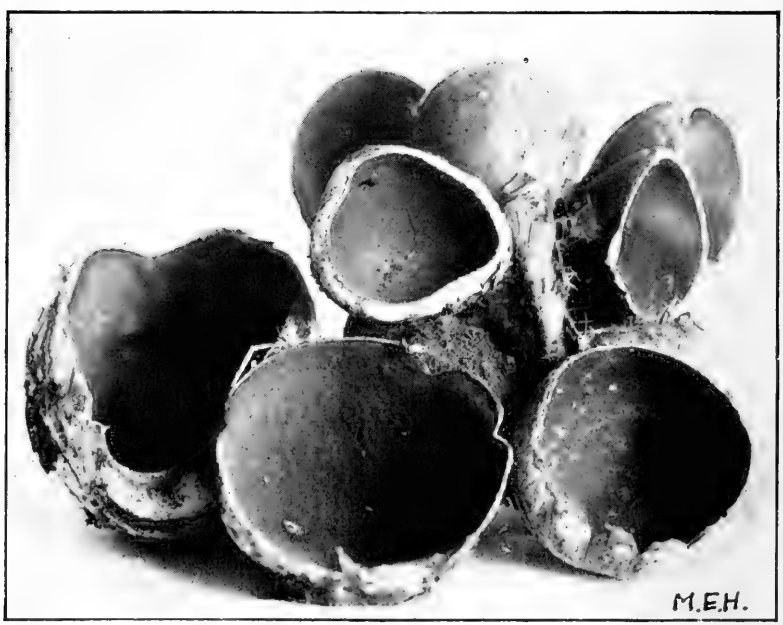


Fig. 177. PE-ZI'-ZA COC-CIN'-E-A. Scarlet within. M. E. Hard, Chillicothe, O.

The fruiting surface is usually saucer or cup-shaped and the bowl of the saucer, which is the fruiting surface, is completely filled with a palisade of cylindrical sacs and in each sac there are eight spores. These sacs have lids at the apex and when the plant is mature they spurt out their spores. If the observer will lie down on the ground and watch a matured cup for a few minutes he will see very distinctly a small cloud of spores thrown off at intervals without his disturbing the plant in the least, but should he disturb the plant just a little he will plainly see a large cloud of spores from the jar. I have taken them into schoolrooms after having been kept for two or three days and by a slight jar the cloud of spores would be visible to the entire room. A number of the cup fungi has this explosive apparatus.

Those in Figure 177 are called PEZIZA COCCINEA Jacq. It is found in damp places in the spring of the year from April to June. However, I

Fig. 178. Sketch of GY-RO-MI'TRA ES-CU-LEN'-TA, slightly reduced. Specimen sent by M. E. Hard. See p. 230.

have found it late in November. It is found on sticks partially buried in the leaves. It is easily distinguished by its deep scarlet color, which gives name to the species. Its external surface is whitish or pinkish and inclined to be tomentose. The stem is short, whitish and tomentose.

This is one of the most beautiful plants in the woods, and dull must be the observer who will not pause to examine this brilliant fungus, truly a "Fairy Cup."

It is very abundant in the woods about Chillicothe this spring, yet its distribution is widespread.

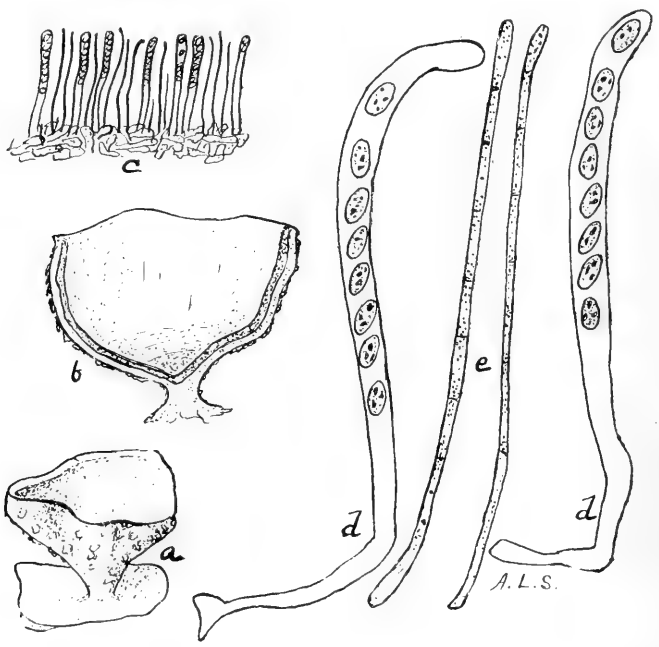


Fig. 179. Pe-zi'-za coc-cin'-e-a. showing plant (a); section of plant (b); portion of the red fruiting layer (c); two asci, each ascus with eight spores (d); and two paraphyses (e).

MUSHROOM NOTES. I.

W. A. Kellerman.

Variation in Urnula Craterium.—We present some illustrations of Urnula craterium, Figs. 180 and 182, to show the great variation in shape and size of these black plants One could well believe that more than one species was represented; but specimens have been submitted from time to time to Dr. Darand, of Cornell University, and the reports from him show that all the forms belong to the species named above—*Urnula craterium.*

It is one of the commonest and one of the earliest to appear in the season. In the partially cleared woods, where twigs and branches in abundance have been decaying for some time, it luxuriates most profusely.

Fig. 180. UR'-NU-LA CRA-TE'-RI-UM. Black Peziza, slender, densely clustered forms. R. F. Grigs, Columbus, O.

The very dark brown or rather dull black color simulates that of the soil, decaying wood, blackened leaves, etc., on which it feeds.

The shapes assumed can better be seen than described—so I will refer to the samples shown in the half tones. In Fig. 180 we have a large densely cespitose cluster of the slender forms cornucopia-like. A different type is shown in Fig. 180. These illustrations were made from specimens collected at Columbus by Mr. R. F. Griggs and at Cable by Mr. Arthur L. Smith.

A Large Gyromitra Esculenta.—In Fig. 178 we show a sketch of a specimen of this species kindly sent by Supt. M. E. Hard, of Chillicothe,

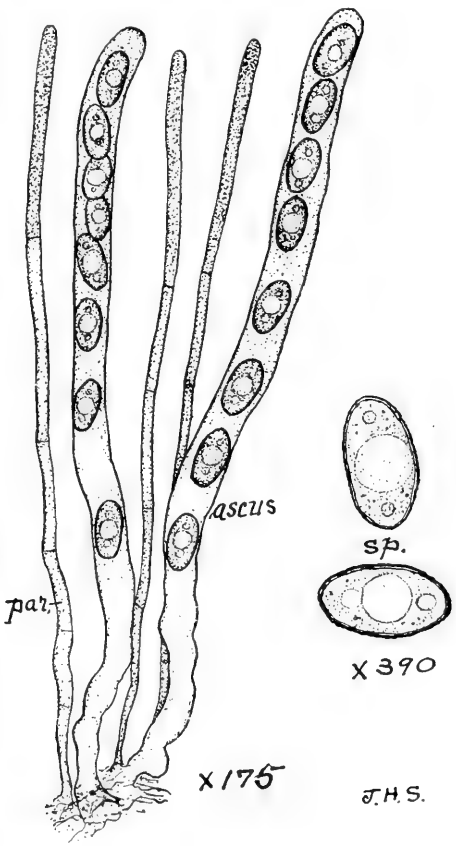


Fig. 181. Asci, spores and paraphyses of Gy-ro-mi'-tra es-cu-len'-ta, enlarged.

Ohio, which weighed 520 grams, or over one pound. The actual size is shown in the cut, or really we had to reduce it slightly to avoid projection beyond the page. I have requested Mr. Hard to give us some notes on this interesting edible species, and next month we hope to hear from him; doubtless he will furnish a photograph for illustration at the same time. In the meantime I have had the fruiting-surface examined and accurate drawings made showng the *asci, paraphyses* and *spores;* see Fig. 181.

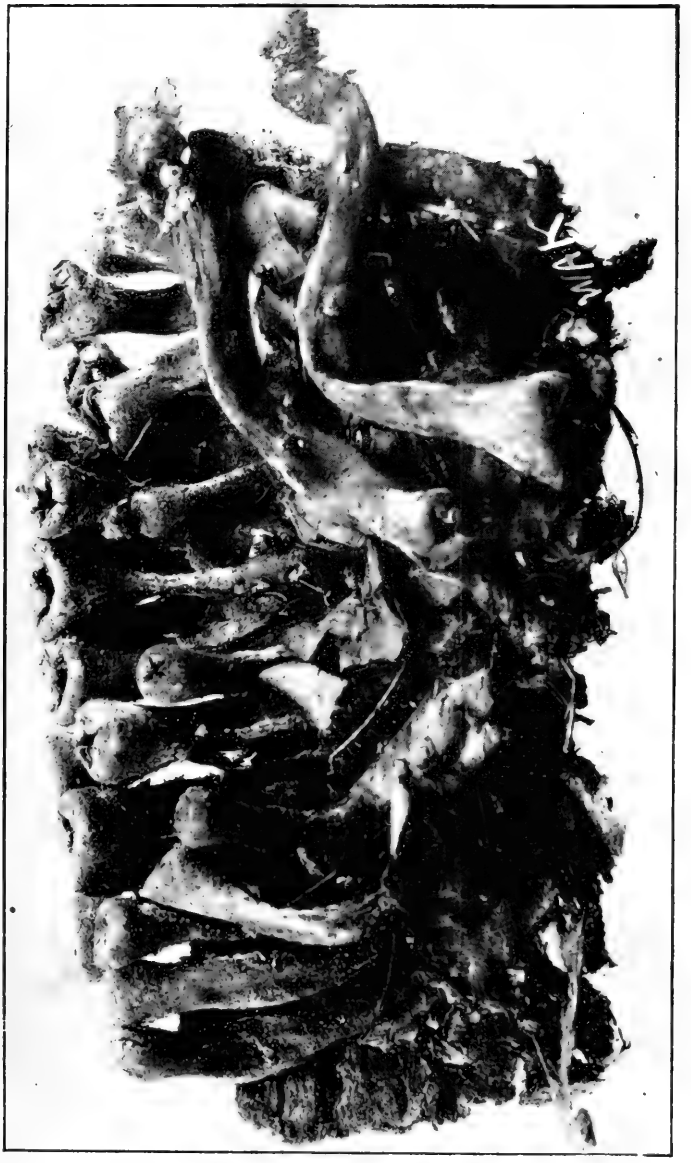


Fig. 182. PE'NU-LA CRA-TE'-RI-UM, Black Peziza, short-stemmed forms, collected at Cable, O., by Arthur L. Smith.

AN EARLY MUSHROOM — NAUCORIA PEDIADES Fr.

Arthur L. Smith, Columbus, Ohio.

This is the first mushroom of the season. It was found April 3, 1906, growing on twigs and in the grass. Even then some of the specimens showed signs of old age and decay. The plant was found in considerable abundance on April 15, after a warm rain; later but two or three were found.

Naucoria belongs to the Ochre-Spored Agarics, and corresponds to Collybia among the White-Spored species. Indeed, on cursory examination, one would be almost sure to call it Collybia.

Atkinson says for the description of the genus, "Gills free or attached, but not decurrent, and stem is cartilaginous." But he does not mention this interesting little species. Mellvaine gives a longer description of the genus, and lists also this species. In my specimens, the pileus was two or three cm. broad, and quite irregular in shape. It varies from convex when young, to flat or even reflexed when older.

The color of the pileus varies with the dryness. Most of the specimens grew in moist places, and were a medium brown color. But those that were dry on the surface and those that dried out afterwards were a quite light brown. The contrast was marked. If the dry plants were wet, they soon returned to the deeper brown. All parts of the plants were of nearly the same color as the wet pileus. The spore print is ferruginous, while the individual spores are 6 x 4 mic. The hollow subcartilaginous stem is irregular and often flattened.

Supt. M. E. Hard, to whom specimens were sent, says, "It is without doubt 'Naucoria pediades Fr.', and is edible." I did not test its edible qualities, but did find when raw the taste insipid. The illustration, Fig. 183, represents two of these plants in their native habitat.

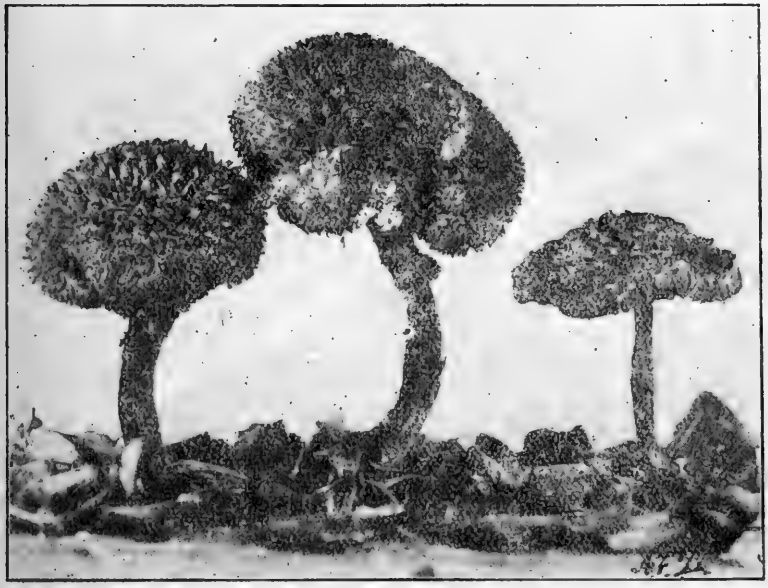
Fig. 183. NAU-CO'-RI-A PE-DI'-A-DES. For description see text.

The Mycological Bulletin is issued Monthly, Price 25c. Copies of Vol. II (1904) and Vol. III (1905) may be had for 50 cents each, or cloth bound copies for 75 cents, No. copies remain of Vol. I (1902). Address W. A. Kellerman, Columbus, Ohio

VOL. IV. JUNE, 1906 NOS. 59-60

MYCOLOGICAL BULLETIN

W. A. KELLERMAN, Ph. D. OHIO STATE UNIVERSITY



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Mycological Bulletin

Nos. 59-60

W. A. Kellerman, Ph. D., Ohio State University
Columbus, June, 1906

THE EDITOR'S EASY CHAIR.

APPRECIATION.—Some appreciative letters have been received from subscribers relative to the improved appearance of the BULLETIN, and for these, sincere thanks are hereby returned. I can not forego the pleasure of allowing others to enjoy with me this portion of one of the letters received: "The little BULLETIN is filling a place in botanical literature hitherto wholly unoccupied. Now as you 'wax fat,' do not change the nature of the publication. If you feel like moving up into the field of 'scientific mycology,' you will leave behind the people for whom it was designed, and they would then have nothing—just as they had nothing of the kind before the BULLETIN was started." Keep it along the present line."

ACKNOWLEDGMENTS—I have to thank Miss Hyde and Messrs. Hard and Smith for both interesting articles and illustrations of striking mushrooms contained in this NUMBER.

MORE PARTICULARS.—I can add that a short quotation will be found from Dr. Harshberger on p. 22, relative to the Peziza on which Mr. Smith discourses. It will be noted, too, that a pen and ink sketch of Mr. Hard's subject (Gyromitra esculenta) was published on p. 227. The half-tone in this NUMBER almost does justice to the fine specimen. Miss Hyde's Verpa is not found every day, and we are fortunate in having been able to photograph the specimens which she brought us.

STROBILOMYCES.—This peculiar tube-bearing mushroom was illustrated on p. 100, and now Mr. A. F. Lane, Milwaukee, Wisconsin, sends us a photograph of *dry specimens* (Fig. 189), which can very appropriately find place here. See p. 240.

ABOUT GYROMITRA ESCULENTA Fr.

M. E. Hard.

Gyromitra means a much wrinkled hood. There are seven species in this genus. It frequently grows very large, as the specimen in Figure 184 will indicate, which is eight inches high and five inches across the cap. This was found in the woods near Chillicothe.

The cap is often rounded and regular as in the specimen photographed, but frequently it is deeply lobed and very irregular, gyrose-wrinkled, bay-red, hollow, white within, uneven.

The stem is white, stout, stuffed or hollow, covered with a mealy substance; it is two to three inches long.

The spores are elliptical, binucleate, yellow, 20-22 mic. long.

This was formerly called *Helvella esculenta*. It is often very irregular and attached to the stem in two or three places. It is easily recognized from its bay-red color and its brain-like folds.

It grows beside old stumps and prefers a sandy soil. It is said to be injurious to some people. I have eaten it without any bad results, but I was careful to use only young and fresh specimens. I should advise not to eat it unless carefully parboiled. It is considered dangerous.

NOTES FROM MUSHROOM LITERATURE, I.

W. A. Kellerman.

A summary of interesting articles on Mushrooms found in various periodicals and brief quotations will occupy some space in the BULLETIN when available. We call attention first to a note published in Torreya recently by Mr. C. C. Hammer. These are his words:

"A Note regarding the Discharge of Spores of Pleurotus ostreatus.—A few evenings since a friend brought me a fine plant of the above species, consisting of about twenty-five pileoli, growing from a common base and arranged in the form of a large rosette, about twelve inches in diameter and of about the same height. Knowing the plant to be very fresh, not yet forty-eight hours old, I decided to keep it and cook it upon the following day. For the night it was left upon my study table, in the same position in which it grew (gills downward). Early the next morning my attention was called to the plant by my wife who asked me to come and observe it. It happened to be exposed to a very strong morning sunlight, which entered the window three or four feet away. The spores were arising from the plant like tiny spirals of smoke or steam, to the height of two or three feet, making to us a very strange sight. At first I doubted if the "smoke" were really spores, but after a careful microscopic examination of some which were caught upon a slide, this point was definitely settled. Perhaps other agarics spore in a similar manner, but never having had conditions favorable before I cannot say. Certainly the fact was interesting to me and for this reason I publish it. I have upon numerous occasions observed the momentary expulsion of spores from fungi such as *Bulgaria rufa* and *Sarcoscypha floccosa*, but with these plants the spore-discharge seems to occur when they are first touched, and then only."

ANOTHER.—New species of Mushrooms have been described by Professor Atkinson in the Journal of Mycology, some of which should be recounted here:—

"PRELIMINARY NOTES ON SOME NEW SPECIES OF FUNGI.—AGARICUS CRETACELLUS, Atkinson, n. sp.—Plants gregarious, sometimes a few joined at the base; 5-8 cm. high, pileus 4-7 cm. broad, stems 6-10 mm. in thickness. PILEUS white convex to expanded, thin, smooth, sometimes inclined to be slightly viscid in wet weather, when leaves cling to the surface; sometimes with slight yellowish stains, flesh white with a tinge of pink sometimes. GILLS narrow, 3-4 mm., narrowed behind, free, first white, then pink, and later dark greyish brown, not becoming blackish. The caps are sometimes fully expanded when the gills show only a slight tinge of pink. SPORES 4-5x3μ. STEM tapering from the enlarged base, white, smooth above the annulus, chalky white below and covered with minute powdery scales often arranged in irregular concentric rings below; stem solid but the center less dense. ANNULUS persistent, white, smooth above, the lower surface with very fine floccose scales similar to those on the stem from which the annulus was separated. Odor and taste of almonds, as in A. arvensis. Growing in leaf mold, woods, Cascadilla creek, Ithaca, N. Y. C. U. herb. No. 5359, collected by Geo. F. Atkinson, September 7, 1900.

"AMANITA FLAVOCONIA, Atkinson n. sp.—Plants usually scattered, sometimes gregarious, 6-12 cm. high, pileus 3-8 cm. broad stems 4-15 mm.

Fig. 184. GY-RO-MI'-TRA ES-CU-LEN'-TA. See text. M. E. Hard, Chillicothe, Ohio.

thick. PILEUS convex then expanded, plain or broadly umbonate, fleshy, very thin except at the center, chrome yellow to orange yellow, darker when young and on the center, smooth, that is not striate, viscid, flesh white, covered with numerous small flocculent patches or heaps of fragments of the yellow powdery volva, which is easily removed and in wet weather sometimes is entirely absent from the pileus. GILLS broad in the larger specimens, narrow in the smaller ones, 4-8 mm. broad, rounded at each end, free, not very crowded, white, very finely serrate or fimbriate from threads which attached the gills to the stem in the young plants. SPORES oval-ovate, white, 6-9x4-6μ. STEMS stuffed, straight or flexuous, slightly tapering from the bulbous base, and at the apex broadening slightly, covered with flocculent scales, tinged with sulphur, fine sulphur powder above the annulus, portions below the annulus covered with powdery masses or particles of the universal veil. Bulb not very prominent, smooth or rarely somewhat cracked, powdered with remnants of the volva. ANNULUS sulphur yellow or chrome yellow, membranous. The VOLVA or universal veil consists of a yellowish powdery substance which separates into numerous powdery masses, covering the pileus and base of the stem, but which easily falls away.

Fig. 185. PE-ZI'-ZA RE-PAN'-DA. Photo from specimens collected at Columbus, Ohio. Arthur L. Smith.

ANOTHER PEZIZA.

Arthur L. Smith.

Peziza repanda Wahl. is a small, rather inconspicuous fungus growing on old wet logs. Specimens were found May 11, 1906, on an old elm log in the O. S. U. woods. In the dark, moist woods, one sees only a group of light, fleshy fungi; but taken out into the sunshine, they become remarkably beautiful objects. The cups are translucent, and the sunshine gives them a delicate golden brown. This, with the purplish brown color of the dry cup rims, produces an effect highly artistic.

When first distinguishable, the future cup is a tiny white knot on the surface of the log. This grows, so that soon a hollow sphere, with an

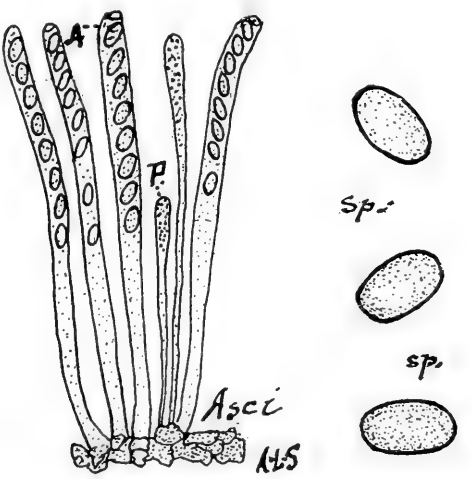

Fig. 186. Pe-zi'-za re-pan'-da. Magnified sketch of a portion of the fruiting layer (inner portion of cup)—showing *asci* accompanied with *paraphyses* and three spores very highly magnified.

opening at the top, is produced. But soon this begins to flatten and expand laterally, at last producing an irregular flattened disk with small upturned edges. The disks are irregular in outline. In diameter they vary from 2—6 cm. On the outside of the cup is a scurfy white layer. The remainder is a fleshy tint. In drying the tissue becomes darker, and may even reach a purplish brown. The exposed edges dry out and change color first, then later the whole plant goes through the same change.

There are two primary layers in the structure of the Pezizas; the inner fruiting layer or hymenium, and the outer sterile tissue. This latter is composed of several more or less distinct parts, whose names would only add to our burden. On the arrangement and structure of these sterile layers, the classification is largely based. E. J. Durand, of Cornell, the authority on fleshy Discomycetes, has largely extended the use of these characters.

On the hymenial surface are borne the asci, or large mother cells of the spores, and a few sterile paraphyses, or accessory hairs. In these specimens the latter are few, very much less numerous than in the other

Pezizas examined. They are also shorter than the average of other species. The asci are quite large, 270x12 mic. In each are eight spores, which are discharged when ripe, at the free end. These spores are smooth, thin-walled, hyaline, and non-nucleate. Size 14x9 mic.

Some young specimens observed from May 11 to May 25 discharged spores during that time. The spores are often seen as little white clouds hanging above the cups. This phenomenon was often seen several times daily during the whole period. The immense number of spores given off by each Peziza can be more easily imagined than expressed.

Explanation of the figures.—The half-tone fig. 185 represents several plants natural size. Two above are immature—the cups scarcely open. The others show various forms assumed on maturity. Fig. 186 gives in outline, much magnified, several asci with spores, intermingled with which are two paraphyses; three spores are shown still more highly magnified.

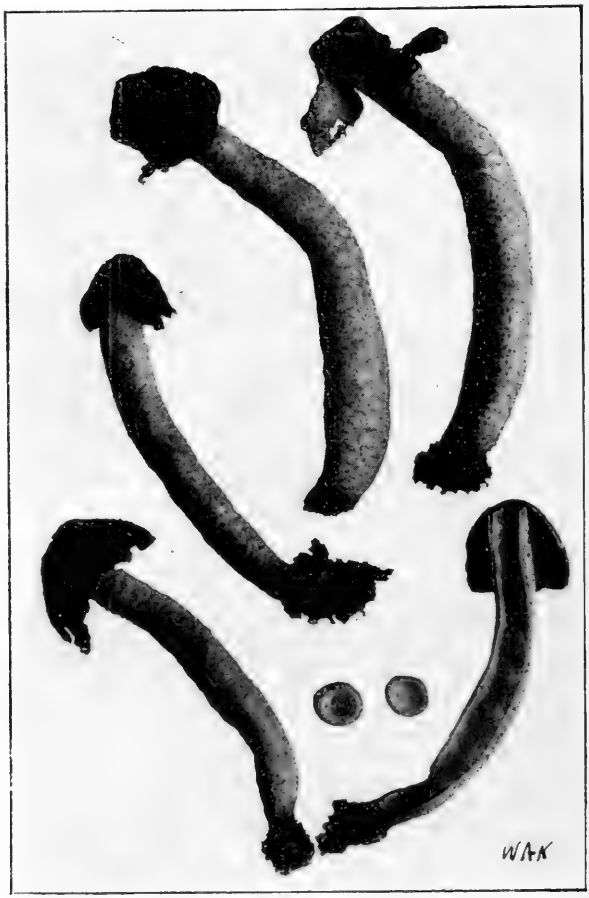

Fig. 187. VER'-PA DIG-I-TAL-I-FOR'-MIS. Photo from specimens collected at Lancaster, Ohio, by Miss Hyde. See text for fuller explanation.

NOTES ON A VERPA.

Edith Hyde, Lancaster, O.

The interesting fungus shown in Fig. 187, called by the botanists *Verpa digitaliformis*, was found north of Lancaster, in a cool, moist and shady ravine early in May. The color of its pileus, or cap, is a kind of olive-umber, while the stem is nearly white, with a very slight reddish tinge. The pileus is campanulate, or bell-shaped, ½—¾ in. high, fitting over the stem, but not attached except at the very top. Its surface has the characteristic smoothness of the *Verpas*. The stem appears smooth to the naked eye except for the few reddish rootlike shreds found at the base. It is filled with a loosely fibrous pith. It is about 3—4 in. high, and one-third to three-quarters inch thick.

The asci are long, regular, colorless cells, situated on the under side of the cap. Each ascus produces eight spores within. Figure 188 shows four of these asci, one of which is spontaneously breaking open at the end in the characteristic manner and thus liberating the spores. The spores are elliptical and almost free of the granular contents, so conspicuous in the spores of some genera of fungi.

This species is edible according to the mycophagists, and resembles the Helvella in its delicacy. It is said to be on sale in the markets in Italy. It was named by Persoon, an eminent European botanist, a century ago. He gave it the name *digitaliformis* (meaning finger) because suggestive of the shape of the pileus, which fits like a thimble over the stem. The generic name *Verpa* (meaning a rod) was probably given to the genus because of the prominence of the rod-like stem.

This mushroom belongs to the family *Helvellaceae*. This family includes four important genera, which may be divided into two groups.

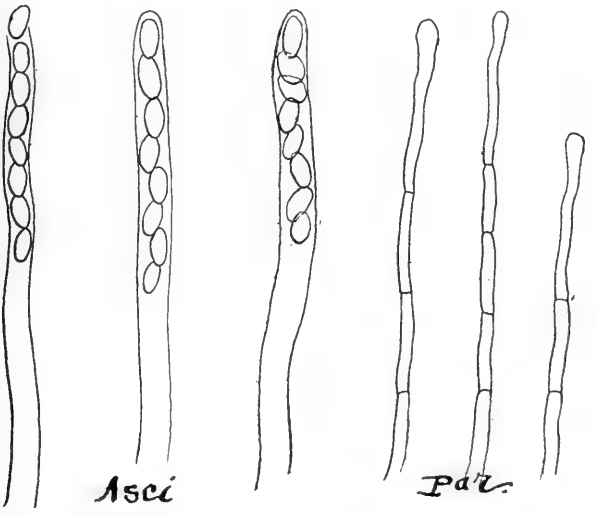

Fig. 188. VER'-PA DIG-I-TAL-I-FOR'-MIS. A sketch of *asci* with *spores*, also *paraphyses* highly magnified.

The first, including the *Helvella* and the *Verpa,* is characterized especially by the pileus or cap being free from the sides of the stem. The second group, including the *Morchella* and *Gyromitra,* has the pileus entirely attached to the stem. These genera need not be confused, since the *Helvella* has a drooping pileus, irregularly lobed or waved, while the *Verpa* has the drooping pileus but comparatively smooth and with an entire margin. The *Morchella,* on the other hand, has the pileus attached to the stem and covered with deep irregular pits, while the *Gyromitra,* also attached, is composed of rounded, variously contorted folds.

Explanation of figures:—The accompanying half-tone is a life size reproduction from a photograph of five of the specimens. The one in the upper right hand corner is old with a split and ragged pileus; the one just below it is a vertical section, showing the pithy contents of the stem. The two circles in the middle below are cross-sections of the stem. The outline sketches, Fig. 188, represent asci and paraphyses; one ascus is broken open to discharge the spores. The paraphyses or slender cells accompanying the asci have septa, or cross-walls, which is not a common characteristic. The plants in the half-tone are represented natural size; the outline figures of asci, paraphyses and spores are highly magnified.

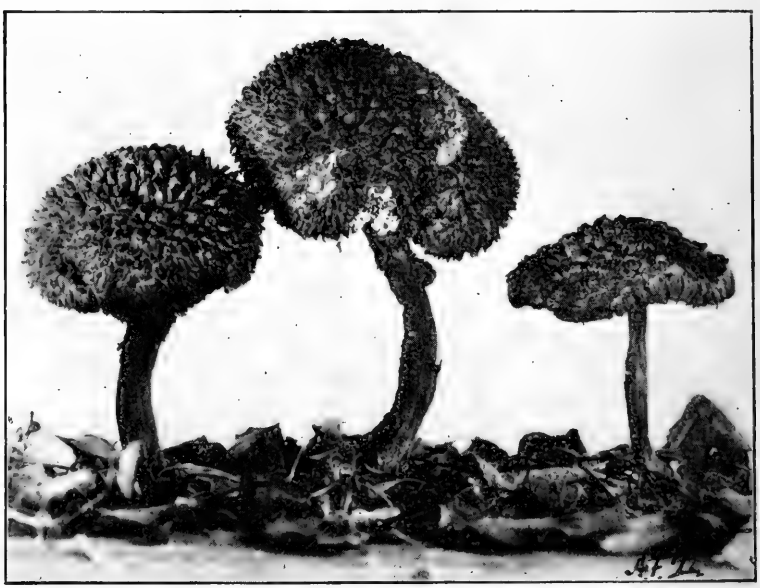

Fig. 189. STRO-BI-LOM'-Y-CES STRO-VI-LA'-CE-US. A mushroom belonging to the family BO-LE-TA'-CE-AE—having pores on the under side of the cap somewhat similar to a *Polypores.* The peculiar wart-like tufts give it a strange aspect and seen in the field or open woods it would never be mistaken. This half-tone from a photograph taken in the winter by Mr. A. F. Lane, Milwaukee, Wisconsin, illustrates the appearance of a preserved dry specimen.

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W. A. KELLERMAN, Ph. D. OHIO STATE UNIVERSITY

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Nos. 61-62

W. A. Kellerman, Ph. D., Ohio State University

Columbus, July, 1906

EDITOR'S NOTES.

SETTLED.—The prolonged consideration of the postal status of the BULLETIN is happily terminated as the second-class entry note on the cover indicates. We had always considered our matter *second class* but the authorities were disposed to rate it higher! But the red tape has all been unwound and we can mail the BULLETIN hereafter without embarassment.

FIGURES AND TEXT.—Some variation in matter as well as illustrations will be seen—for example we have drawn on Professor Atkinson's excellent book for a note on the uses of Mushrooms; then the peculiar growths on the common Hackberry tree are illustrated—where a fungus (though not called a Mushroom) is concerned as one of the causes.

THE FUNGUS OF THE HACKBERRY BRANCH-KNOT.—The Witches' Brooms, as they may be called, which are so common on the Hackberry tree, illustrated in Figs. 193 and 194, are caused by a mite (of the genus *Phy-top-tus*) and a Leaf-Mildew fungus associated. The distortion consists of multiplied branchlets due to the irritation of the two organisms. The explanation under the cuts (especially under Fig. 192) is perhaps all that is needed at present.

AN INTERESTING CORDYCEPS.

M. E. Hard.

CORDYCEPS is from a Greek word meaning a club and a Latin word meaning a head. This is a genus of Pyrenomycetous fungi of which a few grow upon other fungi and grasses but by far the greater number are parasitic upon insects or their larva. The larva stage suffers most frequently from the parasitic fungi.

There are two species of Cordyceps found in the woods or wooded places of great interest to the mycologist. They are parasitic on Elaphomyces which are truffle-like growths found in soils. They are Cordyceps ophioglossoides, Adder's Tongue Cordyceps and Cordyceps capitata. The potato-like growth upon which they are found and the form of the fruiting body as indicated by their specific names, will clearly identify them.

Plant lice and flies suffer from attacks of fungi. The common house fly will frequently be seen hanging to the window pane surrounded by a visible halo of fungus spores which have been thrown from the fungus sacs and caught on the glass. A great portion of which were thrown into the

air where they float about until they come into contact with other flies. When a spore comes in contact with a healthy fly a fungus thread is produced which soon makes its way to the inside and continues to branch and grow till it kills the fly when it comes to the surface and forms a new crop of spores.

One of the most interesting group of parasitic fungi are the beetle fungi. They are extremely small and can only be seen by a strong lens. They are found on the legs of the water beetles and usually found on a certain joint of one leg. This localization is accounted for on the ground that plant sexes are often formed on different plants so sexual cells of fungi may be brought in contact by the breeding acts of the insects.

Fig. 190. Cor'-dy-ceps her-cu'-le-a. Giant Caterpillar Fungus. See text for explanation. M. E. Hard, Chillicothe, Ohio.

The caterpillar fungus is the most common and presents many interesting features because of its ability to produce a variety of spores, each specialized for a definite purpose. Spores may be produced upon fruiting bodies similar to figure 190. As soon as a spore falls upon a caterpillar it germinates, sending out germ-threads in the body cavity. Here these germ-threads form new spores which move freely in the fluid of the caterpillar. These spores germinate until the entire body cavity and muscle fiber are thoroughly permeated by mycelium threads. These threads continue to branch and grow until they have absorbed all the larva's soft parts, retaining not only the external form of the caterpillar but also the internal form of

its organs. It is a complete fac-simile of the larva made up of fungus growth. This may be called a resting or storage organ. This requires time to ripen. It may send up an orange-colored club-shaped body as in figure 190 or it may produce a dense growth of threads resembling a small ball of cotton and from these threads another kind of spores is produced. This new kind of spore affects the larva in the same way as the kind already described. The caterpillar will continue to move sluggishly for some distance after it has been thus infected. The caterpillar fungus is of great economic value for thousands of larvae are killed in this way every year.

One of the largest forms of the caterpillar fungi is Cor'-dy-ceps her-cu'-le-a Schw. An excellent representation is given in the half tone. figure 190. It is called *herculea* because of its large size. The species can be readily identified from this cut. It grows from the body of a large white grub found on rotten wood. A perfect form of the grub is retained yet every bit of the larva has been coverted into fungus starch for storage material.

The plant is quite large, clavate in form, head oblong, round, slightly tapering upward with a decided protuberance at the apex as will be seen in the half tone. The head is a light yellow in all specimens I found, not alutaceous as Schweinitz states, nor is the head obtuse. They are found in August and September.

USE OF MUSHROOMS.

Geo. F. Atkinson, Cornell University.

Another very favorable indication accompanying the increasing interest in the study of these plants, is the recognition of their importance as objects for nature study. There are many useful as well as interesting lessons taught by mushrooms to those who stop to read their stories. The long growth period of the spawn in the ground, or in the tree trunk, where it may sometimes be imprisoned for years, sometimes a century, or more, before the mushroom appears, is calculated to dispel the popular notion that the mushroom "grows in the night." Then from the button stage to the ripe fruit, several days, a week, a month, or a year may be needed, according to the kind, while some fruiting forms are known to live from several to eighty or more years. The adjustment of the fruit cap to a position most suitable for the scattering of the spores, the different ways in which the fruit cap opens and expands, the different forms of the fruit surface, their colors and other peculiarities, suggest topics for instructive study and observation. The inclination, just now becoming apparent, to extend nature study topics to include mushrooms is an evidence of a broader and more sympathetic attitude toward nature.

A little extension of one's observation on the habits of these plants in

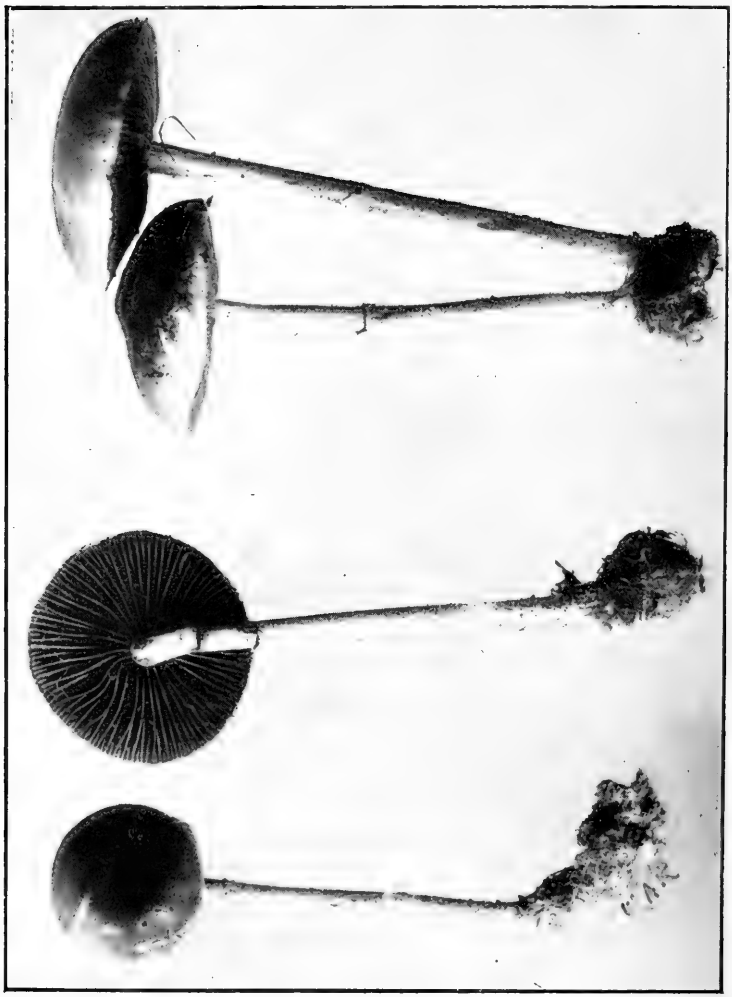

Fig. 191. PA-NAE'-O-LUS CAM-PAN-U-LA'-TUS.—See explanation at bottom of the page.

PA-NAE'-O-LUS.—This a genus of black-spored Agarics, somewhat resembling the species of Coprinus, but the gills not deliquescing or dissolving into ink as in case of the latter genus. The pileus is somewhat fleshy or thin and the margin even (not striate). The genus is further characterized as having gills not uniform in color, being clouded or spotted with black or brown colors, the edges of the gills often white in contrast. The stem is usually smooth.

The species shown on this page was collected near Columbus, Ohio; it grew from old horse dung in a pasture, the plants being few and scattered. McIlvaine says he has "several times eaten of this fungus in small quantities, because larger could not be obtained, and with no other than pleasant effect." But he advises caution because a case of poisoning from eating this species was reported in 1816 in the London Medical and Surgical Journal.

the woods will reveal the fact that certain ones are serious enemies of timber trees and timber. It is quite easy in many cases for one possessing no technical knowledge of the subject to read the story of these "wood destroying" fungi in the living tree. Branches broken by snow, by wind, or by falling timber provide entrance areas where the spores, lodging on the heart wood of broken timber, or on a bruise on the side of the trunk which has broken through the living part of the tree lying just beneath the bark, provide a point for entrance. The living substance (*protoplasm*) in the spawn exudes a "juice" (*enzyme*) which dissolves an opening in the wood cells and permits the spawn to enter the heart of the tree, where decay rapidly proceeds as a result. But very few of these plants can enter the tree when the living part underneath the bark is unbroken.

These observations suggest useful topics for thought. They suggest practical methods of prevention, careful forestry treatment and careful lumbering to protect the young growth when timber trees are felled. They suggest careful pruning of fruit and shade trees, by cutting limbs smooth and close to the trunk, and then painting the smooth surface with some lead paint.—Mushrooms, Edible, Poisonous, etc.

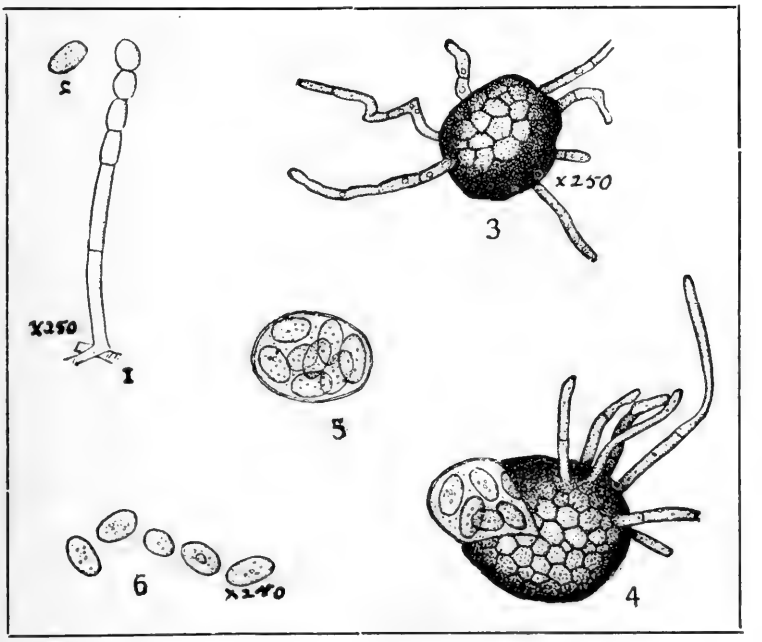

Fig. 192. Magnified figures of portions of the Leaf-mildew Fungus that causes (in conjunction with a mite) the Branch-knots or distortions on Hackberry trees, similar to Witches'-brooms, the latter shown in Figs. 193 and 194. Minute *spores* are shown at 1 and 2 which are produced early in the season, and later minute, scarcely visible, black spore-cases (shown at 3 and 4) are formed; these contain sacs (*asci*) of spores—eight in each sac or asceus (shown at 5); spores escaped from the asceus are shown (at 6). The botanical name of this microscopic fungus is *Sphae-ro-the'-ca phy-top-toph'-i-la.*

Fig. 193. Branch-knot or Witches'-broom of the Hackberry tree, caused by a small mite and a microscopic fungus.

NOTES FROM MUSHROOM LITERATURE. II.

W. A. Kellerman.

The Veteran American Mycologist, Professor Charles H. Peck, Albany, N. Y., describes several *new species* of Mushrooms, in the February No. of the *Bulletin of the Torrey Botanical Club* (1905). They are as follows:

Lepiota maculans Peck; found in September at St. Louis, by Dr. N. M. Glatfelter. Prof. Peck adds: This is a small but pretty species, easily known by the flesh of both pileus and stem changing to a reddish color where wounded and by the lamellae assuming a reddish or pink color with age or in drying.

Mycena denticulata Peck; St. Louis, August, Dr. Glatfelter. Pileus 12-20 mm. broad; stem 5-7 cm. long, 1-2 mm. thick.

Pleurotus umbonatus Peck, on the ground, Kittanning, Pa., D. R. Sumstine.

Lactarius sumstinei Peck; grassy places in open woods, Kittanning, Pa., Prof. Peck says this is related to such species as *Lactarius fuliginosus, L. gerardi* and *L. lignyotus;* but it may be separated from the first by its unchangeable milk and its more distant lamellae, and from the others by its acrid taste.

Marasmius sutliffae Peck; collected on lawn in shady places, Sacramento, California, by Miss M. L. Sutliff, who says that in a test of its edible qualities, she found that cooking seemed to intensify its bitter flavor and make it rival that of quinine.

Panus meruliiceps Peck; on trunks of elm trees, collected by Dr. Glatfelter, St. Louis, Mo.

Flammula multifolia Peck; on decaying wood in ravines. Dr. N. M. Glatfelter, St. Louis, Mo.

Cortinarius braendlei Peck; among fallen leaves in woods, Washington, D. C., collected by F. J. Braendle.

Cortinarius morrissii Peck; moist shaded places under hemlock trees, at Ellis, Mass., August to October; collected by G. E. Morris.

Stropharia schraderi Peck; in sandy, grassy soil about stumps, Washington, D. C.; collected by F. F. Schrader.

Psathyra multipedata Peck; densely cespitose, forming tufts of many individuals, in grassy ground, St. Louis, Mo., N. M. Glatfelter.

Geopyxis nebulosioides Peck; on decorticated wood, Canada, J. Macoun.

The North American species of Marasmius.— Prof. A. P. Morgan has printed in the *Journal of Mycology* a monograph of this genus which students find very useful. The author is one of our leading mycologists and he has for some time devoted much attention to the species of *Marasmius.* He enumerates 162 forms and also adds 6 species of *Heliomyces.* The latter are tremelloid when fresh and growing, but dry they have the appearance of species of Marasmius. No doubt (Prof Morgan says) some tropical species of *Mycena* and *Marasmius* described from the dried specimens belong properly in Heliomyces. The species of Marasmius are grouped under several sections, and under these divisions are made in a synoptical manner, so that the student who undertakes the study of this interesting group has his labors lightened by the reason of the descriptive head-lines. The morograph can be obtained in pamphlet form as a reprint from the *Journal of Mycology.*

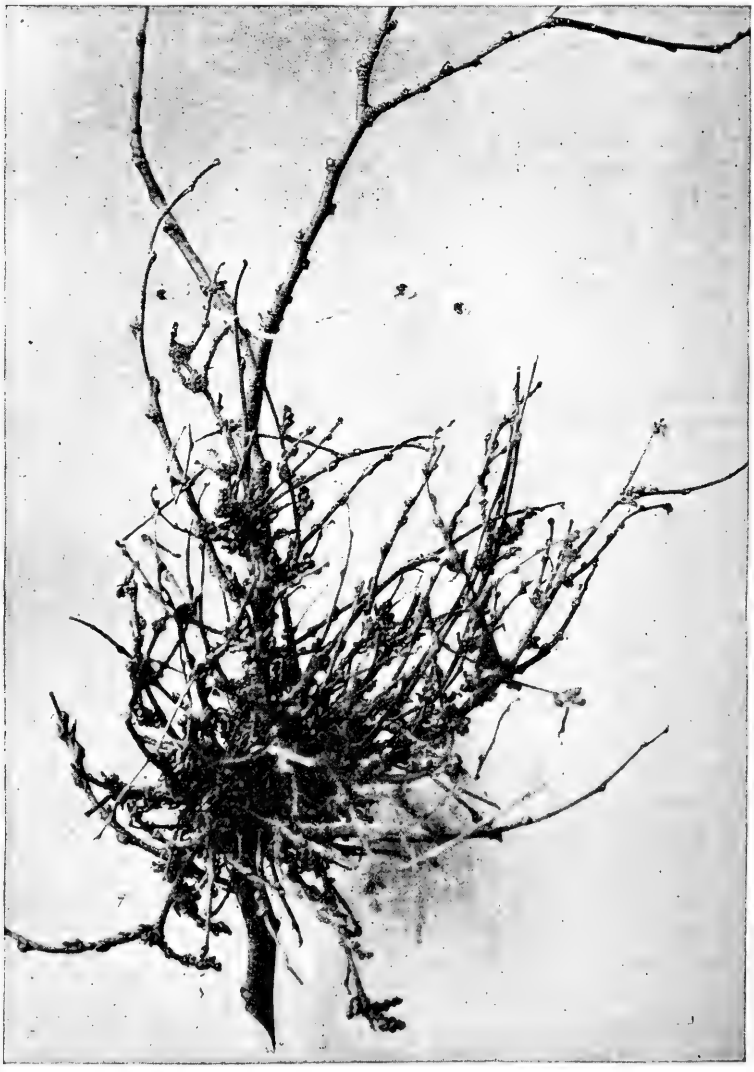

Fig. 194. Branch-knot or Witches'-broom of the Hackberry tree—similar to that shown in Fig. 193, but photographed in the winter when the tree was destitute of leaves. See explanation in the text, also under Fig. 192, where the fungus is illustrated.

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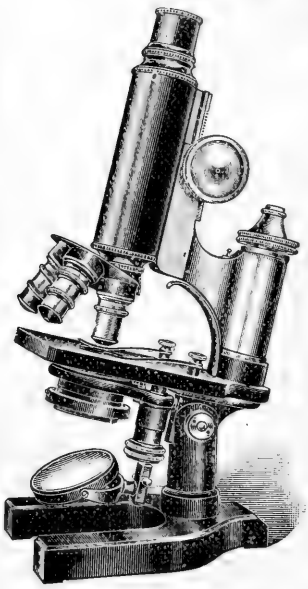

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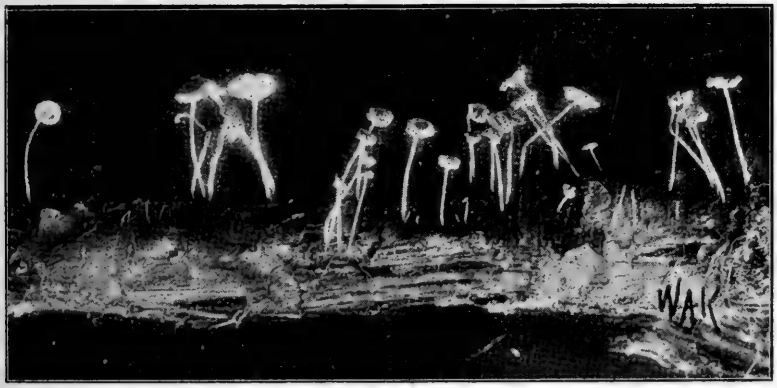
VOL. IV. AUGUST, 1906 NOS. 63-64

MYCOLOGICAL BULLETIN

W. A. KELLERMAN, Ph. D. OHIO STATE UNIVERSITY



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Mycological Bulletin

Nos. 63-64

W. A. Kellerman, Ph. D., Ohio State University

Columbus, August, 1906

BY WAY OF EXPLANATION.

We are favored again with a short article by Superintendent Hard and are able to reproduce one of his photographs illustrating the subject.

We have to thank also Professor Atkinson, whom we draw upon again for some interesting statements as to the uses of Mushrooms, which he has published in his excellent book, Mushrooms, Edible and Poisonous.

Other Figures which we present are a neat little *Marasmius*, which we do not want to eat, but do want to look at (beauty is its own excuse for being). Then the *Mycena* follows—another charming little plant of the woods; the *Pluteus cervinus*, which we have once before illustrated, all ought to know (it has pinkish gills, the color deepening after the cap has expanded for a time—they are white at first; the stem can be easily twisted out of a socket-like cavity)—this medium-sized Mushroom being one among the best edible species; then the last page shows one of the Puffballs—*Sclerodcrma* as it is called rightly, because it has a *hard* wall or covering.

CORRECTION.—A regrettable mistake in regard to placing one of the illustrations in the last number was made, and readers are therefore requested kindly to change the name Panæolus campanulatus (Fig. 191) to *Stro-pha'-ri-a sem-i-glo-bo'-sa.* The correct half-tone of Panæolus campanulatus will be given in a future number.

A WORD ABOUT PLEUROTUS ULMARIUS

M. E. Hard.

Columbus, Ohio, August, 1906.

The pileus is from two to fourteen inches across, obtuse, smooth, sometimes scaly, very white within, compact, thick, sometimes inclined to be marbled with livid spots, moist, margin smooth or even.

The gills are adnate, sometimes slightly decurrent, sometimes slightly notched, somewhat crowded, bread, white or whitish.

The stem is often eccentric, two to three inches long, one inch thick, usually curved as in the figure, solid, firm, thickened at the base, smooth, sometimes tomentose, especially at the base. The spores are nearly round, the diameter being .0002 in.

This plant usually grows on elm logs yet I have found it on hickory

logs and stumps. It is very meaty and sweet, one of our best mushrooms to eat. It sometimes grows very large and one plant will make several meals.

It is a later grower than the oyster mushroom. I have never found it till late in the summer and in the fall. It is frequently found in the cities where the elm trees have ben trimmed or injured.

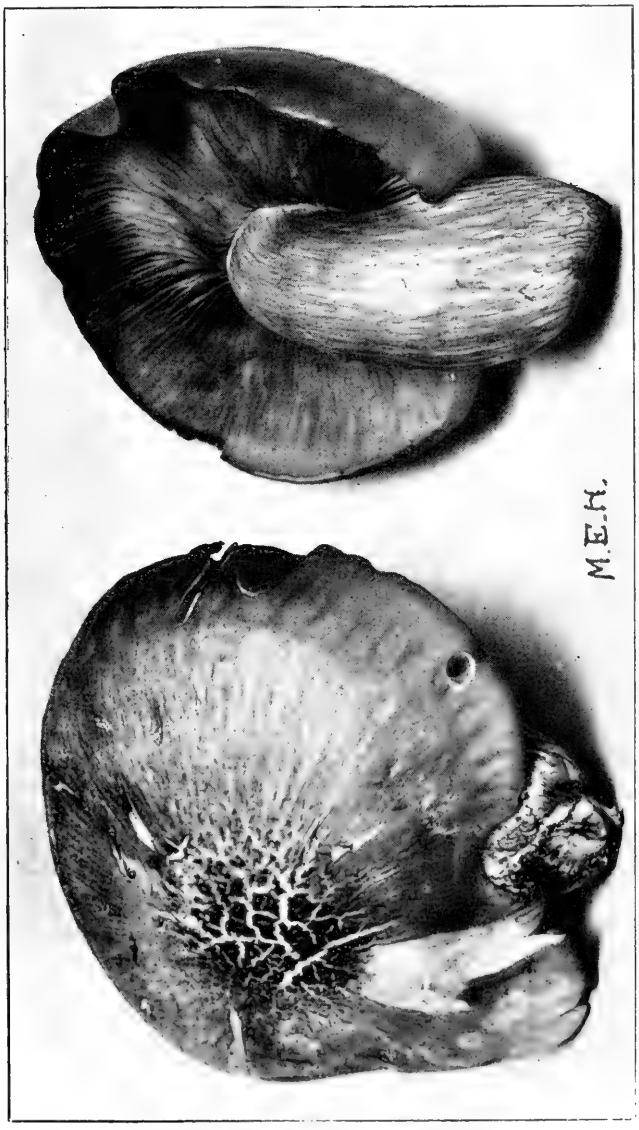

Fig. 195. P EU-RO'-TUS UL-MA'-RI-US. For explanation see Supt. Hard's article.

NOTES FROM MUSHROOM LITERATURE. II.

W. A. Kellerman.

MUSHROOM REPORT FROM SWITZERLAND.—In the report of the Botanical Garden and Museum of Zurich, Switzerland, for 1904, an account is given of the sale of Mushrooms in the market of that city. Sale can be made only upon authorization, and 666 permits were granted during the season. The greatest sale was on the 27th of September, on which day 40 permits were granted for the sale of 8 species. Six interdictions were served on sellers who offered the folowing poisonous or spoiled Mushrooms: Amanita muscaria, Lactarius rugis, Lactarius piperatus, Boletus edulis and Clavaria flava.

The amount sold reached 5,000 k. The species were the following: Lactarius deliciosus, Amanita cæsarea, Agaricus campestris, Hydnum coralloides, Boletus badius (?), Boletus aurantiacus (?), Boletus edulis, Lactarius volemus, Lactarius piperatus, the Morelle, Lepiota procera, Pluteus cervinus (?), Polyporus sulfureus, Russula sp., Lycoperdon sp., Hydnum repandum, Craterellus cornucopioides and Tuber cibarium.

The reviewer who furnished the above items says in substance the following by way of general comment: It would be very useful to have similar statistical tables systematically made in all the more important cities. One would then have data for a report on the geographical distribution of the edible Mushrooms, and at the same time information as to the quantity consumed. It may be remarked also that it is imperative in reports of this kind, to designate the species by their Latin names as well as by their common names; foreigners could then without difficulty identify the species—often a task, or impossible, if only the common name is given.

MUSHROOMS SOLD AT NANTES.—A list of species of Mushrooms sold

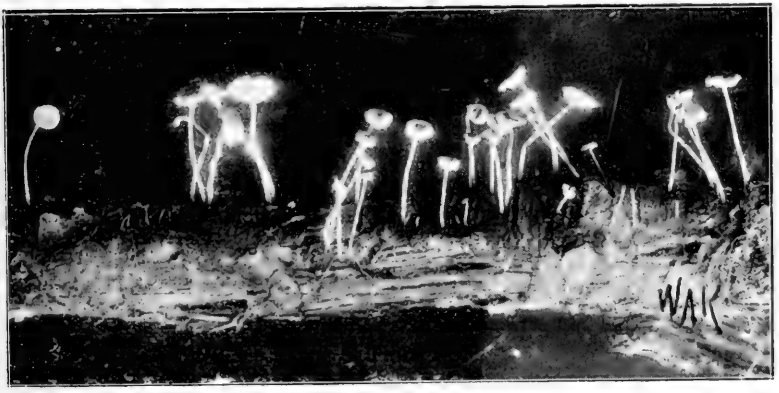

Fig. 196. MA-RAS'-MI-US RA-ME-A'-LIS. One of the many beautiful species of an interesting genus of plants. The specimens were collected by Supt. Hard, Chillicothe, Ohio.

at Nantes, France, in 1905, furnished by M. Baret, is as follows: Amanita cæsarea, Lepiota procera, Lepiota rhacodes, Lepiota excoriata, Lepiota pudica, Psalliota pratensis, Psalliota sylvatica, Psalliota bernardii, Clitopilus orcella, Marasmius oreades, Lentinus tigrinus, Tricholoma personatum, Clitocybe laccata, Boletus edulis, Boletus æstivalis, Boletus æreus, Boletus scaber, Boletus scaber var. aurantiacus, Boletus luteus, Fistulina hepatica, Hydnum repandum, Craterellus cornucopioides, and Lycoperdon giganteum.

The Genus Cortinarius.—Some excellent work has been done on this genus by C. H. Kauffman, at Cornell University, during the past three seasons, the results of which in part are published in the Bulletin of the Torrey Botanical Club for June, 1905. In a future number we propose to refer more fully to the article and will here only reproduce the descriptions of a few of the new species therein contained. These pertain to interesting plants. Mr. Kauffman says it is absolutely useless to pick up an old dried specimen of Cortinarius and ask any one to recognize it. In the majority of cases old plants of different species look so much alike that it is mere guessing to say anything about them. The first thing to remember (he says) is that young, unexpanded plants must be examined as well as mature ones. Next, a careful description must be made *with special reference to the color of the gills of the young* plants. But the remaining space must be given to some of his new species—these model descriptions being as follows:

Cortinarius sterilis *Kauffman n. sp.*—Pileus 1.5—4.5 cm. broad, suborbicular when young, then convex-expanded, margin incurved, drab, drab-gray to olive-buff [Ridgeway's Nomenclature], even, smooth, *viscid*, somewhat umbonate at times, flesh white, soft, thin. Gills relatively broad, 4.6 mm., drab-gray (Ridg.) at first, then light cinnamon, rounded behind, then emarginate, not at all ventricose, rather crowded; edge serrulate and white, later eroded, *provided with sterile cells*. Cortina white or sordid. Stem 4 to 8 cm. long, 4-6 mm. thick at base 10 mm., hence clavate or tapering upward, solid, spongy, dingy-white, tinged towards apex with light blue, clothed when fresh with the delicate patches of the *viscid*, universal veil, which is of the same color as the pileus, within pale bluish at apex, white below. Spores 6-7x5-6.5 mic., subsphæroid, rather smooth. Plants slender.

Cortinarius cylindripes *Kauffman n. sp.*—Pileus 3-7 cm. broad, *very glutinous at first* and shining, later opaque, at the very first lavender, then yellowish with a violaceous tinge, at length becoming brownish-ochraceous, with the appearance of being stained with these colors at various stages, obtusely orbicular when young, then campanulate and expanded, rather small in comparison with the length of the stem; margin incurved and pellucid-striate; surface smooth, at length longitudinally wrinkled. Flesh thick on disk, thin elsewhere, violaceous, soon dingy white. Gills rather broad, at length 5/8 mm., adnate, emarginate, not attenuate toward margin of pileus, *violaceous or lavender when young*, becoming pale cinnamon, not crowded, thin, edge serrulate and paler, somewhat wrinkled at the sides but not veined. Stem 8-10 cm. long, 5-9 mm. thick, elastic, *remarkably equal*, covered by a violaceous, *glutinous*, universal veil which sometimes remains as evanescent patches and at its junction with the partial veil as a slight annulus, smooth or fibrillose-striate at apex, violaceous or dingy-white within, solid or stuffed; *entire* stem usually a beautiful pale, azure blue. Spores 12-1 x6.5-8 mic., slightly tuberculate; basidia about 10 mic. long.

Gregarious, rarely cespitose. Entire plant is soft and quickly decays.

Related to *C. clatior*, from which it differs in its equal stem, which is never scaly and is always violaceous to blue; the gills are lavender when young and the whole plant is very viscous.

CORTINARIUS OLIVACEO-STRAMINEUS *Kauffman n. sp.*—Pileus 4-7 cm. broad, viscid from a gelatinous cuticle, broadly convex, slightly depressed in the centre when expanded, margin incurved for some time, *pale straw-yellow with an olivaceous tinge,* slightly rufous-tinged when old, smooth or silky-fibrillose, disk sometimes covered with minute squamules, shreds of the partial veil attached to the margin when expanded. Flesh *very thick,* becoming abruptly thin toward the margin, white, dingy-yellowish in age, *soon soft and spongy.* Gills rather narrow, 7 mm. broad, sinuate-adnexed, whitish at first, then pale cinnamon, crowded, edge serratulate and paler. Stem 6-8 cm. long, 5-12 mm. thick, with a slight bulb when young, from whose margin arises the dense partial veil; white and very pruinate above the veil, which remains as dingy fibrils stained by the spores, spongy and *soft* within, becoming somewhat hollow. Veil white with an olive tinge. Spores 10-12 x 5.5-6.5 mic., granular within, almost smooth. Odor agreeable.

To be placed under the division *"scaurus"*, where it comes near *C. herpeticus* Fr., but the gills when young are never violet-tinged.

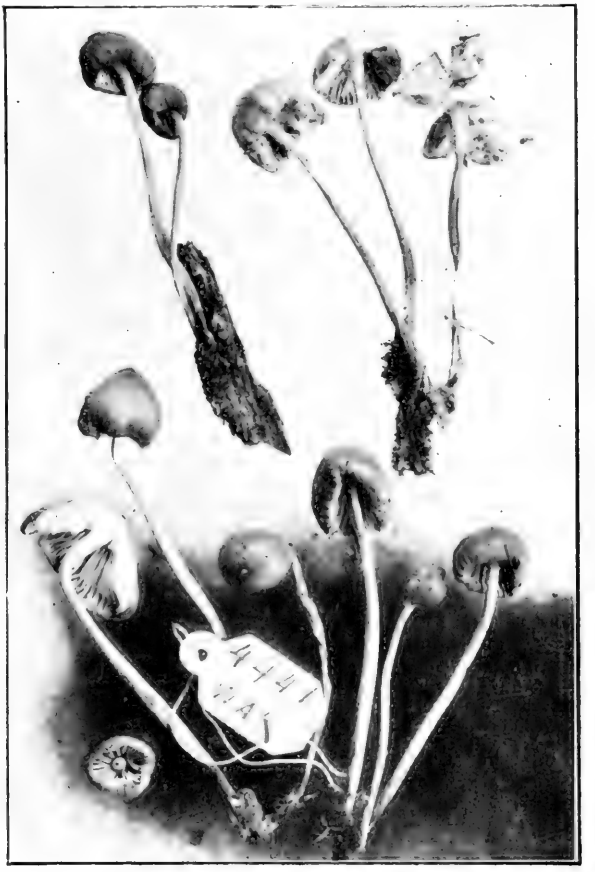

Fig. 197. MY-CE'NA GA-LER-IC-U-LA'-TA. Little plants that grow on rotten wood in shady, moist places; common and abundant throughout the season. Said to be edible.

Fig. 198. PLU'-TE-US CER-VI'-NUS. Edible. A rosy-spored Agaric, without volva or annulus; common and widely distributed, growing on rotten wood under the ground, on stumps, and still more abundant on old piles of sawdust. The specimens from whihc the half-tone was made were collected at Chillicothe, Ohio.

USES OF MUSHROOMS.

Geo. F. Atkinson, Cornell University.

While we are thus apt to regard many of the mushrooms as enemies to the forest, they are, at the same time, of incalculable use to the forest. The mushrooms are nature's most active agents in the disposal of the forest's waste material. Forests that have developed without the guidance of man have been absolutely dependent upon them for their continued existence. Where the species of mushrooms are comparatively few which attack living trees, there are hundreds of kinds ready to strike into fallen timber. There is a degree of moisture present on the forest floor exactly suited to the rapid growth of the mycelium of numbers of species in the bark, sap wood, and heart wood of the fallen trees or shrubs. In a few years the branches begin to crumble because of the disorganizing effect of the mycelium of the wood. It gradually passes into the soil of the forest floor, and is made available food for the living trees. How often one notices that seedling trees and shrubs start more abundantly on rotting logs.

The fallen leaves, too, are seized upon by the mycelium of a great variety of mushrooms. It is through the action of the mycelium of mushrooms of every kind that the fallen forest leaves, as well as the trunks and branches, are converted into food for the living trees. The fungi, are, therefore, one of the most important agents in providing available food for the virgin forest.

The spawn of some fungi in the forest goes so far, in a number of cases, as to completely envelope those portions of the roots of certain trees as to prevent the possibility of the roots taking up food material and moisture on their own account. In such cases, the oaks, beeches, horn-beams, and the like, have the younger parts of their roots completely enveloped with a dense coat of mycelium. The mycelium in these cases absorbs the moisture from the soil or forest floor and conveys it over to the roots of the tree, and in this way supplies them with both food and water from the decaying humus, the oak being thus dependent on the mycelium. In the fields, however, where there is not the abundance of humus and decaying leaves present in the forest, the coating of mycelium on the roots of these trees is absent, and in this latter case the young roots are provided with root hairs which take up the moisture and food substances from the soil in the ordinary way.

The mushrooms also prevent the forest from becoming choked or strangled by its own fallen members. Were it not for the action of the mushroom mycelium in causing the decay of fallen timber in the forest, in time it would be piled so high as to allow only a miserable existence to a few choked individuals. The action of the mushrooms in thus disposing of the fallen timber in the forests, and in converting dead trees and fallen leaves into available food for the living ones, is probably the most important role in the existence of these plants. Mushrooms, then, are to be given very high rank among the natural agencies which have contributed to the good of the world. When we contemplate the vast areas of forest in the world we can gain some idea of the stupendous work performed by the mushrooms in "house cleaning," and in "preparing food" work in which they are still engaged.

—*Mushrooms, Edible, Poisonous, Etc.*

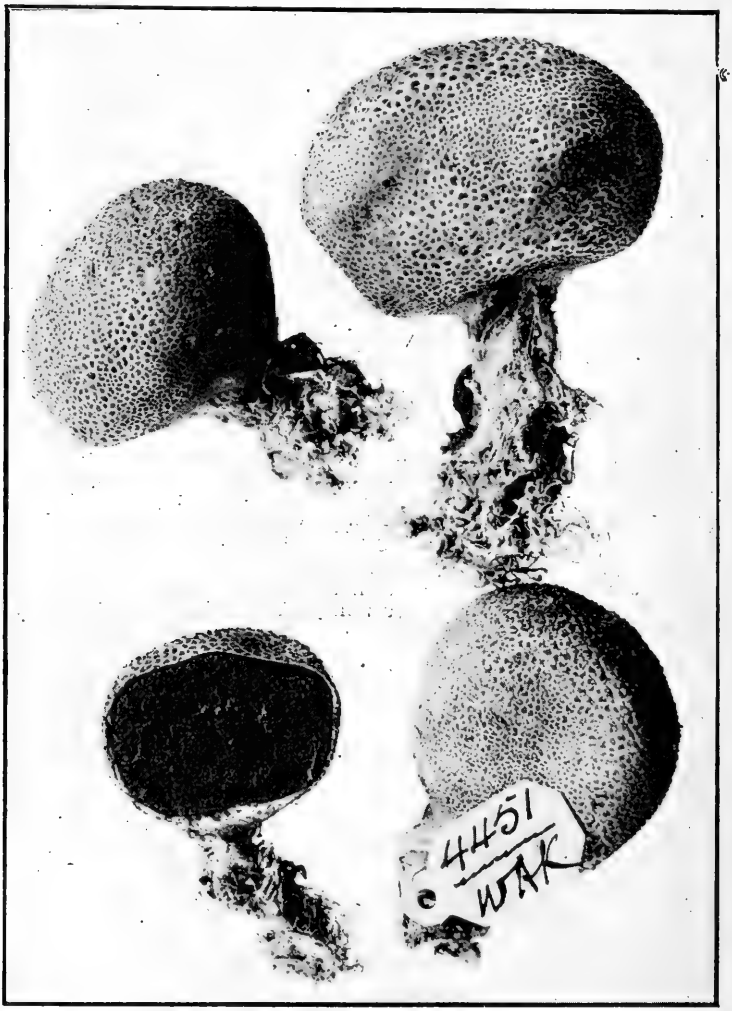

Fig. 199. SCLER-O-DER'-MA VUL-GA'-RE.. A puff-ball with a firm, corky, warty wall or covering, growing in sandy soil or clay, in sheltered places, seldom on wood. The plants from which the photo was made were collected at Columbus, Ohio. This species is widely distributed, occuring in Europe, Africa, and Australia as well as in North America. It was known to the early botanists and has been repeatedly renamed, the following being some of the synonyms: *Lycoperdon cervinum, L. aurantiacum, L. tessellatum, Scleroderma citrinum, S. aurantiacum.*

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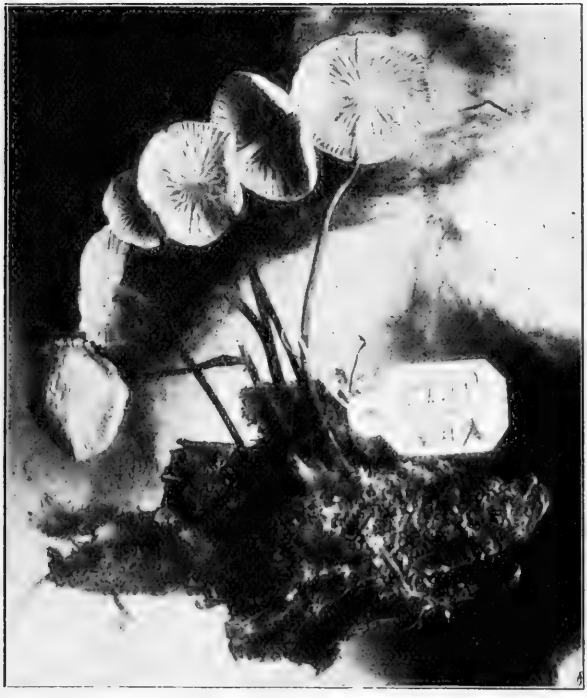
MYCOLOGICAL BULLETIN

W A. KELLERMAN, Ph. D. OHIO STATE UNIVERSITY



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Mycological Bulletin

Nos. 65-66

W. A. Kellerman, Ph. D., Ohio State University
Columbus, September, 1906

A WORD OR TWO BY THE EDITOR.

Our coadjutors who have made it possible to issue a very interesting Number have our special thanks—and others are also urged to make contributions in the way of short articles, notes, specimens, and photographs.

The note on Spore discharge of Bulgaria is interesting, and others will doubtless test the conclusion which O. E. Jennings has announced, namely, that the factor inducing it is alternate expansion and contraction of the spore bearing surface, due to varying degrees of heat, and that a varying moisture content can, at least, be of but secondary importance.

In Mushroom Literature we have given much space to the nice work of Gertrude E. Douglas on the rate of growth of one of the common mushrooms. Much is said by people on "Mushroom Growth," yet I think little exact knowledge can be claimed. Miss Douglas has set an example for others to imitate in this matter. We continue also to press Professor Atkinson into service—but his book on Mushrooms is full of good things and we therefore do not promise to refrain from "copying" again in the future. These suggestions on the uses of mushrooms should be read the second time.

Besides acknowledgments for other assistance, it is quite appropriate to call special attention to the excellent picture of Polyporus umbellatus the photograph of which was kindly furnished by Fred Mutchler, of Clark University.

A NOTE ON THE DISCHARGE OF SPORES IN BULGARIA RUFA.

Otto E. Jennings, Carnegie Museum.

In connection with a note in Torreya[1] by Mr. C. C. Hanmer, mentioned recently in the Mycological Bulletin,[2] a few remarks upon the manner of spore-discharge in *Bulgaria rufa* Schweinitz may be of possible interest.

Mr. Hanmer says in the note referred to that "I have upon numerous occasions observed the momentary expulsion of spores from fungi such as *Bulgaria rufa* and *Sarcoscypha floccosa*, but with these plants the spore discharge seems to occur when they are first touched, and then only."

In early July, Mrs. O. E. Jennings collected a fine specimen of Bulgaria rufa in rich, swampy woods, near my father's home in northern Ohio. Returning from the woods about the middle of the after-

[1]A note regarding the Discharge of Spores of Pleurotus ostreatus. C. C. Hanmer. Torreya, 5: 146-147. August, 1905.

[2]Notes from Mushroom Literature, I. W. A. Kellerman. Mycological Bulletin, 4: 234-236. June, 1906.

noon the various fungi collected, together with the specimen of Bulgaria, were placed for the remainder of the day upon a hot, dry roof, exposed to the sun. In the evening the fungi were placed upon a wire rack above the kitchen stove. About nine o'clock the next morning, I was examining the Bulgaria, when to my surprise it emitted a considerable cloud of spores. Curious as to the factors inducing such a discharge, I soon found that upon breathing gently upon the spore-bearing surface a discharge would take place after an interval of about two to three seconds. Experimenting further I found that a discharge could also be induced by holding the fungus in the bright, warm sunshine for a few minutes, and then quickly placing it in the cool shade for two or three seconds.

After probably twenty minutes of experimenting, during which time the Bulgaria had discharged a dozen or more clouds of spores, I was unable to bring about any further results, the spores apparently being exhausted.

The inferences to be drawn from the behavior of this particular specimen seem to be that;—

The factor inducing spore discharge is alternate expansion and contraction of the spore-bearing surface, due to varying degrees of heat, and that a varying moisture content can, at least, be of but secondary importance. Also, *Bulgaria rufa* is, at least under certain conditions, capable of discharging puffs of spores, not only when first touched, but successively at intervals, for some time after.

CARNEGIE MUSEUM. August 2, 1906.

Fig. 200. MA-RAS'-MI-US DE-LEC'-TANS. This charming plant was collected in the woods at Sugar Grove, Ohio, by R. A. Young, July 28, 1906. It is a new species which Prof. Morgan has recently described.

NOTES FROM MUSHROOM LITERATURE III.

W. A. Kellerman.

PANAEOLUS RETIRUGIS.—Some observations on the Rate of Growth of Panaeolus retirugis are published in the August number of Torreya, 1906. These were carried out in the palm-house of the Cornell University conservatory by Gertrude E. Douglas, in March of this year. We make the following extracts from her interesting account.

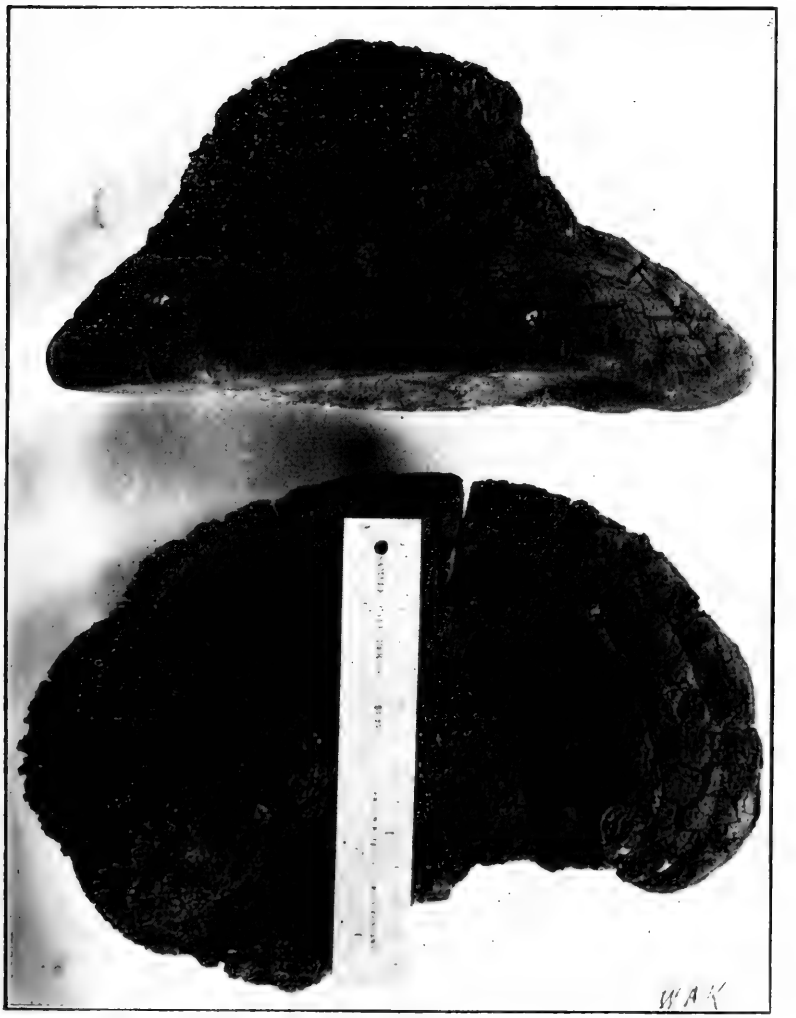

Fig. 201. PO-LY'-PO-RUS IG-NI-A'-RI-US. A very common woody Polypore that grows on Black Locust trees. In his revision of the species of the family Polyporaceae W. A. Murrill has given to this plant the new generic name of *Py'-ro-po-ly-po-rus*.

"As the rate of growth of mushrooms is a matter of some interest, individuals of this species were selected in as early stages as possible, and measured twice a day, until they had reached maturity. These measurements were taken in the morning and evening at the same time every day, the day interval between them being of eight hours and the night of sixteen. A large number of individuals were measured during the period from March 22 to April 4, but complete records were obtained from only eighteen, owing to the sensitiveness of the mushrooms. * * *

"As No. A was a very typical specimen, and as the most complete record was obtained of this, I shall describe its growth in some detail. The first measurements were taken in the morning. During the first 8-hour period by day, the plant did not change. However, during the following night, it began to grow slowly until it was 10 mm. high. On the following day, the stem entered on a period of very active growth, which lasted about fifty-six hours, until the plant was 145 mm. high. During this period of active growth, the rate at first increased, and then decreased slightly. The stem continued growing slowly for sixteen hours after this rapid growth interval.

The pileus began to grow slowly at the same time as the stem. It increased steadily, but slowly, for sixty-four hours, with width remaining slightly less than the length. During the last day of the most active stem growth, the width of the pileus made a rapid increase, from 8 to 20 mm. and continued broadening for 32 hours, after the stem had ceased to grow, until it reached 40 mm. At the same time the length continued increasing slowly till it reached 25 mm.

"The plant was growing six days and five nights, after its first appearance above the soil. The growth appeared to be no more rapid by night than by day. This was true also of the other specimens measured. In plant A the greatest growth which took place in any one period was during the third day. In the other plants it occurred sometimes by day and sometimes by night. * * *

"A few plants were marked to determine in what region of the stem the greatest growth took place. A section of the pileus was cut off in each case so that the whole stem, from the ground to the point where it joined the pileus, might be taken into account. The marks were placed 2 mm apart. The marked mushrooms were very sensitive to injury and for this reason I was not able to get records more than three times from each plant. The records show that the greatest increase in length took place near the top of the stem. It was usually not in the topmost interval, but in one or two down from the top, near the margin of the pileus. The plants grew for several intervals down the stem, but no growth took place in the lowest ones.

"These results in regard to the position of growth in the stem are similar to those obtained by J. Schmitz in 1841, from the Hymenomycetes. He divided the stem into thirds and found the greatest growth to take place in the topmost third, less growth in the middle third, and very slight or no growth in the bottom third. In some plants he divided his topmost interval into two parts and found that in many cases the topmost half grew less than the one beneath, although there were a great many variations from this."

New Cuban Mushrooms.—We find a brief account of scientific work heretofore done for the Island of Cuba, and two dozen new species described, and nearly all of them figured, in the First Annual Report of the Agricultural Experiment Station issued from Santiago de las Vagas, Cuba, by F. S. Earle. The report is in Spanish, as also is this account of "Algunos Hongos Cubanos," and the descriptions of the new species are published

in the same idiom. The first scientific account of Cuban Fungi was contained in the work of Ramon de la Sagra on the "Historia Fisica, Politica y Natural de la Isla de Cuba"; the account of Fungi is by the botanist Montague, an enumeration and description of 113 species, the title being "Les Plantes Cellulaires de Cuba." But little work has been done since, but Dr. Earle's activity promises now to increase materially our knowledge of the fungal flora of that country. And doubtless there are many "Mushrooms" for here we have already many new species detected. Five of them belong to the genus *Pocillaria*, which is but another

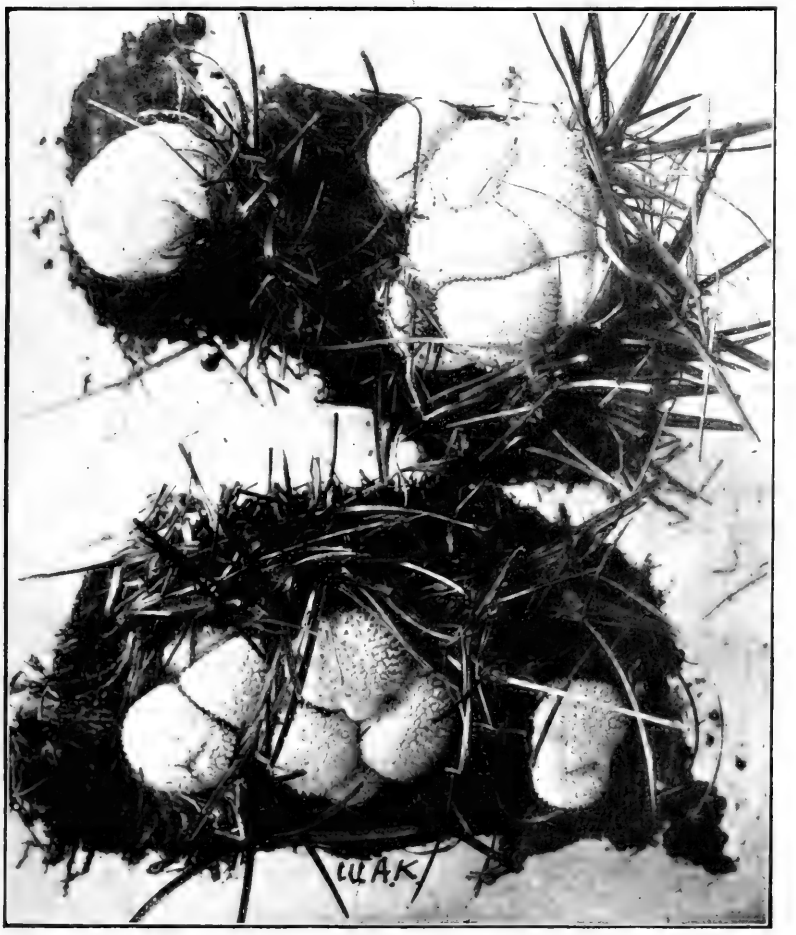

Fig. 202. LY-CO-PER'-DON WRIGHT'-I-I. A beautiful Puff-ball growing in the fields, easily recognized by the ornamentation. This consists of small spines about 2mm. long that presently flake off. Lloyd says: This little species is quite frequent in short grass, and takes kindly to yards, gardens and often to paths. It does not grow in Europe; it was originally described and named by the English botanist Berkeley to whom specimens were sent from this country.

name for Lentinus. To the genus *Phyllotus,* he ascribes two, to *Geopetalum* three, and to *Crepidotus* one species—all of these being the old genus *Pleurotus.* Other new species are *Galera,* three representatives; *Gymnochilus* (which is another name for *Hypholoma*), with five species; *Stropharia,* with two species; *Pholiotinia* (representing former Pholiota), with one species, and finally *Pholiota cubensis.*

USES OF MUSHROOMS.

Geo. F. Atkinson, Cornell University.

The most prominent and at present important use of mushrooms from the standpoint of the utilitarian is as an article of food. We have now learned that their food value as a nutrient substance is not so great as has been fondly supposed, but, as Mr. Clark points out in Chapter XXII, in addition to the value they certainly do possess as food, they have very great value as condiments or food accessories, and "their value as such is beyond the computation of the chemist or physiologist. They are among the most appetizing of table delicacies, and add greatly to the palatability of many foods when cooked with them." Mushrooms undoubtedly possess a food value beyond that attributed to them by the chemist or physiologist, since it is not possible in laboratory analysis to duplicate the conditions which exist in the natural digestion and assimilation of foods.

Probably the larger number of persons, in America, at present interested in mushrooms, are chiefly concerned with them as an article of food, but a great many of these persons love to tramp to the fields and woods in quest of them just as the sportsman loves to hunt his game with dog and gun. It is quite likely that there will always be a large body of persons who will maintain a lively interest in the collection of *game* mushrooms for food. There are several reasons for this. The zest of the search, the pleasure of discovery, and the healthfulness of the outdoor recreation, lend an appetizing flavor to the fruits of the chase, not to be obtained by purchasing a few pounds of cultivated mushrooms on the market. It cultivates powers of observation, and arouses a sympathetic feeling toward nature, and with those outdoor environments of man which lend themselves so happily in bettering and brightening life, as well as in prolonging it.

Many others are discovering that the observation of form and habits of mushrooms is a very interesting occupation for those who have short periods of time at their disposal weekly. It requires but a little observation to convince one that there is an interesting variety of form among these plants, that their growth and expansion operate in conformity with certain laws which result in great variation in form and habit of the numerous kinds on the ground, on leaves, on branches, on tree trunks, etc.—*Mushrooms, Edible, Poisonous, etc.*

Fig. 203. Po-ly'-po-rus um-bel-la'-tus. Photo by Fred Mutchler, Clark University, Worcester, Mass.

Fig. 204. TRI-CHO-LO'-MA SUL-PHU'-RE-UM. This Brimstone Tricholoma is said to be common—but, perhaps, it is not to the same extent interesting. MacIlvaine says of it: "When quite young Tricholoma sulphureum is showy and inviting. Its smell is discouraging, its taste forbidding. No amount of cooking removes its unpleasant flavor. I have tried to eat enough of it to test its qualities, but was satisfied, after strenuous efforts, to mark it INEDIBLE."
The specimens from which the photo was made were collected by Supt. M. E. Hard, Chillicothe, Ohio, October 30, 1905.

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W. A. Kellerman, Ph. D., Ohio State University
Columbus, October, 1906.

A REAL MUSHROOM NUMBER.

Through the kindness of Albert F. Woods, the Pathologist and Physiologist of the U. S. Department of Agriculture, it is possible to use in this NUMBER, cuts published in Bulletin No. 85, of the Bureau of Plant Industry on *The Principles of Mushroom Growing and Mushroom Spawn Making*, by B. M. Duggar, and to make extensive quotations from that interesting and important work. The Bulletin may be obtained from the U. S. Department of Agriculture and all interested especially in Mushroom growing, are urged to send for a copy.

Dr. Duggar treats his subject under the following heads: Introduction, General Considerations, Market Conditions, Germination Studies, Review of Earlier Work, Experimental Work, Tissue Cultures, Nutrition, Growth on Manure and Other Complex Media, Growth on Chemically Known Media, Tabulation of Special Results, Acid and Alkaline Media, Temperature and Moisture, Preparation of the Compost, Installation of Beds, Spawning and Casing the Beds, Mushroom Growing, Experiments at Columbia, Mo., Variability in Mushrooms Grown Under Different Conditions, The Cultivation of Various Species of Mushrooms, Co-operative Experiments, Cave Facilities in the United States, Open-air-culture, Mushroom Spawn Making, A "Chance" Method, A "Selective" Method, Pure-culture Precautions, The Tissue-culture Method, The Commercial Process and The Vitality of Mushroom Spawn. Quotations as far as space allows follow:

QUOTATIONS FROM DUGGAR'S BULLETIN ON THE PRINCIPLES OF MUSHROOM GROWING AND MUSHROOM SPAWN MAKING:

The conditions under which mushrooms may be successfully grown are limited, and intelligent attention is therefore essential. It must be said, moreover, that the majority of failures may be directly traced to erroneous ideas as to the cultural requisites, or to a reckless disregard of conditions. The essential conditions will be subsequently defined in detail, but it may be stated here that failures are usually due to one or more of the following causes: (1) Poor spawn; (2) very poor manure; (3) unfavorable temperature; and (4) heavy watering during the early stages of growth.

Under suitable conditions mushrooms may be grown with assurance of

Fig. 205. ACARICUS VIL·ATICUS. A promising species, fleshy and prolific. From Bulletin No. 85, B. M. Duggar, Bureau of Plant Industry, U. S. Department of Agriculture.

success. Ordinarily they are grown only where the conditions may be controlled, and success should therefore be invariable.

In many cases it has been possible to obtain growth from the spores by the use of the stimulating salts which have been mentioned in connection with the germination studies. Where it is desired to make experiments along this line the writer has found it more practicable to

use spores from a mushroom as young as possible. If one takes a mushroom just at the time that the veil is breaking, inoculations may be readily made from the spores and few contaminations will result. In this case, by means of a sterile needle, or scalpel, a few spores may be removed from the spore-bearing, or gill, surface and these may be transferred to the tubes in the same way as were bits of the fresh tissue. It is also possible to secure a spore print from a mushroom the gill surface of which has not been exposed to germs of the atmosphere. In the latter case it is desirable to remove stem and partial veil, peel off the incurved edges of the cap which have been in contact with the soil, and place the cap, gill surface downward, in a sterilized dish or on sterile paper. If this is then kept free from dust, a spore print may be obtained, which should not be contaminated by foreign germs. This print may then be used in making a large number of spore cultures.

Tissue Cultures.—The suggestion which had presented itself of using bits of living tissue from a sporophore instead of spores seemed also, from genral observations, to be of sufficient importance to warrant a thorough trial. During moist weather, or in a moist cellar where

Fig. 206. A fine cluster of Agaricus campestris, the Horticultural Variety Columbia. From Bulletin No. 85, B. M. Duggar, Bureau of Plant Industry, U. S. Department of Agriculture.

mushrooms are being grown, one will frequently find that an injury in a young mushroom is rapidly healed by a growth of hyphae from the edges of the injured area. The same thing had been noted in the open in the case of puffballs. In many instances, moreover, pure cultures of fungi in other groups have been obtained by the use of small bits of a sclerotial mass of tissue. Accordingly, a young sporophore of *Agaricus campestris* was obtained, and after breaking it open longitudinally a number of pieces of tissue from within were carefully removed with a sterile scalpel to a sterile Petri dish. A number of cultures were then made by this tissue-culture method on a variety of nutrient media, such as bean pods, manure, leaf mold, etc. From this and from numerous other similar tests it was ascertained that when the mushrooms, from which the nodules of tissue are taken, are young and healthy, there is seldom an instance in which growth does not result. It was easily shown that failure to grow was generally due to the advanced age of the mushroom used, to an unfavorable medium, or to bacterial contamination.

The first successful pure cultures were made by this method during the early spring of 1902 from mushrooms grown indoors. During the following summer, or as other fleshy fungi appeared in the open, cultures were made from other forms in order to determine the general applicability of the method. The experiments were successful in most cases, although it was found almost impossible to obtain certain species of fungi in a condition young enough to be free from bacterial infestation. In general, the method seemed to commend itself strongly as a means of procuring

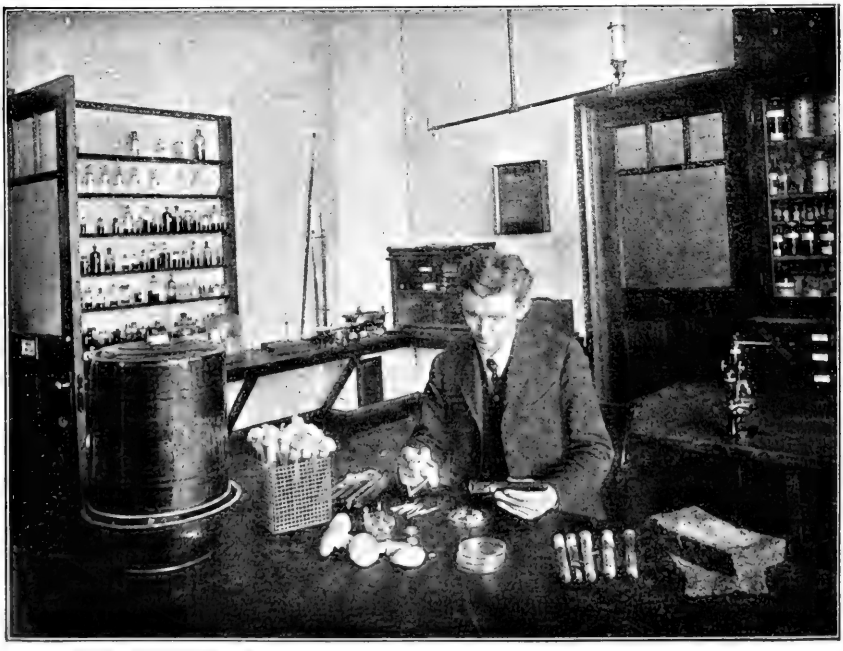

Fig. 207. The Method of Making Pure Cultures, Showing the Apparatus and Materials. From Bulletin No. 85, B. M. Duggar, Bureau of Plant Industry, U. S. Department of Agriculture.

Fig. 268. A Young Specimen of the Common Puffball (CALVATIA CRANIFORMIS). From Bulletin No. 85, B. M. Duggar, Bureau of Plant Industry, U. S. Department of Agriculture.

pure cultures of desirable edible species, particularly of those species the spores of which could not be obtained pure or which could not be readily germinated.

During the two subsequent seasons this method has been employed with a great variety of fungi representing many natural orders. No systematic endeavor has been made to determine the limitations of the tissue-culture method as applied to Basidiomycetes, but, incidental to the general studies, cultures have been made from forms differing very widely, not only in relationship but also in texture and in habitat.

TEMPERATURE AND MOISTURE.—The temperature factor is, next to that of good spawn, perhaps the most important in mushroom growing. It has been frequently stated that mushroom growing is not profitable when the temperature may not be maintained more or less continuously at from 50° to 60° F. It is very probable that the exact temperature which may be considered an optimum will vary somewhat in different sections of the country. It will be noted later in detail that the temperature factor acts not so directly upon the growth of the spawn or the production of mushrooms as indirectly to render some other conditions of the environment injurious. It is best to consider that in practice the optimum temperature for mushroom growing varies from 53° to 58° F.

VARIABILITY IN MUSHROOMS GROWN UNDER DIFFERENT CONDITIONS.—

The writer does not intend to discuss even in a general way the relationships of the various forms of Agaricus—that is, those that may be considered allies of *A. campestris*—which he has cultivated or studied in the field. Some reference to the variability of common forms should, however, be made. For a comprehensive study of species and varieties, a knowledge of European forms as well as of those found in America is essential. Authors differ so widely in their descriptions of species, as well as in their conceptions of them, perhaps, that in the absence of unlimited material nothing short of confusion results from any attempt to harmonize opinions. It is sufficiently difficult to separate what many would regard as varieties of *A. campestris* from those of *A. arvensis.* When specific rank is bestowed also upon such forms as *A. pratensis, A. villaticus, A. magnificus, A. rodmani,* etc., the difficulties are greatly increased. The writer has grown many forms of Agaricus, and, as might be expected, there seems to be no form which will remain practically constant under variable conditions.

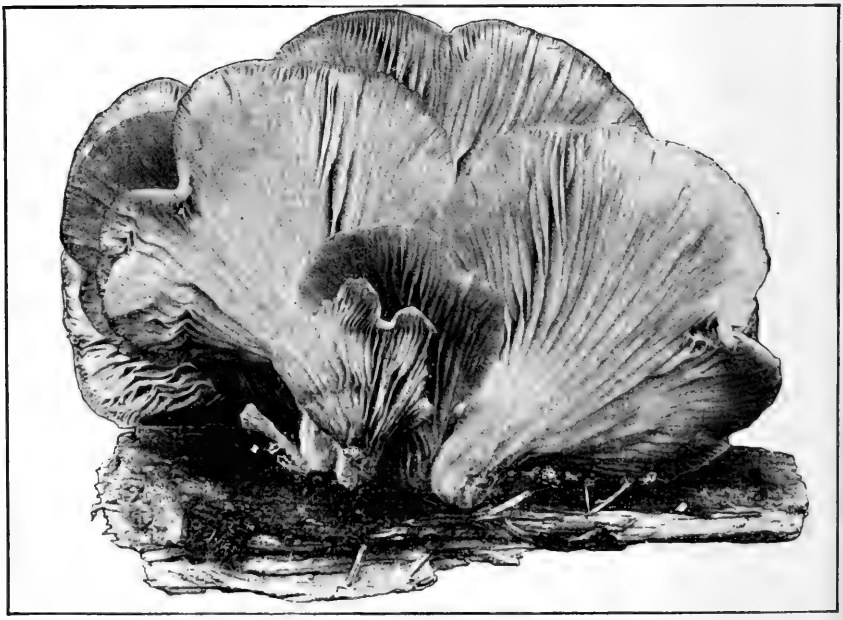

Fig. 209. The Oyster Mushroom (PLEUROTUS OSTREATUS), Growing on Decayed Willow Log. From Bulletin No. 85, B. M. Duggar, Bureau of Plant Industry, U. S. Department of Agriculture.

[It might be added that stimulated by Dr. Duggar's work, several firms have undertaken to furnish spawn prepared under conditions that would seem to guarantee success—yielding desirable "varieties" of Mushrooms. Tests by various amateurs and others show that the claims made by these firms can at least sometimes be verified.—Editor.]

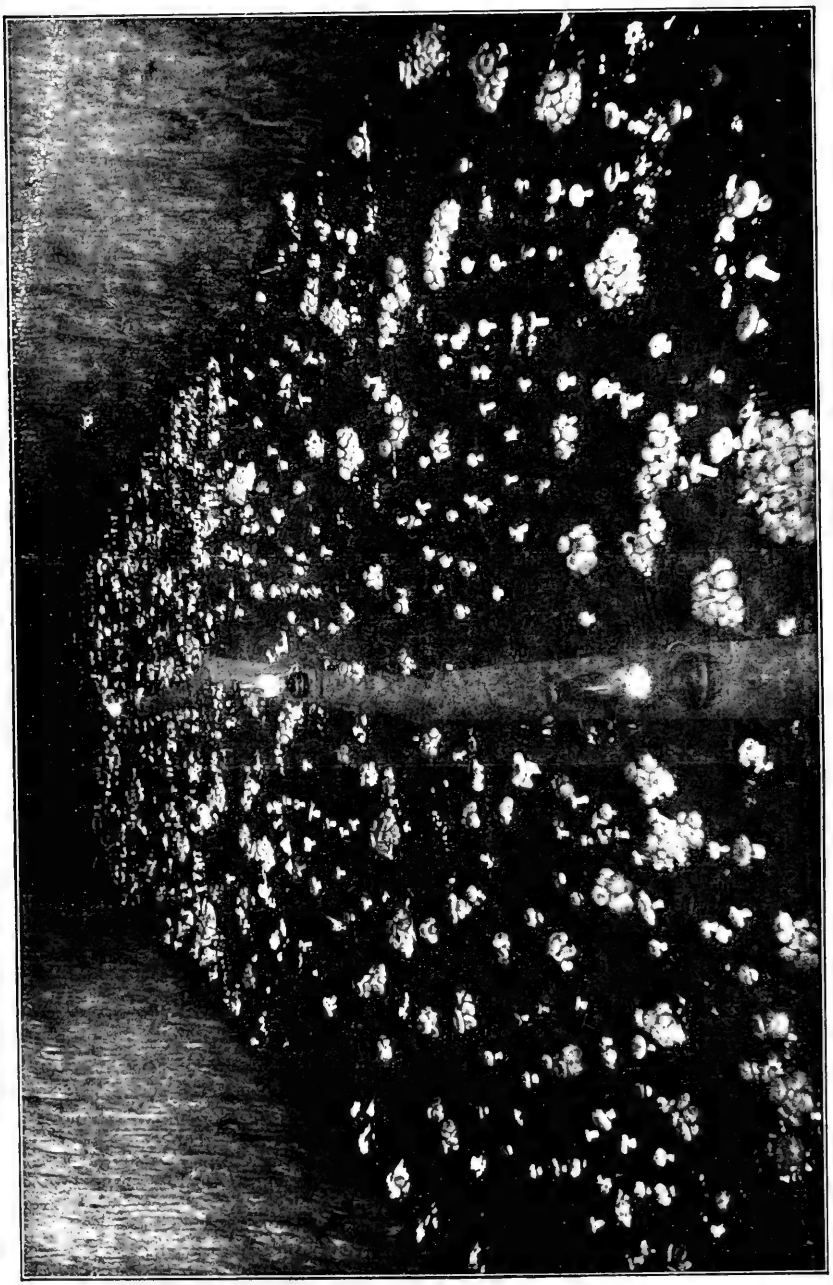

Fig. 210. A Fine Bed of Mushrooms Grown from Spawn of Pure-Culture Origin. By D. Duggar, U. S. Dept. Agr.

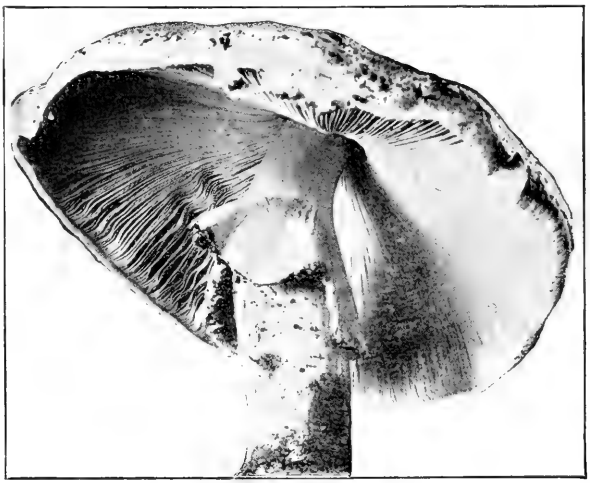

Fig. 211. AGARICUS FABACEUS, the Almond-flavored Mushroom.

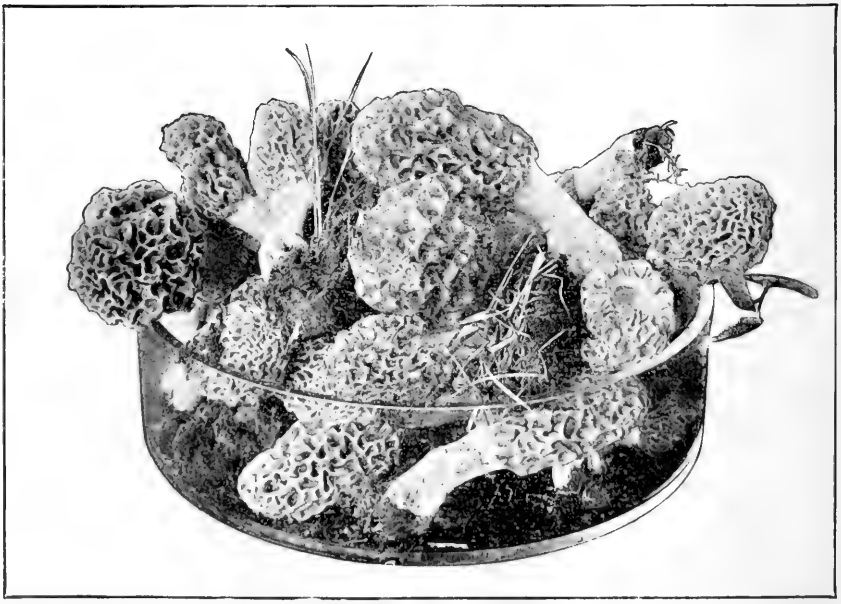

Fig. 212. Morels (MORCHELLA ESCULENTA), One of the Finest Edible Fungi. Cuts furnished by U. S. Dept. Agr. from Bulletin by B. M Duggar.

The Mycological Bulletin is issued Monthly, Price 25c. Copies of Vol. II (1904) and Vol III (1905) may be had for 50 cents each, or cloth bound copies for 75 cents, No. copies remain of Vol. I (1902). Address W. A. Kellerman, Columbus, Ohio

THIS SPACE TO LET

VOL. IV. NOVEMBER, 1906 NOS. 69-70

MYCOLOGICAL BULLETIN

W. A. KELLERMAN, Ph. D. OHIO STATE UNIVERSITY

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Mycological Bulletin

Nos. 69-70

W. A. Kellerman, Ph. D., Ohio State University
Columbus, November, 1906.

A WORD ABOUT SENDING SPECIMENS.

The season unusually favorable for Mushrooms has induced many to send specimens to be photographed, to be identified, etc., but alas, the precious boxes are not appreciated by the mail carriers, and the plants are in sorry plight too often on their arrival. We can not always blame the postmen, perhaps, for the general destruction; no doubt, in some cases at least, it is the fault of imperfect packing. The box may be strong enough to withstand the weight of superincumbent mail, but if the specimens rattle about in the space assigned them, surely the delicate or fleshy ones will suffer. Then, perhaps, a suggestion will be in order:

Very soft paper should be used in the packing—tissue-paper or paper napkins. Wrap the stem carefully, to keep the dirt from soiling everything that it may touch. Then continue folding the soft paper around the stem until the diameter is equal to the cap, finally enclosing the latter. Treat each specimen in this manner which you are intending to lay in the box; the same applies to clusters also. Have the box lined with cotton and after the specimens have been laid in their place, add still more cotton to fill quite snugly or compactly all the otherwise vacant space between the specimens. End the packing by laying a liberal supply of the same material on the top of the plants and tie down the lid. Of course, the appropriate Nos. on tags or slips of paper should have been placed with the specimens in each case. If you have fine material it ought to be worth this much attention.

We are again under obligations to Superintendent Hard, of Chillicothe, for a nice picture and some notes on an interesting Mycena. We have also levied tribute on Professor Atkinson again; what he says can be relied on—and then I can not quote too often from his valuable book on Mushrooms.

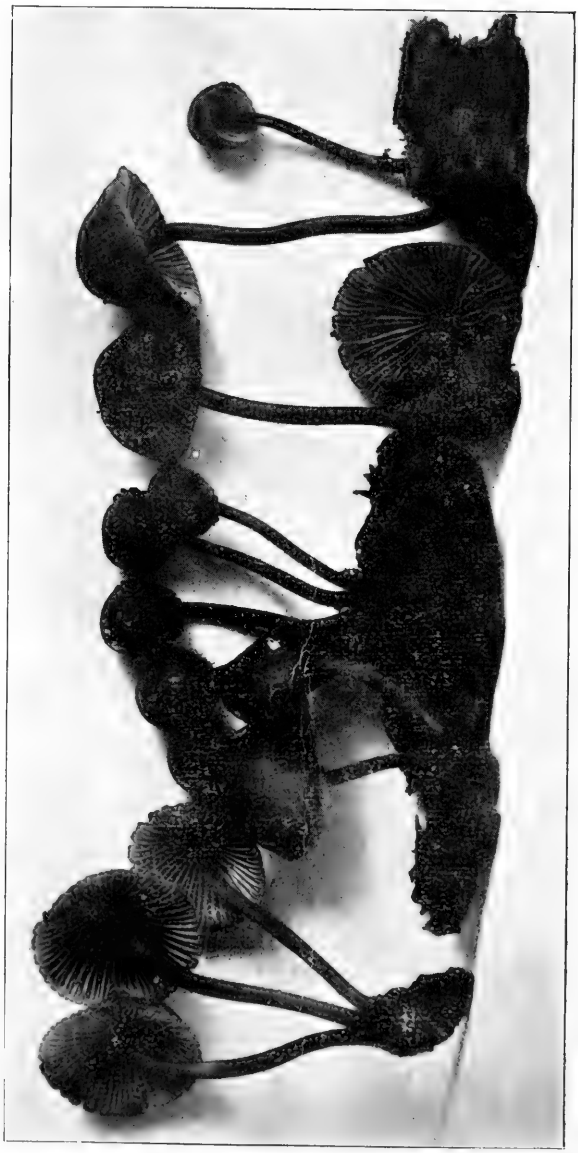

Fig. 213. MY-CE'-NA HAE-MAT'-O-PA. See text for explanation.

MYCENA HAEMATOPA, PERS.

M. E. Hard.

This is one of the prettiest specimens found in the woods at this season of the year. It is quite common about Chillicothe. The stems and caps are alike tender and will amply pay to pick them. They grow on well decayed logs and stumps. They grow in tufts or groups. No one will experience any difficulty in recognizing it from the cut. Its dense cespitose habit, the red juice which exudes from the stem, and the denticulate margin of the cap will assist the student in recognizing it. It is called "haematopa" or bloody-footed Mycena because a deep blood red juice exudes from the stem. This also more or less pervades the cap. The cap is fleshy, one inch broad, conic or bell-shaped, somewhat umbonate, obtuse, whitish to flesh color, with more or less dull red, even or slightly striate at the margin, the margin extending beyond the gills and is denticulate or toothed.

The gills are attached to the stem, often with a decurrent tooth, whitish and tinged with a dull red.

The stem is two to four inches long, firm, hollow, sometimes smooth, sometimes powdered with a whitish soft hairy down, the color the same as the pileus, yielding a dark red juice which gives the name to the species.

The color varies quite a little in these plants. This is due to some plants having more of the red juice than others. It is found on decayed stumps and logs in damp places from August to October.

FUNGI IN THE ARTS.

Geo. F. Atkinson, Cornell University.

A number of different species of mushrooms have been employed in the manufacture of useful articles. Their use for such purposes, however, was more common in the past than at present, and it is largely, therefore, a matter of historic interest at the present time, though some are still employed for purposes of this kind.

TINDER MUSHROOM OR AMADOU.—The Polyporus fomentarius, or "tinder mushroom," or, as it is sometimes called, "German tinder," was once employed in the manufacture of tinder. The outer hard coat was removed and the central portion, consisting almost entirely of the tube system of several years' growth, was cut into strips and beaten to a soft condition. In this form it was used as tinder for striking fire.

The inner portion was also used in making caps, chest-protectors, and similar articles. A process now in vogue in some parts of Germany, is to steam the fruit bodies, remove the outer crust, and then, by machinery constructed for the purpose, shave the fruit body into a long, thin strip by revolving it against a knife in much the same way that certain woods are shaved into thin strips for the manufacture of baskets, plates, etc. Some articles of clothing made from this fungus material are worn by peasants in certain parts of Europe.

MUSHROOMS FOR RAZOR STROPS.—The beech polyporus (*P. betulinus*), several centuries ago was used for razor strops. The fruit body after being dried was cut into strips, glued upon a stretcher, and smoothed down with pumice stone (Asa Gray Bull. 7:18, 1900.) The sheets of the weeping Merulius (See Fig. 189), were also employed for the same purpose, as were also the sheets of "punk" formed from mycelium filling in cracks in old logs or between boards in lumber piles. Sometimes

extensive sheets of this punk are found several feet long and a foot or more wide. These sheets of pure mycelium resemble soft chamois skin or soiled kid leather.

MUSHROOMS EMPLOYED FOR FLOWER POTS.—In Bohemia (according to Cooke, Fungi, etc., p. 103) hoof-shaped fruit bodies of *Polyporus fomentarius* and *igniarius* are used for flower pots. The inner, or tube portion, is cut out. The hoof-shaped portion, then inverted and fastened to the side of a building or place of support, serves as a receptacle for soil in which plants are grown.

CURIOS.—The *Polyporus applanatus* is much sought by some persons as a "curio," and also for the purpose of etching. In the latter case they serve as pastels for a variety of art purposes. The under surface of the plant is white. All collectors of this plant know that to preserve the white fruiting surface in a perfect condition it must be handled very carefully. A touch or bruise or a scratch results in a rapid change in color of the injured surface. Beautiful etchings can thus be made with a fine pointed instrument, the lines of color appearing as the instrument is drawn over the surface.—Mushrooms, Edible, Poisonous, etc.

Fig. 214. PO-LY'-PO-RUS SUB-SE-RI'-CE-US. An interesting little Polypore, dark brown and silky in appearance, growing in open woods and protected places, not occurring in abundance. The specimens from which the photograph was made were sent from Chillicothe by Supt. M. E. Hard.

NOTES FROM MUSHROOM LITERATURE. V.

W. A. Kellerman.

Another Fly Agaric.—Under this title D. R. Sumstine gives in the Journal of Mycology for November, 1905, the following note:

Amanita muscaria is called the fly agaric because infusions of it are poisonous to flies. It has now, however, a keen rival for this reputation in another species of the same genus. Last summer while drying specimens of *Amanita olitaria* Bull, a number of flies were attracted to them. After the flies had remained on the plants for a short time they fell over apparently dead. This continued until thirty-nine fly mycophagists had become the victims of some narcotic contained in the mushrooms. The box with flies and plants was then set aside for future study. After two hours the box was again examined, but the flies which once were dead were now alive and had departed with no more serious results possibly than a severe headache from their mycological "booze."

Several experiments were made with other specimens of the same species and the same results were obtained. It seems that this plant has some property that acts as an intoxicant or soporific to flies. It is reported by some writers as edible and by others as poisonous.

Something interesting about the Morelle.—The following was published in the Journal of Mycology, November, 1905, by W. C. Sturgis, under the title *Remarkable Occurrence of Morchella Esculenta (L.)Pers*: During a recent hunting trip in southwestern British Columbia the writer came across this fungus growing in such abundance and in a location and at a season of the year so unusual that the circumstances seem worth recording. Usually one expects to find *Morchella* in the Spring growing on the borders of meadows or other grassy places. In the present instance the plants were found in September on a steep mountain side which had, within a little over a year, been subjected to a destructive forest fire.

On September 11th the writer was skirting the precipitous side of a mountain at an altitude of about 7,000 feet, and while passing through what had been a fairly good growth of aspens and small spruces, a few fine specimens of *Morchella* were noticed. Further search revealed the presence of these plants literally in hundreds. A fire had passed across the mountain in June, 1904, leaving only skeletons of the trees standing and charring the ground to such a depth that no trace of green vegetation had since appeared. Yet under these unfavorable circumstances and at a season when snow had already fallen not far from the locality, a bushel of *Morchellas* might have been gathered within a radius of one hundred yards. The specimens were exceptionally fine, in some cases attaining a height of seven inches and a circumference around the pileus of ten inches. In such specimens the pileus usually showed a great variety of form, from conical and flattened to nearly spherical. In other cases the pileus more nearly resembled that of *M. conica* Pers. The base of the stipe was in all cases much swollen and consisted of a mass of mycelium and soil cemented into a sclerotoid mass. Specimens were secured from which the identity of the fungus was later determined.

The interesting question arises whether, on the western slopes of the Rocky mountains, *Morchella* usually occurs in the autumn rather than in the spring, as elsewhre, and also how the presence of the particular specimens is to be accounted for. It is hardly possible that the spores could have been carried to the locality in sufficient quantity to have produced in one season so large a growth of plants, and it is almost equally inconceivable that a subterranean mycelium could have resisted a degree of heat sufficient to destroy permanently all surface vegetation and leave the ground a desolate waste of charred clay.

Polyporus obtusus.—We have learned to expect a goodly number of mycological articles in each new Annual Report of the Missouri Botanical

Garden. One such in the 16th report (1905) deals with one of the shelf-fungi, or Polypores, namely Polyporus obtusus, author Perley Spaulding. This species seems to occur only in North America and is confined to a few of the oaks, the "black oak family" exclusively, gaining entrance to the living plants through wounds. The disease so caused Mr. Spaulding found in central Missouri and northern Arkansas, on *Quercus marilandica* (Black Jack)) and *Quercus velutina* (Black Oak). However, the Polypore is a saprophyte—"There is not the slightest hint of its occurring as a wound parasite. It not only grows on the trees but it sooner or later causes the death of the affected trees. The rot extends up and down in the heart wood until the tree is so weakened that it breaks over or dies outright. From what could be gathered by observations it seemed that the fungus works remarkably fast in causing the death of the attacked trees." Three full-page half tones admirably illustrate the species in question.

MARASMIUS DELECTANS.—Prof. Morgan has recently described this elegant new species, the same being illustrated by Fig. 200 in the BULLETIN. His description of the plant is as follows: MARASMIUS DELECTANS MORGAN SP. NOV.—Pileus subcoriceous, convex then expanded and depressed glabrous, rugulose, white changing in drying to pale and alutaceous. Stipe long, slender, tapering slightly upward, glabrous, brown and shining, white at the apex, arising from an abundant white-floccose mycelium. Lamellae moderately broad, unequal, rather distant, trabeculate between, white emarginate adnexed; spores lance-oblong, hyaline, 7-9 x 4 mic.

Growing on old leaves in deciduous woods. Pileus 1-2 cm. in diameter, the stipe 3-5 cm. long and 1.0-1.5 mm. thick.

THE FOLLOWING IS TAKEN FROM THE LAST NUMBER OF THE JOURNAL OF MYCOLOGY:

A NEW SPECIES OF GALERA: CHARLES H. PECK.—A species of this genus apparently undescribed has been brought to my notice recently of which the following account may be given:

GALERA KELLERMANI PECK sp. nov.—Pileus very thin, subovate or subconic, soon becoming plane or nearly so, striatulate nearly to the center when moist, more or less wavy and persistently striate on the margin when dry, minutely granulose or mealy when young, unpolished when mature, often with a few scattered floccose squamules when young, and sometimes with a few slight fragments of a veil adhering to the margin which appears as if finely notched by the projecting ends of the gills, watery brown when moist grayish brown when dry, a little darker in the center, taste slight, odor faint, like that of decaying wood; lamellae thin, close, adnate, a delicate cinnamon brown becoming darker with age; stem slender, equal or slightly tapering upward, finely striate, minutely scurfy or mealy at least when young, hollow, white; spores brownish ferruginous with a faint pinkish tint in mass, elliptic, 8-12x6-7 μ.

Pileus 2-3 cm. broad; stem 2.5-4 cm. long, 1-2 mm. thick. Gregarious or subcespitose. Ground in a greenhouse, Columbus, Ohio, August, 1906. Number 4494. Dr. W. A. Kellerman.

The distinguishing characters of this species are its broadly expanded or plane grayish brown pileus with its minutely granulose or mealy surface, its persistently striate margin and its very narrow gills becoming brownish with age. The indication of a veil is also unusual.

The species is respectfully dedicated to its discoverer who has kindly sent copious notes, specimens, spore-prints and photograph from which the description has been prepared.

EXPLANATION OF PLATE 89.—Galera kellermani Peck. A half tone illustration of several plants. A very young specimen shows the minutely granulose or mealy character of the cap. Fully grown plants are shown and in one case the fragments of a veil are distinctly seen attached to the margin.

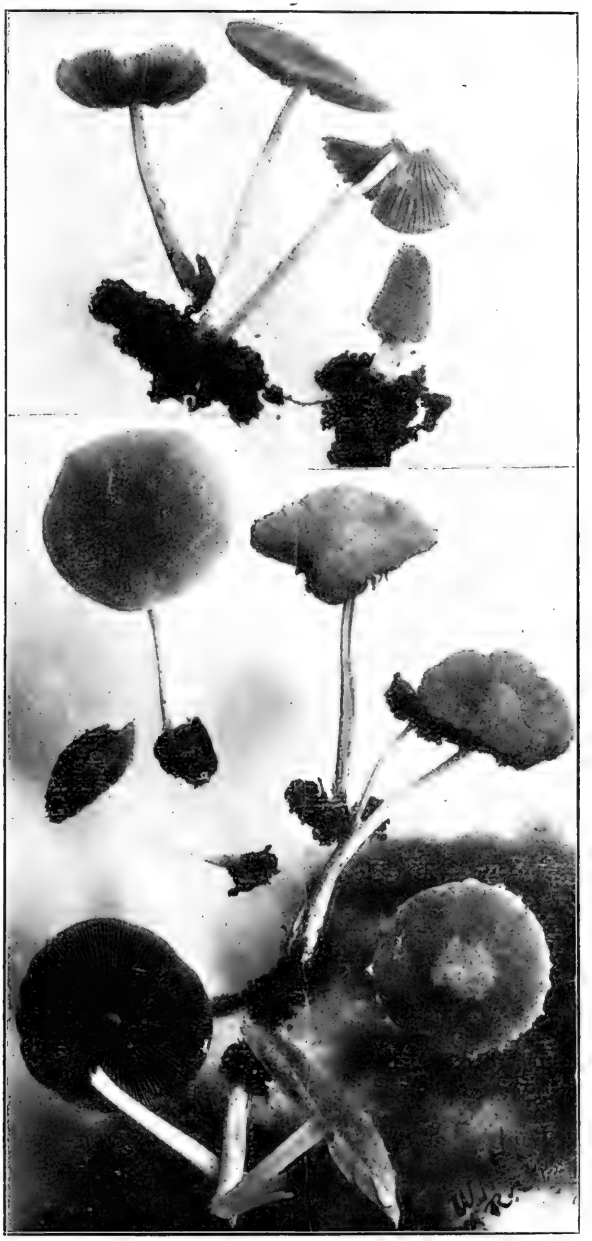

Fig. 215. GA-LE'-RA KEL-LER-MAN'-I. See text on opposite page.

Fig. 216. I-NOC'-Y-BE SUB-O-CHRA'-CE-A, BURT'-I-I. A small but conspicuous Mushroom sent to us by Supt. Hard, of Chillicothe, Ohio. Neither Atkinson nor McIlvaine describe any of our species, the latter remarking that "none reported as edible or poisonous; those I have tasted are not pleasant." The genus Inocybe is well described by Atkinson. It consists of ochre-spored species of various character, the gills being adnate, sinuate, rarely decurrent, and in one species free. It is placed next to the genus Hebeloma.

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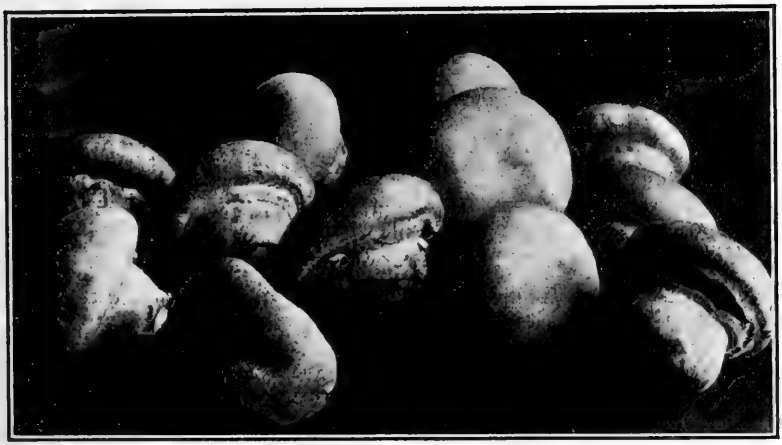
VOL. IV. DECEMBER, 1906 NOS. 71-72

MYCOLOGICAL BULLETIN

W. A. KELLERMAN, Ph. D. OHIO STATE UNIVERSITY



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Mycological Bulletin

Nos. 71-72

W. A. Kellerman, Ph. D., Ohio State University
Columbus, December, 1906.

THE LAST LESSON IN THE BOOK.

What! Have we come to the last lesson in the book! And did you enjoy the Mushrooms? Yes? Well, we will issue another volume of the same kind—only better we hope. More notes and more photos sent by the subscribers will surely be an improvement; and may be our own experience will contribute to slight advancement.

The Frontispiece for Volume IV.—We take pleasure in presenting the portrait of one so eminent as Dr. W. G. Farlow of Harvard University, the professor of cryptogamic botany in that Institution. Well can the portrait grace our fourth volume. Dr. Farlow has been one of the leaders in mycology in this country, and he has done much in advancing our knowledge of Mushrooms.

Editing at a Distance.—On the day this No. reaches the subscribers the editor will set sail for Central America. Therefore from Guatemala again the editorial pen will reach back for issuance of the winter Nos. Every effort will be made to send these out promptly (the first week of each month), and if not well served complaints may be cabled without delay, to a country where nature is kind, where birds sing and flowers blow, a land of sunshine and gladness, where it is summer all winter!

CULTIVATING THE MUSHROOM.

It seems very appropriate to an interest in mycology that this subject should be an important one. We have already issued a "Mushroom No." and desire to call attention to work along the line suggested by the Bulletin from which we quoted so liberally. Profiting by that work started by Dr. Duggar, establishments are now undertaking to furnish pure-culture spawn to customers, and thus one of the sources of embarrassment in growing mushrooms is relegated to a minor place. Without further comment I will quote from a catalog and guide book issued by a reliable firm and leave the matter in the hands of my subscribers who may be interested in this phase of the subject. (And our advertising pages should also be consulted.)

Fig. 217. First testing of Spawn and varieties. (Cut from Pure Culture Spawn Co.)

QUOTATIONS RELATIVE TO PURE CULTURE SPAWN.

"Early in 1904 the work of the Pure Culture Spawn Co. was projected. For some time previous a member of the company had been employed by the U. S. Department of Agriculture to investigate a variety of problems connected with the growing of mushrooms. Every phase of the industry was considered.

"One was to determine what was the best kind of mushroom spawn. All known sorts of spawn from England, France and America were tested. In this spawn test was a new kind, a spawn produced from the tissue of selected mushrooms. The idea was not new, but the application was. No one had ever grown anything but spawn of the ordinary wild field mushrooms. It was thought that spawn grown from selected productive cultivated varieties would make mushroom growing more profitable. It did. Results followed.

The important features of the new spawn were its quick, strong growth, quick fruiting and large mushrooms. Most important of all was the large yields,—two to three times more than any other spawn. The usefulness of such spawn could be easily understood. It remained to simplify the methods by which such spawn could be produced at a reasonable price and still preserve all the advantages of quick growth, quick

Fig. 218. Weight 25 oz. (Cut from Pure Culture Spawn Co.)

fruiting and large yields. We did it. Not all at one time to be sure, but only after many costly trials and experiments. It was placed on the market as Tissue-Culture Pure Spawn.

"This name tells just what it is. Absolutely pure cultures of mushroom spawn made only from the tissue of selected mushrooms. * * *

"Our spawn has been tested by several experiment stations and the results speak well for it. The Cornell University Agricultural Experiment Station reports over 2 pounds per square foot of bed in about three months from spawning. Referring to the Pure Culture Spawn Company,

Fig. 219. Cut from Pure Culture Spawn Co.

they say: 'It is possible with the method employed by this company to cultivate varieties true to name because the spawn is derived from known varieties, whereas most or all of the imported spawn may contain several varieties mixed.' * * *

"We now offer spawn of five select varieties, all our own introduction. A number of other forms are being tested. The following varieties

represent careful selections from different strains of mushrooms and have been thoroughly tested. * * *

"Success in growing mushrooms is not so much dependent upon long experience as an intelligent study of the conditions. There are three important things to consider:

1. The spawn.
2. The manure and its composting.
3. The temperature of the place in which the beds are made.

"PREPARATION OF COMPOST.—Mushrooms grow naturally in half decayed manure piles. This is the natural soil of the mushroom. The spawn would be killed by the heat of fermentation if placed in a bed of fresh manure. It must undergo a preliminary fermentation. The ma-

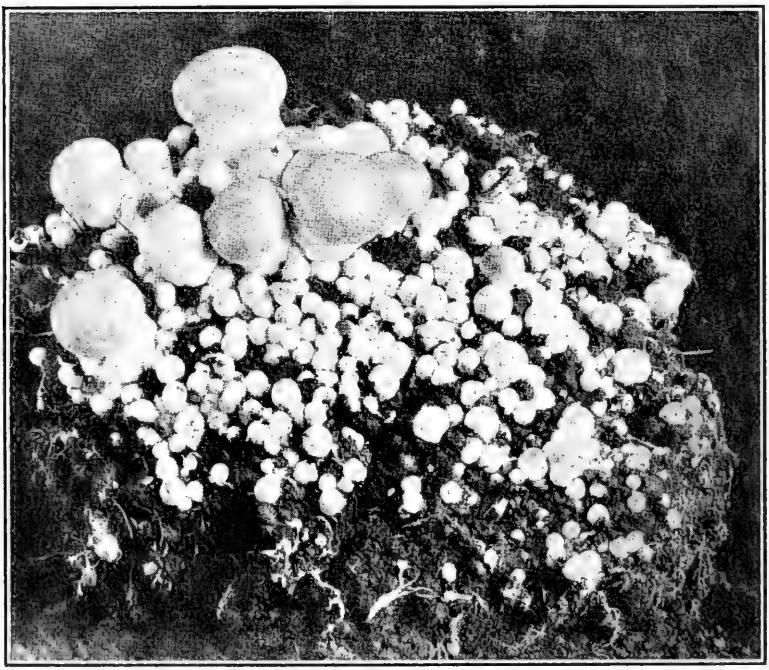

Fig. 220. From Atkinson, cut furnished by Pure Culture Spawn Co.

nure, preferably that from well nourished draft animals with a moderate amount of grain straw or shavings used for bedding (never hay or coarse weeds) should be reasonably fresh to begin with. It will in general not be advisable to use manure that is more than ten days old, unless it has been kept dry and under shelter. If it shows no blackening from fermentation it may be much older. For composting the manure should be placed in ricks. The usual method is to pile down in ricks four to eight feet wide and three to five feet high and as long as may be necessary. As it is piled down in layers it should be well moistened and tramped down. It will begin to ferment immediately, and in one or two days will be quite warm below the surface. This warmth is a result of the fermentation and should continue for some time. The manure may be allowed to ferment in this way for five to eight days when small whitish spots will be observed in the hottest portions. About this time the compost should be given the first turning."

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Mycological Bulletin

(Nos. 73 to 84)

Volume V.

1907

W. A. Kellerman, Ph. D.
Ohio State University

COLUMBUS, OHIO
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1907

AN EMINENT FRENCH MYCOLOGIST

VOL. V. JANUARY, 1907 NO. 73

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Mycological Bulletin

No. 73

W. A. Kellerman, Ph. D., Ohio State University
Columbus, January, 1907.

FOR THE NEW YEAR.

We give first place to an enthusiast who is not unknown to the readers of the Bulletin. Superintendent Hard not only furnishes the text, but also the illustrations which were made under his supervision. It is a brief treatment of the large and interesting genus Tricholoma, but more space at present could not be placed at the disposal of the author. Half-tones of some of the other species will be given later.

It is hoped too that another characteristic photograph may be furnished during the year of Volvaria bombycina. An illustration is needed of the too perishable plant when it reaches the climax of its glory.

The Frontispiece.—There are many eminent French mycologists—in fact, I doubt whether any other country than France can furnish so long and honorable list of scientific men who have paid attention to Mushrooms. The first representative which we select is M. le Professeur Dr. N. Patouillard.

THE GENUS TRICHOLOMA AND SOME OF THE OHIO SPECIES.

Supt. M. E. Hard.

The generic name TRICHOLOMA, comes from two Greek words meaning *hair* and *fringe.*

In this genus the veil is absent or, if present, it is floccose and adheres to the margin of the pileus. The volva and ring are both wanting. The pileus is generally symmetrical and is never umbilicate and rarely umbonate. The gills are attached to the stem and are more or less strongly notched or sinuate at the stem. The stem is fleshy-fibrous, rather short and stout, without a bark-like skin as in the Collybia. It is homogeneous and confluent with the cap. The gills are white or dingy and frequently spotted. The caps may be smooth, scaly, dry, moist or water soaked.

The distinguishing feature of the Tricholoma is the *sinuate gills.* There are a number of species of the Tricholomas. I have found thirty-one species about Chillicothe. Of these but one, according to my experience, is not edible, *Tricholoma sulphŭreum.* The plants occur from May to freezing weather. A few of the species are here described and illustrated,

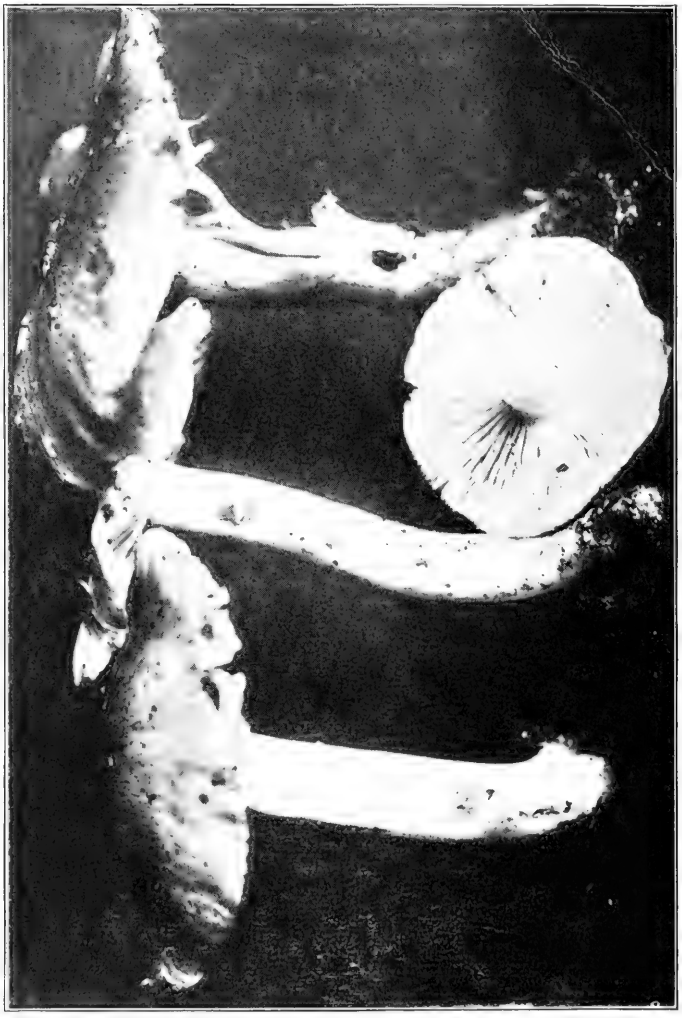

Fig. 221. Tri-cho-lo'-ma se-junc'-tum. See text for explanation.

TRICHOLOMA SEJUNCTUM Sow.

This is called *sejunctum* because the gills easily separate from the tem. It is a beautiful plant growing in beech woods among the leaves.

The caps two to three inches broad, convex, then expanded, broadly mbonate, viscid when moist, light yellow in color, streaked with black ibres, margin of the cap thin, odor frequently strong, taste mild.

The gills are notched at the stem, broad, rather distant, white, easily eparating from the stem.

The stem is solid, smooth, stout, often swollen in the middle. Spores

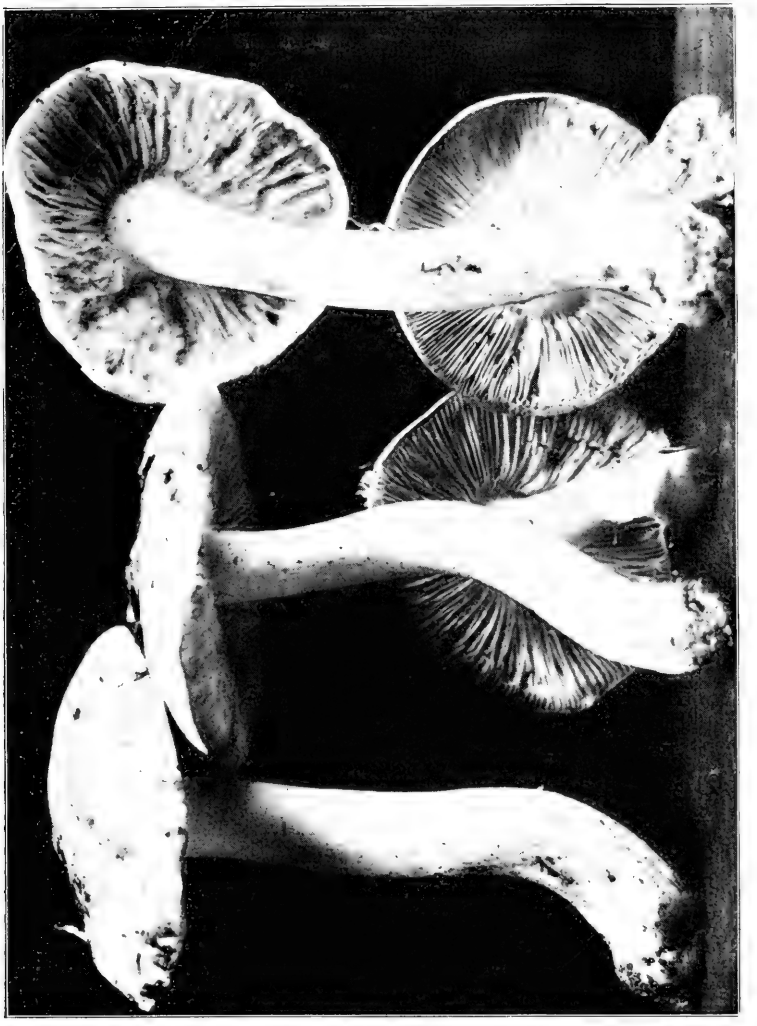

Fig. 222. Tri-cho-lo'-ma re-splen'-dens. See text for explanation.

are nearly spherical, 6μ. Its peculiar yellow color will distinguish the species. The taste of our plants is mild when raw and the flavor is excellent when cooked.

TRICHOLOMA RESPLENDENS Fr.

The significance of *resplendens* is *shining brightly*, and this species is called the *Shining Tricholoma*. It is edible and a very good flavored plant.

The caps are convex, then expanded until quite plane, viscid, shining

when dry, sometimes a shade of yellow on the disk. The flesh is white, taste mild, mushroom odor, entire plant white.

The gills are notched at the stem, rather crowded, unspotted, white.

The stem is rather long, solid, stout, smooth, sometimes flocculose at the apex, frequently slightly bulbous, even, white.

This is a beautiful plant found growing in mixed woods on a northern hillside among leaves. In Figure 222 is given a sample set of the species.

TRICHOLOMA FUNESCENS Pk.

The word *funescens* means *growing smoky.* The entire plant is of a dingy white. The gills are a cream white, soon changing to a smoky color with a blue or blackish color where bruised.

The caps are two to three inches broad, at first convex, then expanded and frequently wavy as will be seen in a Figure to be given later, dry, dingy white, with a fine tomentum.

The gills are narrow, notched at the stem, cream color, changing to a smoky blue or blackish where bruised, crowded.

The stem is short, round, sometimes slightly tapering downward, whitish. The spores are oblong-elliptical, 5-6.5 μ.

This species will be readily identified by the fine crowded gills and the smoky blue or blackish hue they assume when bruised or in age.

They are found in mixed woods on the ground among leaves. I find them on the north hillsides about Chillicothe, during September and November.

TRICHOLOMA SQUARRULOSUM Bres.

The specific name, *squarruolsum,* means *full of scales;* the caps, as shown in a Figure to be given later, are very scaly.

The caps are two to three inches broad, convex at first, then expanded, slightly wavy at times, margin somewhat involute at first, dry brownish tinge, then a lurid tan, darker in the center of disk, broadly umbonate, margin exceeding gills.

The gills are rather broad, crowded, whitish gray, changing to a reddish color when bruised, slightly notched at the stem.

The stem is somewhat paler than the pileus, two to three inches long, more or less scaly. The spores are elliptical, 7-9 x 4-5 μ.

This is an attractive plant growing in mixed woods among leaves. The caps are covered with black or reddish black squamules, which give rise to the name of the species. I have only succeeded in finding the plant in October. The specimens which will be shown in a later Number were found in Poke Hollow near Chillicothe, Ohio. They are edible and of good flavor.

TRICHOLOMA TERREUM Schaeff.

The word *terreum* is from Latin *terra,* the *earth;* so-called because of its color. It is known as the *Gray Tricholoma;* however, it is quite variable both in size and color, as well as in the manner of growth.

The pileus is usually dry, fleshy, two to three inches broad, often umbonate, grayish-brown or mouse-color.

The gills are adnexed, not close, white, becoming grayish.

The stem is one to three inches high, whitish, fibrillose, paler than the cap.

I find this plant on the north hillsides in beech woods. It is not plentiful about Chillicothe. There are several varieties of this species. It is edible and the time for its appearance is September to November.

Fig. 223. Tri-cho-lo'-ma ter'-re-um. See text, opposite page.

VOLVARIA BOMBYCINA.

M. E. Hard.

This is one of our most interesting plants. Its manner of growth will interest any one. The cut represents the plant when in the egg state. The volva or wrapper, mottled brown color, quite viscid. It soon breaks open at the top as will be seen in the cut. The volva has a silky appearance, but the cap or pileus is at first a pure silky white as will be seen in the figure where the volva has begun to fracture.

The plant grows quite large about Chillicothe. I frequently find it ten inhces broad. It is entirely white, fleshy, at first round or oblong, then bell-shaped, then convex, everywhere silky but when old it is apt to be hairy scaled. The flesh is rather thin and white.

The gills are not attached to the stem and very close together, broader in the center, flesh color as soon as the spores begin to drop.

The stem three to six inches long, solid, smooth, white, tapering from the base to apex.

The volva is soon split at the apex, membranaceous, viscid and persistent. The spores are elliptical.

It is usually found solitary, but sometimes a number will be found growing from the same log. I have frequently seen a dozen growing from a hollow beech log where the plants in Figure 224 were found. It is found growing in hollow trees, on decayed shade trees, or on decayed branches in the woods. I have never eaten it but Dr. Curtis gives it as edible in his list of edible mushrooms. It is found from July to October. I found a specimen that measured eight inches across the cap Saturday, September 29, 1906.

Fig. 224. Vol-va'-ri-a bom-by-ci'-na. The egg-state of the plant when in the act of emerging from the *volva*. The pileus and flesh-colored gills are not yet visible. The photo represents two fine plants close together, found growing from a hollow beech log, near Chillicothe, Ohio. See text on previous page.

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Mycological Bulletin

No. 74

W. A. Kellerman, Ph. D., Ohio State University
Columbus, February, 1907.

A TYLOSTOMA NUMBER.

The interesting Puffballs belonging to the genus Ty-los'-to-ma have been thoroughly treated by eminent authority, namely, C. G. Lloyd in Mycological Notes, and we give our readers the benefit of his study, which has extended over several years. He has kindly furnished the cuts as well, and we devote this entire No. to the subject.

QUOTATIONS AND ILLUSTRATIONS FROM MYCOLOGICAL NOTES, RELATING TO THE SPECIES OF TYLOSTOMA.

By C. G. Lloyd.

TYLOSTOMEAE.

The Tylostomeæ embrace all Gastromycetes with dry spores, having peridia borne on distinct stalks that are not prolonged as axes.

THE GENUS TYLOSTOMA.

This is the largest genus and the smallest individuals that belong to the tribe Tylostomeæ. It is spread over the earth's surface and every locality has probably one or more species. The genus is more common in sandy countries. All species with the exception of two or three grow in the ground. Tylostoma exasperatum (and perhaps a couple of others that are little known) always grows on branches or logs.

The genus can be thus described. Exoperidium of the nature of a cortex, separating more or less from the upper part of the mature plant, but usually remaining more or less persistent at the base of the peridium. Endoperidium opening by a definite mouth (in a few species by several mouths). There is a depression or "socket" at the base of the peridium into which the stipe is inserted. Gleba of branched, septate, capillitium mixed with the spores. Stipe distinct from the peridium and inserted into a "socket" at its base.

THE SPECIES OF TYLOSTOMA.

For convenience in classification we have divided the Tylostomas into groups according to the most prominent characters as follows:

Mouth definite, tubular, round, naked, more or less protruding.
Spores smooth ..... Group 1.
Spores not smooth.
Cortex granular or tubercular or scaly..... Group 2.
Cortex not granular or tubercular or scaly.
Stipe with strong scales, [No American Species]..Group 3.
Stipe without strong scales.
Peridium uncolored ..... Group 4.
Peridium colored ..... Group 5.
Mouth definite, naked, elongated, sometimes several on same peridium ..... Group 6.
Mouth with an indefinite, torn aperture, not surrounded with a fibrillose layer, [No American Species]..... Group 7.
Mouth surrounded with a fibrillose layer.
Spores smooth ..... Group 8.
Spores granular ..... Group 9
Mouth "fimbriate" [No American Species]..... Group 10

GROUP 1.

TYLOSTOMA OCCIDENTALE.—Peridium *white,* with a small, tubular, circular, protruding mouth. Cortex adhering, separating imperfectly, largely adhering in patches to the peridium, not strongly thickened at the base. Stem pale, not scaly, strongly longitudinally striate, white internally, hollow with a central fibril. Capillitium slightly colored, with plane or oblique unthickened septa. Spores 4-5 mic. almost smooth.

This species is very close to Tylostoma albicans, but on comparison is quite different. The peridium is much whiter, the stem strongly striate, the spores smoother. Specimen from the state of Washington.

Fig. 221.—Ty-los'-to-ma oc-ci-den-ta'-le. (C. G. Lloyd).

GROUP 2.

TYLOSTOMA VERRUCOSUM.—Peridium globose deeply colored, reddish brown, with a protruding, tubular mouth. Cortex thin, adnate, verrucose, persistent. Stem deeply colored, covered when growing with long, spreading scales which mostly fall away from dried specimens leaving the stems with short scales. Capillitium faintly colored, freely septate, not swollen at the septa. Spores 5-6 mic. *aculeate.*

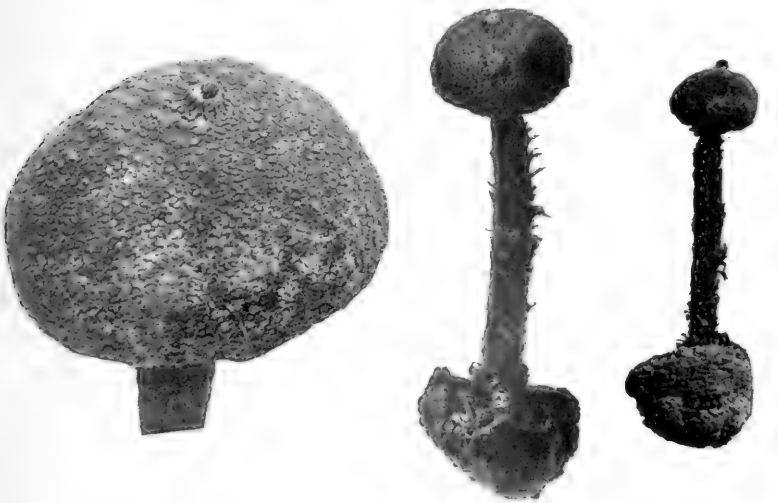

Fig. 222.—Ty-los'to-ma ver-ru-co'-sum. (C. G. Lloyd.)

This is evidently a very rare and local plant. I collected it once in company with Prof. Morgan who told me it was the first time he had seen it since the original collection some ten or fifteen years before. I have received it from no correspondent save Mr. Long, Texas, who sent two small specimens but evidently the same species. Tylostoma verrucosum is very close to Tylostoma squamosum of Europe, having the same mouth, color, spores and stem scales, and is in my opinion the American expression of the European plant. It differs in its verrucose cortex and more robust habits.

GROUP 4.

TYLOSTOMA ALBICANS.—Peridium uncolored, dirty white, with a small, tubular, circular protruding mouth. Cortex adherent, separating imperfectly, particles adhering to the peridium, at the base of the peridium thickened and subpersistent. Stem pale or slightly colored, rough, striate but not scaly. Internally white, with central fibrils. Capillitium hyaline, slightly swollen at the joints, with a plane septum. Spores 5-6 mic., slightly asperate.

The prominent features are the uncolored peridium, the tubular mouth,

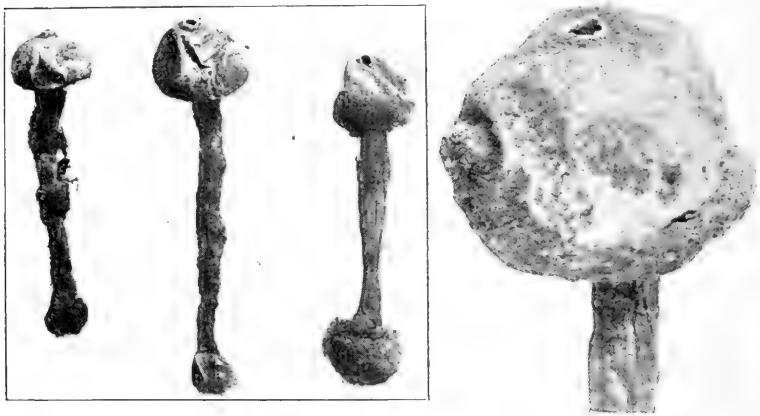

Fig. 223.—Ty-los'-to-ma al'-bi-cans. (C. G. Lloyd).

the partly adherent cortex. The plant is never "smooth" and does not seem to us to be well described or figured by Miss White. However, we are assured from our study of the type specimens and the photographs we have made of them that it is the same plant that reaches us from Texas and hence use the name. We have received Australian specimens from J. G. O. Tepper that we can not separate from the Texan species.

Fig. 224.—Ty-los'-to-ma pyg-mae'-um. (C. G. Lloyd).

TYLOSTOMA PYGMAEUM.—Peridium uncolored, dirty white with a small, tubular, circular, protruding mouth. Cortex adhering, separating imperfectly, particles adhering to the peridium, thickened and persistent at the base. Stem slender, pale, rough, longitudinally striate but not scaly. Capillitium hyaline, swollen at the joints. Spores 5 mic., strongly asperate.

This little species is of a southern range in the United States, and in general appearance could be described as a pygmy Tylostoma albicans. It differs from that species in its small size and rougher spores.

GROUP 5.

TYLOSTOMA SIMULANS.—Peridium pale, castaneous color, with mouth unicolorus. Cortex thin, separating imperfectly. Stem slender, pale, slightly striate and sometimes slightly scaly. Capillitium rarely septate with thickened nodes. Spores 5 mic., asperate.

This is the nearest approach we have in America to Tylostoma mammosum of Europe, and it is a rare plant. On comparison it differs in its unicolorous and more deeply colored peridium, more adnate cortex and paler stipe.

Fig. 225.—Ty-los'-to-ma sim'-u-lans. (C. G. Lloyd).

TYLOSTOMA RUFUM.—Peridium deeply colored, reddish brown, with a circular, tubular, strongly protruding mouth. Cortex thin, adhering, but separating perfectly from old specimens, leaving the peridium perfectly smooth. Stem deeply colored, covered with short scales, internally

Fig. 226.—Ty-los'-to-ma ru'-fum. (C. G. Lloyd).

white with central fibrils. Capillitium faintly colored, not swollen at the septa. Spores 5 mic., granulose.

This species has been, I am sure, usually determined as Tylostoma mammosum in the United States. It differs from Tylostoma mammosum of Europe in its more deeply and uniformly colored and larger peridium, its short, thick, scaly stem and in its capillitium nodes.

Fig. 227.—Ty-los'-to-ma pur-pu'-si-i. (C. G. Lloyd).

TYLOSTOMA PURPUSII.—Peridium pale, castaneous color, darker at the mouth, with a circular, tubular, protruding mouth. Cortex partly adherent at the base but mostly freely separating, leaving the peridium smooth. Stem colored, rough but not scaly. Capillitium subhyaline, the septa rare, those of the smaller branches swollen but of the large branches very slightly. Spores 5 mic., asperate.

This species can easily be taken as a giant form of Tylostoma mammosum. It is a rare plant and I have seen from America only the type specimens at Berlin, which were collected in Colorado by a Mr. Purpus.

Fig. 228.—Ty-los'-to-ma flor-i-da'-num. (C. G. Lloyd).

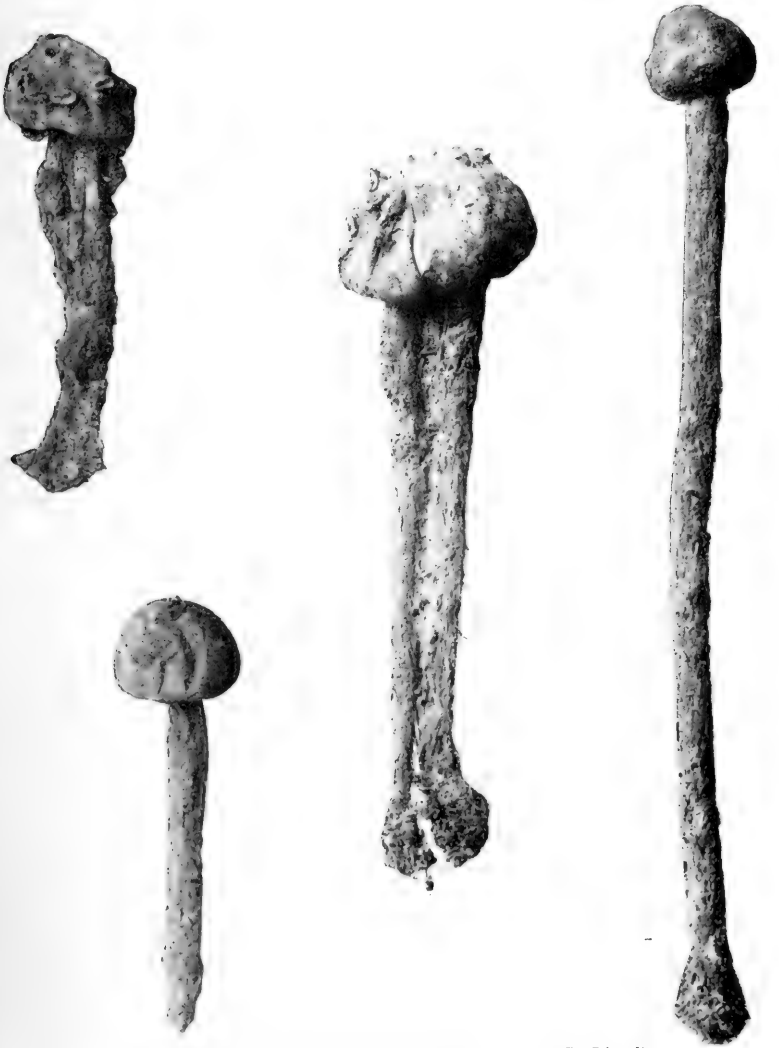

Fig. 229.—Ty-los'-to-ma a-mer-i-ca'-num. (C. G. Lloyd).

TYLOSTOMA FLORIDANUM.—Peridium *dark castaneous* color, with a small, tubular, circular, protruding mouth. Cortex separating imperfectly, particles adhering to the peridium, thickened and subpersistent below. Stem slender, *dark reddish brown*, sub-smooth, substriate with no trace of scales, white within, hollow with central fibrils. Capillitium subhyaline, sometimes waxy with septa both swollen and even. Spores 5 mic., strongly asperate.

This little species seems to be of a southern range, reaching me only

from Florida. The slender, very dark colored stem and the colored peridium distinguish it from all related species.

GROUP 6.

TYLOSTOMA AMERICANUM.—Peridium uncolored, pale, often with several irregular, naked, protruding mouths. Stem obese, pale or light colored, hollow, often striate, varying much in thickness and length, from two to six inches long. Capillitium hyaline. Spores 5-6 mic., smooth.

This plant was collected in great abundance in the vicinity of Denver, Colo., by E. B. Sterling. In my opinion it is only an American form (hence the name) of Tylostoma caespitosum of North Africa, although the spores are not the same and it is a much more robust plant.

SYNONYMS.—In my opinion Tylostoma Kansense is the same plant although I do not use the name, as Prof. Peck (to whom I sent specimens of the Denver plant) strongly disagrees with me and Patouillard and Bresadola have coincided with Prof. Peck. They form their opinions from the darker color of the capillitium, which I readily agree is slightly darker in Kansas specimens. The specimens Mr. Bartholomew sent me are old, wintered specimens(and I think that explains not only the darker capillitium but also the *different mouth* of T. Kansense as described.

[CONTINUED IN NEXT NUMBER]

Fig. 230.—TY-LOS'-TO-MA POC-U-LA'-TUM. (C. G. Lloyd).

(SEE NEXT NUMBER)

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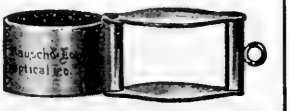

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Mycological Bulletin

No. 75

W. A. Kellerman, Ph. D., Ohio State University
Columbus, March, 1907.

TYLOSTOMA CONCLUDED—CORTINARIUS BEGUN

The valuable monagraph of the stemmed puffballs, *Ty-los-to-ma* by C. G. Lloyd in his Mycological notes, with admirable illustrations, we complete in this number. We desire to give our readers some idea of what Mr. Kauffman is doing to increase our knowledge of the large, conspicuous and interesting genus *Cor-ti-na-ri-us*. We will reproduce a part of his article published in the *Botanical Gazette, Torrey Bulletin* and the *Journal of Mycology* with half a dozen or more plates of his new species.

GROUP 8.

TYLOSTOMA POCULATUM.—Peridium smooth, pale, with a strongly raised shield-shaped fibrillose mouth. Cortex thick, breaking away *perfectly* from the peridium which it leaves *perfectly smooth* excepting at the base where the thick cortex persists as a kind of cup. Stem pale or slightly colored, sulcate, striate, not scaly, usually thickened below (sometimes strongly) with the mycelial, adnate sand. Capillitium subhyaline, or sometimes distinctly colored, sparingly septate, with slightly thickened septa. Spores 5 mic., *smooth.*

This is a most peculiarly marked species. both in its mouth and cortex characters and we know no other species having either of the characters so strongly marked. It occurs chiefly in our western states, but we have it also from Australia. No form is known in Europe. Tylostoma minutum is, in my opinion, based on a small specimen of it. It varies in two features, color and roughness of the spores, and plants so varying have been called species, but to my mind they are so close that they may better be called forms.

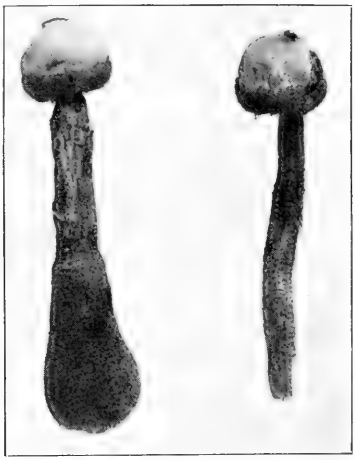

Fig. 231.—Ty-los'-to-ma tu-ber-cu-la'-tum. (C. G. Lloyd).

FORMS OF TYLOSTOMA POCULATUM.

TYLOSTOMA TUBERCULATUM.—We find specimens agreeing with Tylostoma poculatum in general characters, and so close to it they can not be distinguished except by the microscope, that differ in having spores not smooth but granular. For us it is a form but for those who give their species no latitude as to *spore variation* it is a strong species. We are not sure it is Miss White's plant, as we would describe the spores as "granular" instead of with "occasional tuber-like warts," but we prefer to use her name rather than to propose a new one

Fig. 232.—Ty-los'-to-ma sub-fus'-cum. (C. G. Lloyd).

TYLOSTOMA SUBFUSCUM.—The usual color of Tylostoma poculatum is pale tan but sometimes collections are dark chocolate brown. Sometimes both colors occur in same collection and I have noted all shades of connecting colors. The extreme color form, however, is very marked. Spores are granular in all we have examined.

Fig. 233.—Ty-los'to-ma lloyd'-i-i. (C. G. Lloyd).

TYLOSTOMA LLOYDII.—Peridium dark, reddish brown, with a thin, closely adnate cortex which separates perfectly above but persists closely adnate at the base. Mouth at first *raised, shield-shaped,* fibrillose. In old specimens these fibrils are worn away, leaving the mouth a naked round, plane opening. Stem *long,* slender, with a dark, scaly, cortex. Capillitium slightly colored, subhyaline, narrow threads with slightly thickened nodes. Spores *smooth,* 4 mic.

This is apparently a very rare and local form but is strongly different from any other species known to me. Prof. W. H. Aikin collected the plants several years ago in the vicinity of Cincinnati, Ohio, and brought the specimens to me. I sent some to Rev. Bresadola who decided it to be undescribed and published it recently (Ann. Mycologici, 1904, p. 423). I have never received specimens from any other collector.

Fig. 234.—Ty-los'-to-ma o-be'-sum. (C. G. Lloyd).

TYLOSTOMA OBESUM.—Peridium uncolored with a raised fibrillose mouth. Cortex separating freely, leaving the peridium smooth. Peridium with a marked collar at base. Stipe, thick, obese. Capillitium strongly colored. Spores smooth.

Known from a single collection from Colorado. The type is at Kew but a better specimen is in Ellis' collection at New York.

Fig. 235.—Ty-los'-to-ma cam-pes'-tre. (C. G. Lloyd).

GROUP 9.

TYLOSTOMA CAMPESTRE.—I do not feel that it is possible to consider this as other than the American form of Tylostoma granulosum. I do not know of a single character to distinguish it. And yet on comparing collections of the American and European plants a general difference is usually seen. The American plant is more robust, the heads are globose and firmer, the cortex peels off more freely in the American plant and does not adhere to the base so strongly. While we believe we could in most cases guess correctly whether a collection was American or European, we would not guarantee to do it in all instances. A plant that does not typically present a single marked character by which it can be known is not a species. We have a few collections that grew in the sand and have more slender stems with mycelial strands strongly developed. This we take to be Tylostoma fibrillosum, but for us it is a condition not a species. A form collected by Mr. Bartholomew, Kansas, is closer to the European plant in stature than to the American, and some specimens have little depressions in the peridium. It was called Tylostoma punctatum.

Tylostoma campestre is the most common species in the United States and the only one that is at all frequent east of the Mississippi. It is most abundant in the neighborhood of the Great Lakes.

Fig. 236.—Ty-los'-to-ma berke-ley'-i-i. (C. G. Lloyd).

TYLOSTOMA BERKELEYII.—Peridium *colored*, reddish brown. Cortex nature of a sand case, separating usually imperfectly and much more strongly adnate than the previous species. Mouth surrounded by a few granular fibrils (the same as the previous plant). Stem *slender*, dark reddish, often slightly scaly, usually strongly sulcate, striate. Capillitium light colored with slightly swollen often oblique septa. Spores 5-6 mic., granulose.

This plant occurs in the southern United States, and is the species referred to in American literature as Tylostoma fimbriatum, surely a misnomer for no similar plant grows in Europe. It was Berkeley I think who first thus determined the American plant, and hence we name it in his honor. This species corresponds to the European only in its mouth

and spore characters. It differs in being a *colored plant* and having a large head and slender stem. A splendid illustration of the plant was given by Petri (Ann. Mycologici, 1904, plate 6) under the name of Tylostoma fimbriatum, and drawn we think from American specimens.

NOTES FROM MUSHROOM LITERATURE IV.

W. A. Kellerman.

Mr. C. H. Kauffman, of the University of Michigan, has published in the Botanical Gazette some observations on Cortinarius as a Mycorhiza-producing fungus. The fungi are very few which have been definitely reported as belonging to this class—in which the hyphae (mycelium) are intimately associated with roots of higher plants, and purveyors of nitrogen. We shallquote liberally from this interesting and important paper. "When we come to a consideration of the agarics our knowledge is meager indeed. Only one investigator, Noack, in 1899, has concerned himself with them. He found that five species of this group were apparently mycorhiza-producers on the forest trees of the locality where he made his observations. Two were Tricholomas; one a Lactarius, and three were Cortinarii. He merely makes the bare statement that they are connected with the rootlets by mycelial strands, which he could easily make out. It is very probable that his observations are correct. It seems to be appreciated that we need some investigation to determine what fungus we are dealing with, so that problems which have to do with the physiological side of mycorhiza may be understood more intelligently; for it is just as likely that knowledge concerning the fungus and its life history may lead to an understanding of the relation of the two organisms as a knowledge of the tree would. It seems worth while, therefore, to report the identity of any such mycorhizal fungi whenever the evidence seemed sufficient to make it acceptable. In a previous paper I pointed out that the members of the genus Cortinarius were so constantly found in limited areas, and some species in such close proximity to certain trees, that it seemed likely that there was some connection. This last summer an effort was made to find out to what extent this might be true. The season was wet during the early summer, and although one finds few Cortinarii as a rule before August, several did occur, and one of these proved to be favorable for my purpose. It not only showed beautifully its connection with the tree roots, but turned out to be an undescribed species of Cortinarius. It was found July 4, 1905, on the south slope of a small ravine along the Huron river, near Ann Arbor, in a layer of humus and forest leaves. This species, as is indeed true of some other fleshy fungi, is characterized by its brick-red mycelial strands and stem. By removing the surface soil it was possible to see the brick-red strands intertwining with the rootlets, apparently in all directions. * * *

"But it was soon found that the reddish net-work extended along definite paths. Beginning with a tiny rootlet, the fungus was followed to a rather large root, apparently growing from a hickory. On examination, however, it was found that the mycorhiza-bearing root passed the hickory, and that all the roots of the hickory examined were devoid of a colored mycorhizal fungus. On the other hand, the root in question was now easily traced to a clump of red oaks. * * *

"About twenty paces down the slope, another troop of the same species of Cortinarius was found. These came up only 30 cm. away from a fine young sugar maple, and close to one of its main roots. Expecting that they were probably attached to the roots of an oak a short distance

away, I dug down carefully and found to my surprise that the strands which were very luxuriant here were attached to the rootlets of the sugar maple. * * *

"An ash, basswood and white oak were examined, but no trace of the fungus found. About 27 dm. from the sugar maple, it was found that some of the strands were apparently attached to a different root. Following this up to a clump of red oaks about 54 dm. away, I was again surprised to find that the oak roots in this case were not conected with the fungus at all, but that the root which was followed—which did not have the appearance of an oak root—belonged to a large *Celastrus scandens* which wound around one of the oaks. It was clear that we had another symbiont connected with the fungus. * * *

"Let it not be supposed that all Cortinarii are mycorhiza-formers, at least normally. *Cortinarius armillatus*, for example, although very partial to *Tsuga canadensis*, is usually found among rotten logs or leaf-mold near this tree, and is probably a saprophyte; on the other hand, it has been found growing out of a cleft at the base of one of these hemlock trees. It seems quite likely, however, that a good many Cortinarii are in symbiotic connection in the manner of the one described in this paper. During several seasons' observations, I have found *C. squammulosus*, C. bolaris, and *C. cinnabarinus* again and again in places which would indicate some relation to one kind of tree. *C. cinnabarinus* seems to prefer the oak, the other two the beech. Noack has shown the connection of *Cortinarius callisteus* with the beech, *C. caerulescens* with the beech, and *C. julmineus* with the oak. Others will, no doubt, be added to the list as soon as observers enter this interesting field."

Fig. 237.—Cor-ti-na'-rius rub'-ri-pes. (C. H. Kauffman.)

Fig. 238.—Cor-ti-na'-rius at-kin-so-ni-a'-nus. (C. H. Kauffman.)

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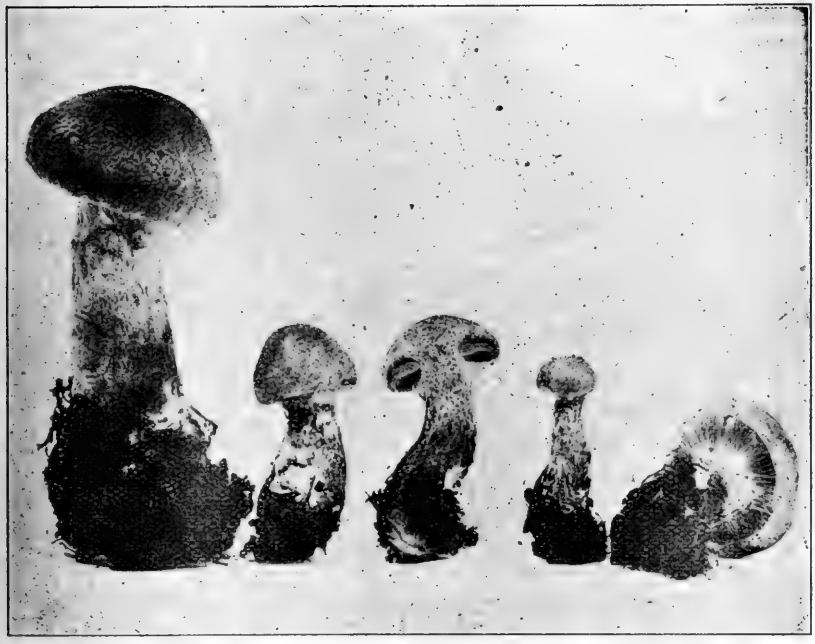
W. A. KELLERMAN, Ph. D. OHIO STATE UNIVERSITY



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W. A. Kellerman, Ph. D., Ohio State University

Columbus, April, 1907.

KAUFFMAN'S ARTICLE AND ILLUSTRATIONS CONCLUDED.

We devote this number to a note on Kauffman's Key to Cortinarius and some of his illustrations that appeared first in the Torrey Bulletin.

THE GENUS CORTINARIUS WITH KEY TO THE SPECIES.

BY C. H. KAUFFMAN.

The editor of the Journal has asked me to furnish an account of the genus *Cortinarius* with *Key* to the species. What follows is given in response to this invitation. I desire to call attention to what was published in the *Bulletin of the Torrey Botanical Club*, based mainly on my study of the species found at Ithaca, N. Y. The cuts prepared for the illustrations then have been kindly loaned for use here.

I quote from the same article the following:

"It is absolutely useless to pick up an old, dried specimen of *Cortinarius*, and ask any one to recognize it. Once in a while some easily known plant may be recognized in that way, but in the majority of cases old plants of different species look so much alike that it is mere guessing to say anything about them. The first thing to remember is that young, unexpanded plants must be examined as well as mature ones. Next a careful description must be made, *with special reference to the difference in the color of the gills in the young and old plants.* Then a similar comparison of the color of pileus and stem; and then a search for an annulus or universal veil, and its character. Finally, a careful test of the pileus and stem for gluten or viscidity. (One must remember that old, dry plants may lose this character.) These points are absolutely essential. In addition to the above, the following characters are often useful: the shape of the pileus; the size of the parts; the smoothness of the surface of pileus and stem; the character of the edge of the gills; the nature of the bulbous base of the stem; the appearance of the flesh. In fact, the notes cannot be too full, *provided they contain the essential facts mentioned first.*" (*Bulletin of the Torrey Botanical Club.*)

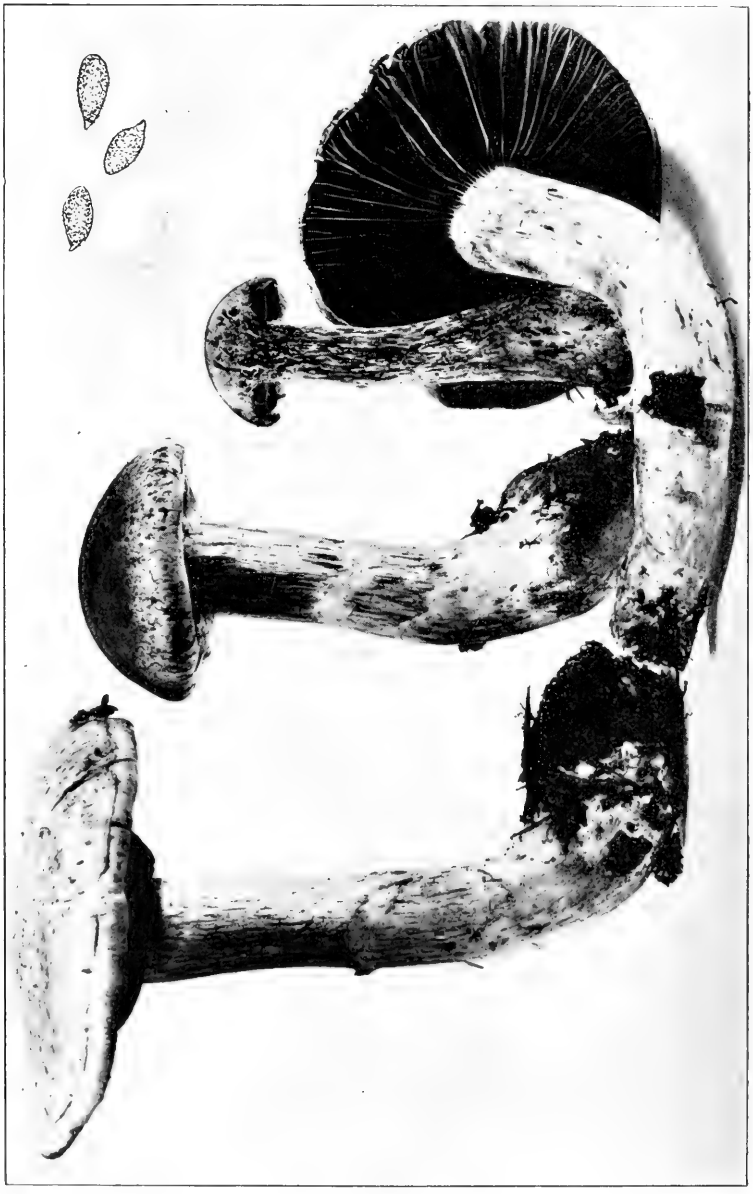

Fig. 239.—Cortinarius umidicola Kauff.

THE KEY.

The key which is here presented is a revision, with many additions, of the key printed in the Bulletin of the Torrey Botanical Club, June, 1905. It is based on the study of fresh plants; but there have been added a few which the writer has not seen, but which have characters so easily recognized, and so different from others, that they were thought worthy of inclusion. This key, like its predecessor, necessarily has many shortcomings. As long as we are not sure what American plants are really identical with European ones, and so long as good figures or photographs of the species described for North America, are lacking, we are easily able to mistake the meanings of the descriptions, which are often of the very briefest. Hence this list is merely offered as a slight forward step towards opening up for amateurs the study of this interesting genus.

Six species, which the writer believes to be undescribed, have been included, although their descriptions have not yet been published. All of them have been collected or been received from various places more than once, and by inserting them in the key, we may be able to help those who continue to come across them. It is hoped soon to publish descriptions of them elsewhere.

It is to be noted that the key has been built largely on the size of the spores. This will necessitate, it is hoped, the study of the plant under the microscope, and so initiate the beginner at once into the proper study of these fungi. We know that two different species of mushrooms have again and again been placed under one name because of similar external appearances, when an examination of the spores would have shown a difference of as much as 8 microns in some cases. In deciding on the size of spores, the measurement of mature spores only should be taken, which may be recognized by the dark wall or the roughness of the exospore; even in plants with yellowish spores a difference between young and mature spores can be made out.

KEY TO THE COMMON SPECIES OF CORTINARIUS OF EASTERN NORTH AMERICA.

A. Pileus with a gelatinous cuticle, more or less viscid or glutinous when moist, as is also the stem in some species. (Myxacium and Phlegmacium.)

a. Pileus coarsely corrugate ..... *C. corrugatus Pk.*

aa. Pileus not coarsely corrugate

b. Surface of pileus or flesh distinctly bitter

c. Pileus yellow

d. Glutinous when young, very bitter; stem white ..... *C. amarus Pk.* *C. vibratilis Fr.*

dd. Not glutinous; stem and gills citron yellow; flesh rather bitter; spores 14-17x7-9..... *C. turbinoides sp. nov.*

cc. Pileus dark olivaceous to fuliginous, surface bitter.... ..... *C. infractus Fr.*

bb. Taste not distinctly bitter

c. Spores large, 9-16μ long

d. Stem short, subequal or marginate-bulbous, spores 9-12μ long.

e. Pileus heliotrope-purple; gills close, narrow and concolor; plant medium size..... *C. heliotropicus Pk.*

ee. Pileus some shade of yellow or greenish

f. Gills whitish at first; pileus tinged greenish; stem not bulbous ..... *C. olivaceo-stramineus Kauff.*

ff. Gills yellow to yellowish at first; stem marginate-bulbous

g. Bulb top-shaped; gills entire; flesh white..... *C. turbinatus Fr.*

gg. Bulb truncate below; gills eroded, flesh yellow; whole plant citron-yellow ..... *C. sulfurinus Quel*

Fig. 240—CORTINARIUS CROCEOCOLOR Kauff.

eee. Pileus whitish, no greenish tinge
f. Stem marginate-bulbous; plant whitish throughout..*C. albidus Pk.*
ff. Stem equal to subequal; pileus whitish or tinged red..... ..... *C. communis Pk.*
dd. Stem long and bulbous; gills and stem violaceous at first.
e. Spores 10-12.5μ long; pileus pale brown; on sphagnum.. .....*C. sphagnophilus Pk.*
ee. Spores 13-16μ long; pileus yellow; in woods..... .....*C. Atkinsonianus Kauff.*
ddd. Stem not bulbous, long and cylindrical, plant more or less glutinous
e. Stem with evanescent, patch-like scales
f. Gills palid at first.....*C. clatior pallidifolius Pk.*
ff. Gills violaceous at first.....*C. cylindripes Kauff.*
ee. Stem with broken, concentric rings of floccose scales, usually somewhat narrowed at base .....*C collinitus Fr.*
cc. Spores smaller, 6-9μ long
d. Pileus olivaceous, stem bulbous
e. Universal veil present; spores 8-9μ long....*C. olivaceoides sp. nov.*
ee. No remains of a universal veil; spores 6-7μ long.*C. olivaceus Pk.*
dd. Pileus violaceous or purple, or at least tinged violaceous
e. Pileus glutinous when young and moist.

The Key of which the above is a small portion, will be concluded in the May Bulletin. It is also printed entire in pamphlet form for sale.

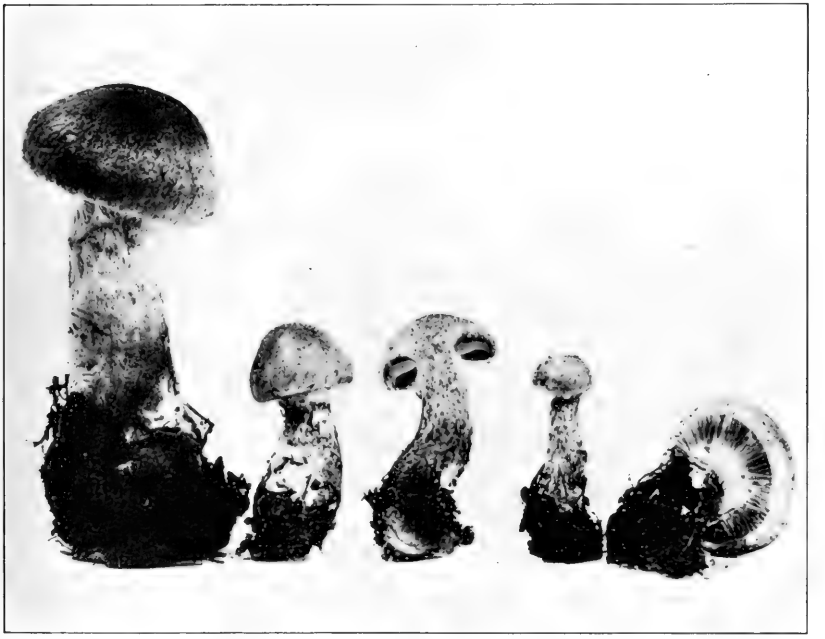

Fig. 241.—Cortinarius deceptivus Kauff.

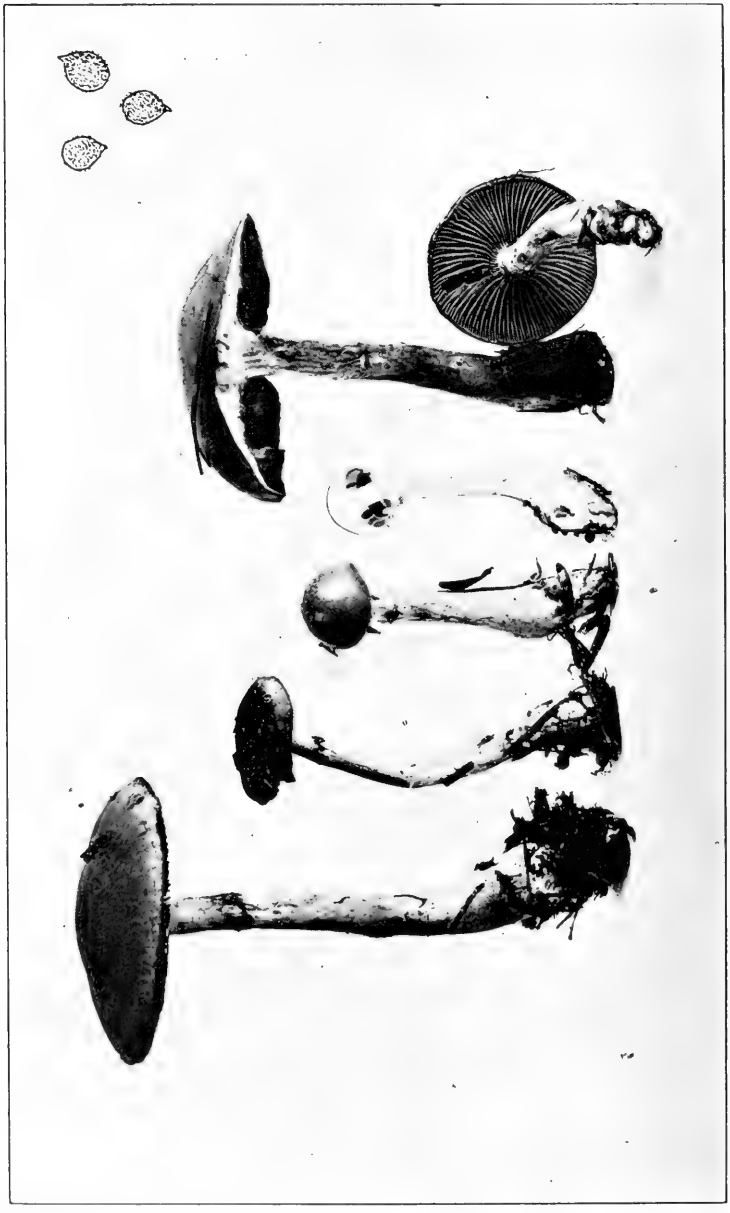

Fig. 242.—Cortinarius sterilis Kauff.

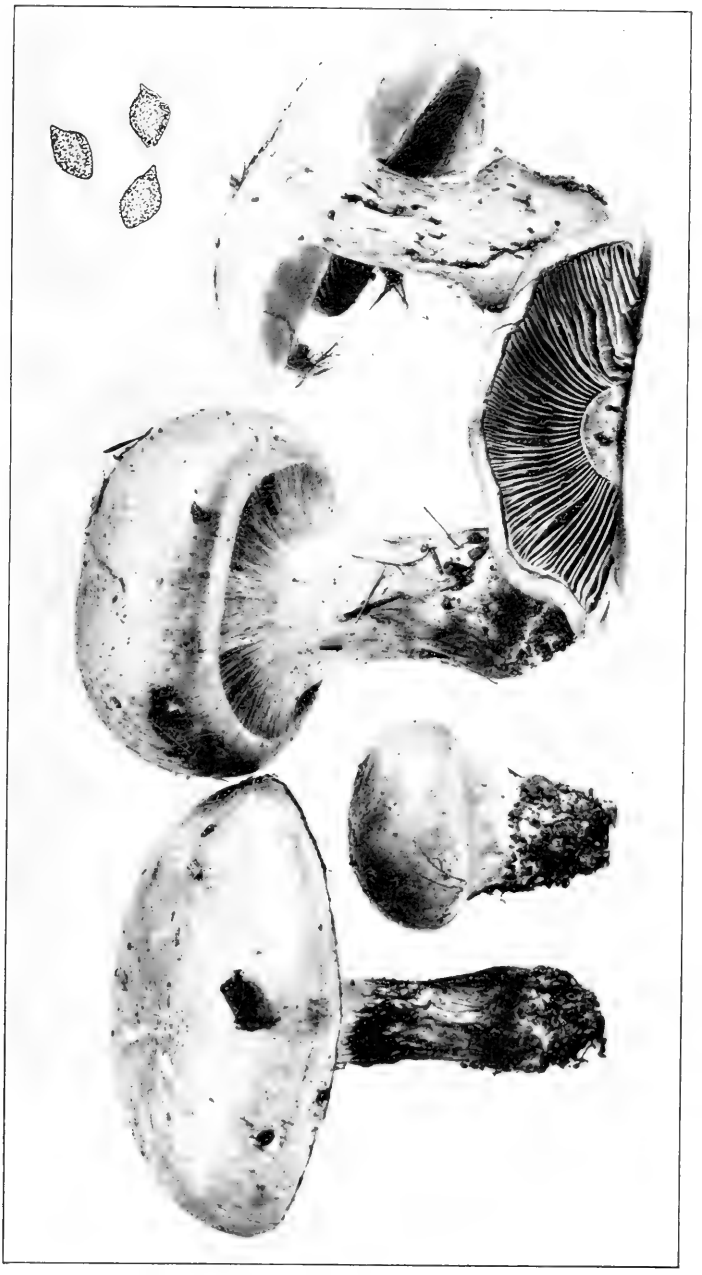

Fig. 243.—Cortinarius olivaceo-stramineus Kauff.

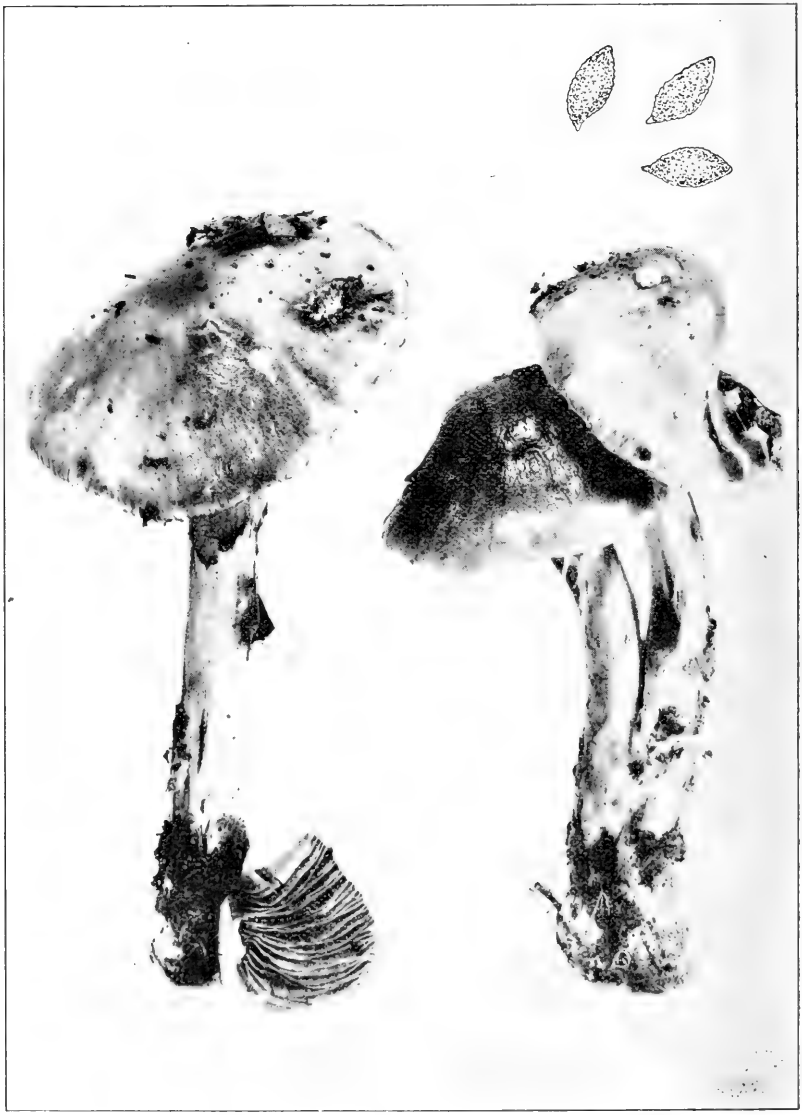

Fig. 244.—CORTINARIUS CYLINDRIPES Kauff.

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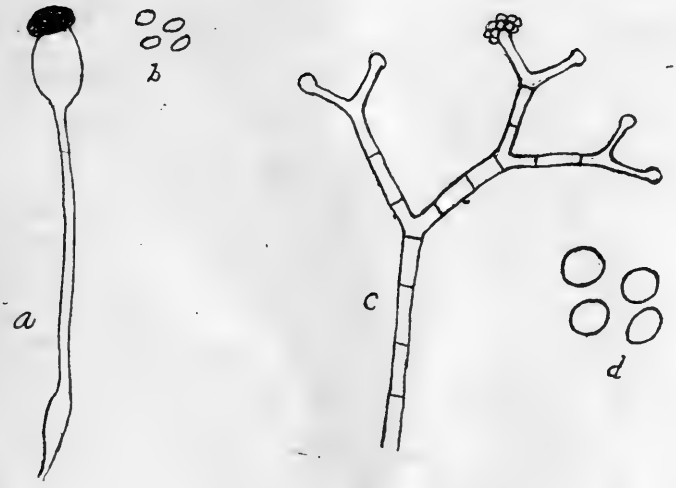

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Mycological Bulletin

No. 77

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio, May 1907.

THE EDITOR NEEDS LITTLE SPACE.

We print the concluding portion of Mr. Kauffman's admirable Key to the species of Cortinarius in this number. It can not fail to be very useful to those who have the courage to attack this difficult genus. Our species are so numerous that every one can take a turn at the Key—but we will not be surprised if some of the amateurs or even students later report to us that some things are easier to master than this Key or the species of Cortinarius.

We are able to furnish an additional diversion also in the presentation of matter that amateurs may not have thought of as in the nature of "Mushrooms"—referring to the article on Moulds by Superintendent Sumstine. But these are Fungi, and the word Mycology includes this interesting group. We will be glad for additional articles and notes by patrons of the BULLETIN.

KEY TO THE SPECIES OF CORTINARIUS.

(Continued from p. 315.)

f. Stem marginate-bulbous; gills very narrow and crowded; whole plant violaceous, large .....*C. Michiganensis sp. nov.*

ff. Stem subequal or clavate; gills subdistant, adnate; whole plant violaceous-purple, medium size .....*C. iodes B. & C.*

ee. Pileus not glutinous

f. Flesh and gills turning purple when bruised...*C purpurascens Fr.*

ff. Flesh not turning purple

g. Stem marginate-bulbous; pileus yellowish or brownish, tinged violaceous; medium size .....*C. coerulescens Fr.*

gg. Stem not marginate-bulbous

h. Pileus yellow; gills violaceous to cinnamon; stem white with violaceous apex .....*C. Berlesianus Sacc. & Cub.* (*Syn.=C. tricolor Pk.*)

hh. Pileus and gills lilac; plant small.....
C. croceo-coeruleus (*Pers.*) *Fr.*

ddd. Pileus with neither olivaceous nor violaceous tints (*except the first*)

e. Pileus glutinous

f. Gills olivaceous; pileus brownish-ochraceous.....*C. glutinosus Pk.*

ff. Gills whitish at first

g. Pileus bay-red .....*C. maculipes Pk.*

gg. Pileus pale ochraceous, spores globose..*C. sphaerosporus Pk.*

fff. Gills violaceous at first, spores as in preceding...*C. delibutus Fr.*

ee. Pileus not glutinous

f. Stem marginate-bulbous

g. Gills at first whitish .....*C. multiformis Fr.*

gg. Gills at first blue .....*C. glaucopus Fr.*

ggg. Gills at first yellow.....*C. fulgens* (*Alb. & Schw.*)

ff. Stem not marginate-bulbous, clavate to subequal

g. Gills and stem pallid at first, soon tinged brown

h. Pileus watery-cinnamon to brick-red on disk; in woods
C. glabrellus sp. nov.

hh. Pileus whitish to pale clay-color; in mushroom and flower-beds .....*C intrusus Pk.*

gg. Gills and apex of stem violaceous at first, soon brownish
C. lanatipes Pk.

ggg. Gills and pileus drab-gray; viscid universal veil present
C. sterilis Kauff.

B. Cuticle of pileus not composed of gelatinous cells, hence never viscid nor gelatinous. [*Inoloma, Talamonia, Dermocybe, and Hydrocybe.*]

a. Spores 12-16μ long

b. Pileus rather large, squamulose; whole plant dark violaceous
C. violaceus Fr.

bb. Pileus small, chestnut color; stem white; spores 16x11μ....
C. sericipes Pk.

aa. Spores 10-12μ long

b. Plants small, 2-4 cm. tall

c. Pileus hygrophanous, glabrous, bay-red (moist); gills subrochraceous .....*C. badius Pk.*

cc. Pileus not hygrophanous, densly fibrillose; gills yellow
C. aurcifolius Pk.

bb. Plants larger

c. Stem distinctly sheathed or ringed by the universal veil

d. Pileus tawny; stem with cinnabar-colored, persistent, concentric rings .....*C. armillatus* (*Alb. & Schw.*)

dd. Pileus purplish-brown, copper-brown, etc., to drab; stem peronate, i. e., sheathed with a universal veil..*C. torvus Fr.*
C. torvus nobilis Pk.

ddd. Pileus tinged yellow or rufous; stem peronate and annulate by a white universal veil .....*C. canescens Pk.*

cc. Stem not sheathed or ringed; the universal veil evanescent or absent.

d. Pileus hygrophanous, fibrillose-squamulose (like C. paleaceus)

e. Pileus dingy chestnut (moist); stem long and slender...*C. gracilis Pk.*

ee. Pileus grayish; stem stout and short, bulbous.....*C. grieseus Pk.*

dd. Pileus not hygrophanous, merely silky or innately fibrillose

e. Pileus reddish-gray, tinged purplish; gills purple or violaceous; spores 10-12μ long .....*C. pulchrifolius Pk.*
C. rubrocinereus Pk.

ee. Pileus, stem and gills lilac; spores 9-10μ.....*C. lilacinus Pk.*

eee. Pileus, stem and gills violaceous at first; spores 10-12μ long....
C. rimosus Pk.

aaa. Spores 4-9μ long; if longer, plants are whitish or violaceous

b. Stem and pileus scaly or shreddy

c. Scales red (scarlet to vermillion).....*C. bolaris Fr.*

cc. Scales brown to blackish

d. Plant large, watery-spongy, soon dark chocolate colored.
C. squamulosus Pk.

dd. Plants of medium size, wood-brown....*C. pholideus Fr.*

bb. Stem not scaly.

c. Stem with more or less persistent annular rings, or peronate

d. Plants large, 2-8 cm. or more tall; pileus in proportion

e. Pileus watery-cinnamon (moist); gills very distant....*C. distans Pk.*

ee. Pileus buff, ochraceous, clay-colored or tawny

f. Gills at first yellow or yellowish

g. Pileus at first buff; stem peronate by the thin universal veil..
C. flavifolius Pk.

gg. Pileus ochraceous to ferruginous; subannulate.....
C. Morrisii Pk.

ggg. Pileus at first tawny-yellow, with pointed squamules on disk; peronate by tawny-yellow universal veil.....
C. annulatus Pk.

ff. Gills at first brownish or ochraceous; pileus rufous-ochraceous

g. Spores elliptical.....*C. bivelus Fr.*

gg. Spores spherical, minute, 4-5μ diameter .....
C. subbivelus sp. nov.

eee. Entire plant saffron-yellow.....*C. croceocolor Kauff.*

eeee. Pileus some shade of blue or purple when young, buff to tan when old

f. Plants stout, umber-purple to buff; pileus punctate; in or near swamps, in large troops.....*C. umidicola Kauff.*

ff. Mature plants rather slender; pileus fawn-colored, tinged lavender when young, not punctate; common in hemlock woods....
C. deceptivus Kauff.

dd. Plants small, subannulate; pileus less than 3-4 cm. broad

e. Pileus fuscous, covered with white villose fibrils.....
C. paleaceus (Weinm.) Fr.

ee. Pileus not villose-squamulose, cinnamon to chestnut color

f. Gills and stem violaceous at first.....*C. subflexipes Pk.*
ff. Gills and stem pallid to brownish
g. On rotten wood; pileus watery cinnamon..*C. ligniarius Pk.*
gg. On ground or moss; pileus bay to chestnut brown; annulus often distinct.....*C. castaneoides Pk.*
cc. Stem with no annulus, or annulus evanescent
d. Stem bulbous or clavate
e. Bulb depressed-marginate; gills heliotrope purple when young..... *C. obliquus Pk.*
ee. Bulb clavate to subclavate
f. Color of plant lilac to violaceous-white
g. Plants of medium size, violet tinge evanescent, never yellowish .....*C. alboviolaceus (Pers.) Fr.*
gg. Plants medium to large, lilac tinge persistent..*C. lilacinus Pk.*
ggg. Plants medium to small, violaceous to cinereous, tinged yellow or brown.....*C. simulans Pk.*
ff. Color of plant deep chrome, unchanging.....*C. callisteus Fr.*
fff. Color of plant watery-cinnamon or rufous-cinnamon (moist)
g. Stem whitish, pileus rufous-cinnamon to tan; not hygrophanous.....*C. subsalmoneus sp. nov.*
gg. Stem red; pileus hygrophanous, pinkish-ochraceous (dry).. *C. rubipes Kauff.*
dd. Stem subequal or tapering downward
e. Pileus distinctly hygrophanous
f. Plant small; pileus 2 cm. broad or less
g. Gills and stem violaceous when young
h. Stem stout, smooth; spores 7-9μ long..... *C. castaneus (Bull.) Fr.*
hh. Stem slender; spores 6-7μ long
i. Gills and stem pale reddish violaceous at first; pileus blackish-brown; in woods.....*C. subflexipes Pk.*
ii. Gills dark-violaceous at first; pileus fuscous, tinged violaceous; on sphagnum.....*C. fuscoviolaceus Pk.*
gg. Gills ochraceous, pale; stem whitish, not slender..... *C. pulcher Pk.*
ff. Pileus broader than 2 cm.
g. Pileus tawny orange to cinnamon; stem pale..... *C. armeniacus (Schaeff.) Fr.*
gg. Pileus watery-cinnamon; gills very distant....*C. distans Pk.*
ggg. Pileus and stem pale lavender; stem long and attenuated .....*C. everneus Fr.*
ee. Pileus not hygrophanous
f. Pileus chestnut or cinnamon color
g. Stem whitish, soon dingy to brownish....*C. castanellus Pk.*
gg. Stem yellow, no oblivaceous tinge
h. Gills at first yellow.....*C. cinnamomeus (L.) Fr.*
hh. Gills at first flame scarlet..... *C. semisanguineus flammeus Kauff.*
hhh. Gills at first dark blood-red....*C. semisanguineus Fr*

ff. Pileus tawny-olive; stem yellow, tinged olivaceous.....
C. croceus Fr.

fff. Pileus and stem scarlet or blood red

g. Pileus broad as compared with the rather short stem; spores 8 x 5μ.....*C. cinnabarinus Fr.*

gg. Pileus narrow; stem longer; spores 6 x 4μ.....
C. sanguineus (Wulf.) Fr.

FIG. 245.—EARTH-STAR. GE-AS'-TER MIN'-I-MA.—A rather common plant here shown in natural size. The cut was made from specimens sent by Supt. M. E. Hard, who collected them near Chillicothe, Ohio, November 9, 1905.

CORRECTION.—The above half-tone was issued on p. 201 as Geaster triplex, which was a mistake; it should have been Geaster minima as here given. Both of these species were received at the same time and inadvertently the name of the little species got wrong in print.

MOULDS.

By David R. Sumstine.

It is not necessary to go to the fields and the forest in search of plants. The kitchen, the cupboard, the cellar, the manure heap about the barn, the decaying vegetable matter about the garden or about the house have a distinctive flora as interesting as the flora of field and forest. The plants of the latter flora are more conspicuous, but the plants of the former flora are just as beautiful and have just as interesting life history and in the economy of nature are just as useful.

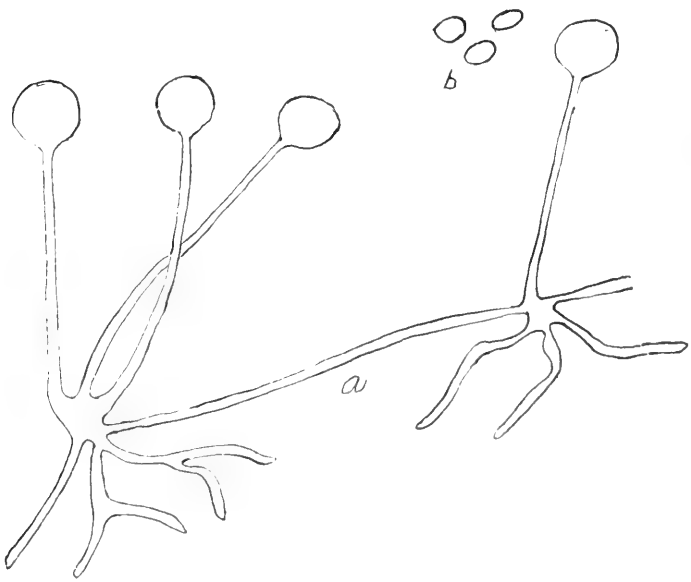
There are many genera and species represented in this flora but only a few belonging to the family *Mucoraceae* will be discussed at this time.

These plants are commonly called *Moulds,* but all the so-called Moulds do not properly belong to this family. This is especially true of the common green mould found on canned fruit. It belongs to an entirely different family.

A piece of bread or sweet potato laid in a moist place for a few days will produce plenty of specimens for study. It seems that the spores of moulds float in the air and fall upon various substances. Whenever the proper conditions of temperature and moisture are supplied the spores germinate and develop. The spores retain the power of germination for a long time.

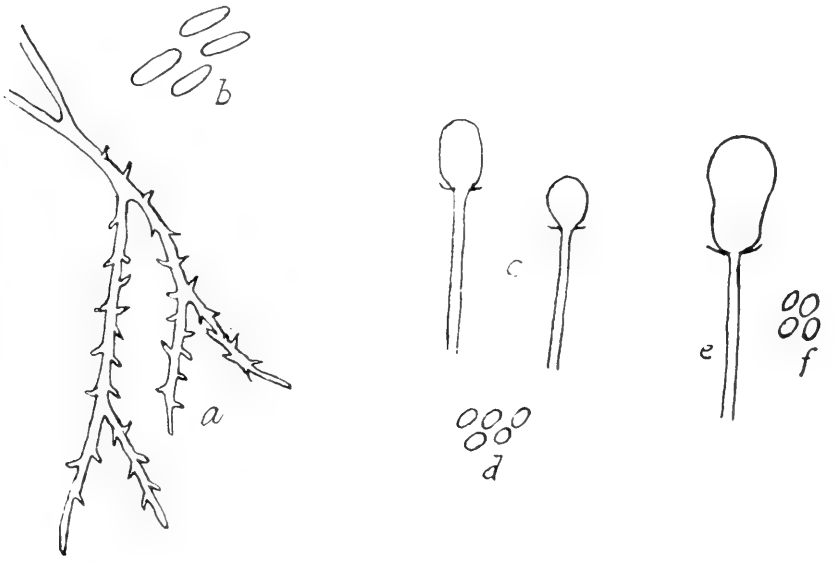
A little observation will show the thread like mycelium spreading in and upon the substratum. At different parts of the mycelium *sporangiophores* arise. At the top of the sporangiophores are developed the sporangia containing spores.

The following species can be found almost anywhere during the summer months:



Mucor mucedo. a Sporangiophores. b Spores.

Fig. 246. Illustrations of Moulds.



a Spinulose mycelium of Mucor fusiger. b Spores of same. c Columella of Mucor stercoreus. d Spores of same. e Columella of Phycomyces nitens. f Spores of same.

Fig. 247. Illustrations of Moulds.

MUCOR.

This genus is characterized by simple or branched, but not dichotomously branched, sporangiophores. The membrane of the sporangium is not cuticularized and soon disappears. The sporangia are of one kind and are furnished with columella.

Mucor mucedo Linnaeus.

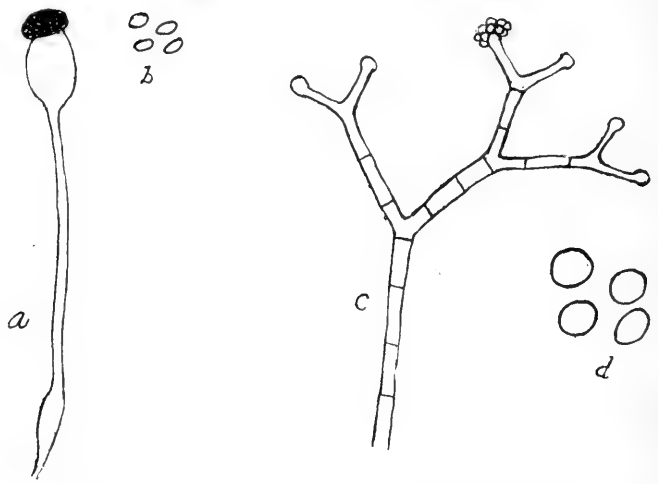
The mycelium is white at first, then brown or even black. The sporangiophores are usually in clusters of three or more, reaching 5 mm. in height. The columella is very prominent, but finally collapses. The spores are globose, oval or irregular. This is the common black mould of bread. The following names are also given to this species, *Mucor stolonifer, Rhizopus nigricans.*

Mucor stercoreus (Tode) Link.

The sporangiophores are erect, undivided, gray: the sporangia are large, yellowish, brownish when old; the membrane disappears and leaves a collar at the base; the columella is variously shaped, cylindrical or conical; spores somewhat elliptical. It grows on dung. *Mucor mucedo* Fresenius has also been applied to this mould.

Mucor fusiger Link.

The sporangiophores are simple, erect, bulbous below, but attenuated upwards, gray to brown in color; columella is large; spores spindle shaped; the aerial mycelium is divided into thorny branches. It grows on Agarics.



a Sporangiophore of Pilobolus crystallinus. b Spores of same. c Sporangiophores of Sporodinia aspergillus. d Spores of same.

FIG. 248. ILLUSTRATIONS OF MOULDS.

PHYCOMYES.

In general appearance the species of this genus resemble the species of *Mucor*. The chief difference is in the formation of zygospores. The metallic appearance will generally separate it from *Mucor*.

PHYCOMYCES NITENS (AGARDH) KUNZE.

The sporangiophores are simple, olive brown, very large, 7-30 cm. long; the sporangia are round, large; columella, pear shaped; spores ellipsoid. It grows on oily substances. Ground flax seed makes a good medium for cultivation.

PILOBOLUS.

This genus is easily recognized by the peculiar formation of the sporangium whose upper part is cuticularized. The sporangiophore is very much enlarged or distended right below the sporangium.

PILOBOLUS CRYSTALLINUS (WIGGERS) TODE.

This is common on horse dung. The sporangium is black and at maturity is thrown off with considerable force; the spores are colorless or yellowish.

SPORODINIA.

This is a monotypic genus and is known by the dichotomously branched sporangiophores.

SPORODINIA ASPERGILLUS (SCOPOLI) SCHROETER.

The sporangia are variously colored, but usually brown or black at maturity. The spores are round or ellipsoid. It grows on Boleti and Agarics.

All figures were drawn by Stella Sumstine, not to any definite scale.

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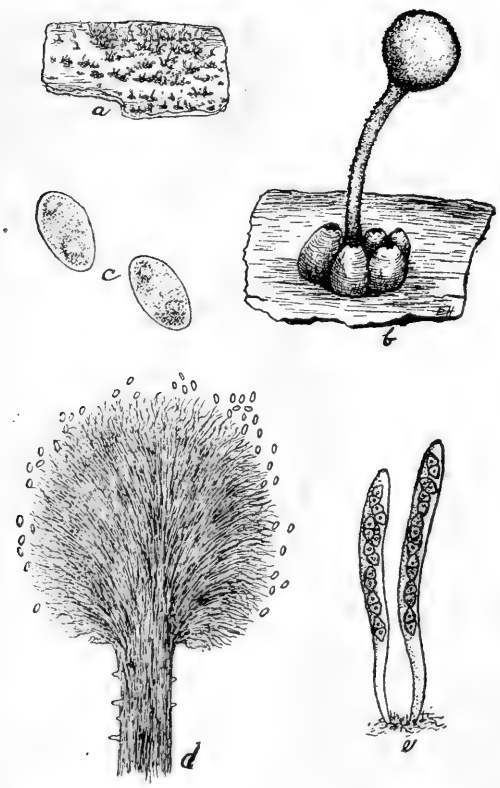
VOL. V. JUNE, 1907 NO. 78

MYCOLOGICAL BULLETIN

W. A. KELLERMAN, Ph. D. OHIO STATE UNIVERSITY



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No. 78

W. A. Kellerman, Ph. D., Ohio State University

Columbus, Ohio, June, 1907.

EDITOR'S NOTES.

We are indebted to Miss Hyde for an interesting account and illustrations of a little bark-inhabiting fungus.

Then Mr. Smith, teacher in the High School of Akron, places us under obligation also. He gives us an account of a rare plant. We have seen many of his photographs of fungi, besides the one that illustrates his Peziza. We never saw finer ones—strong language but justifiable. We will insist that he furnish may of them for use in future numbers of the Bulletin.

Mushroom literature is abundant and we resume our notes in that field, even at the risk of bordering strongly on the technical. Professor Atkinson has in the past few years described many new species. His descriptions are very full and careful and therefore we desire to copy as many of them as space will permit.

SCLEROTINIA TUBEROSA; TUBEROUS PEZIZA.

G. D. Smith, Akron, Ohio.

This is one of the very rare Pezizas that produces a sclerotium at the base, and has been found but few times in this country. It is said to be much more common in Europe. The photograph illustrates very nicely the general appearance of the plants. They grow in rich, shady woods, sometimes unprotected, but more often near stumps, logs, or the projecting roots of trees. I have never found them except in early spring, from April 15 to May 20. These shown in the photograph (Fig. 249) were found April 30, in a ravine about two miles north of Akron, Ohio. I noticed that they were very sensitive to different temperatures in the explosion of their spores. When I would hold them in the warm sun for a minute and then pass them suddenly into the shade there would be a cloud of spores sent forth. I also noticed that a sudden breeze would produce the same result. I then tried blowing my breath on them and the response was still greater. This I repeated

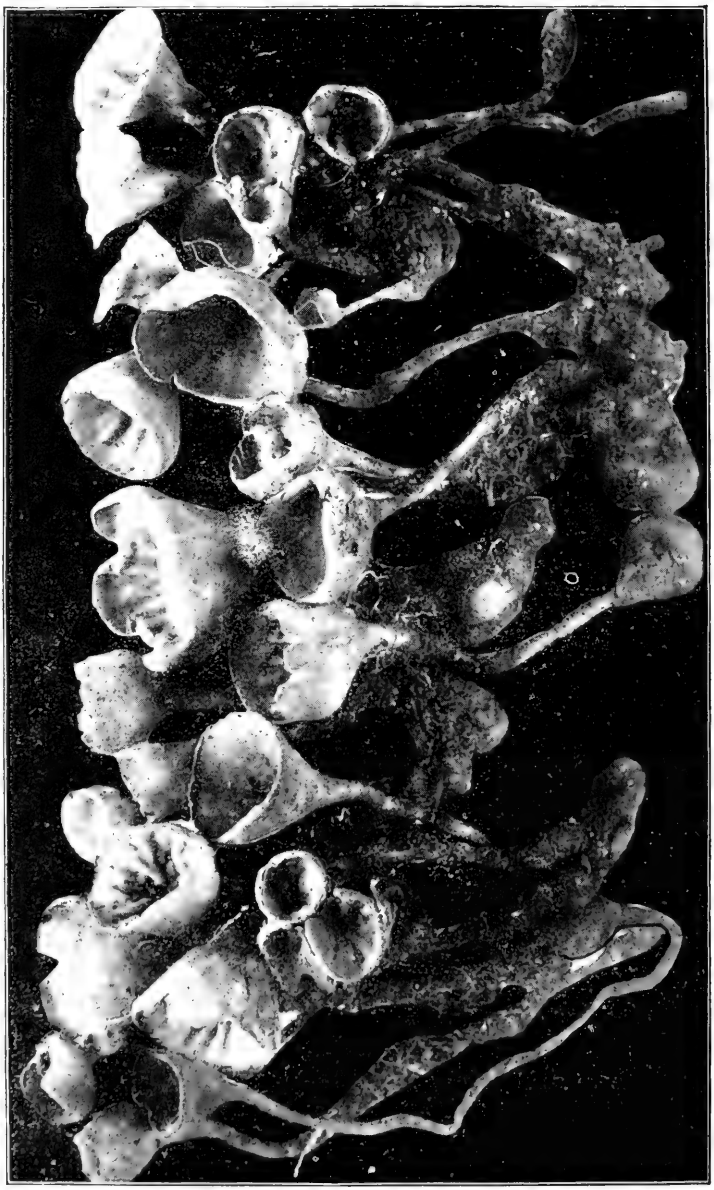

FIG. 249.—SCLER-O-TIN'-I-A TU-BER-O'SA. Phot. G. D. Smith, Akron, Ohio.

several times, the results diminishing with each repetition until they finally ceased to respond. I now noticed that the spore surface that had been most active in exploding the spores had become quite moist.

After they had rested for some minutes I repeated the experiment with the same result but not so strong as at first. I then put them in a closed box and did not open it until I was inside a warm room. When I removed the lid a dense cloud of spores arose to meet my gaze. I again tried blowing on them and found them very active until exhausted. They vary in color from tan to a rich brown.

A LITTLE CORTICICOLOUS FUNGUS.

EDITH HYDE.

At the request of the editor of the Mycological Bulletin I have studied and figured an interesting little fungus that grows on bark as indicated in the title. The specimens were collected in Jamaica by A. E. Wight and our material was received from Dr. Farlow, of Harvard University.

The botanical name of the plant is *Sphaerostilbe cinnabarina;* it belongs to the large group called the *Ascomycetes.* In this group the fruit or spore-bearing portion may be open and somewhat cup-shaped or saucer-shaped; or it may be nearly or quite closed and more or less globular or pear-shaped. In the first case the name *Discomycetes* is applied to the plants; in the second case they are called *Pyrenomycetes.* It is to the latter group that the Sphaerostilbe belongs.

The dry specimens examined were of a dark reddish-brown color, the lower portion of the stem being much darker than the upper portion. The tiny plants are clustered on the bark not densely, but as trees in an open woods, as shown in Figure 2 at a. It will be seen that the upright stem is not the entire plant; the lower portion is made up of a number of globular or slightly pear-shaped bodies clustered about the base of the upright stems (see fig. *b*). These are the *perithecia,* a greek word which means pockets; these pockets or perithecia, contain spores as will be explained presently.

An inspection of the figures already referred to, will show that the upright portion or stem is decidedly enlarged at the upper end and here also spores are borne.

There are two kinds of spores borne by this Sphaerostilbe, very different each from the other, but both microscopic. Covering the upper end or head of the upright stem are myriads of little threads which are directed outwards and on the tip of each is borne a small body called a conidium. Each one is oval or very slightly egg-shaped. The threads, which are really tiny tubes, are called *conidiophores;* the word means bearers of the *conidia.*

The drawing marked *c* in the figure shows two conidia very much enlarged. The one at *d* is a diagram and shows the real structure of the conidiophore, or rather the stem or stipe which bears the multitude of conidiophores. As can be seen, there are innumerable threads or tiniest tubes joined side by side and compacted into a rather firm stem or stipe. These spread out and seem to be multiplied to form the head; the outer fringe of hairs produce the spores as has been explained.

The other kind of spores is to be sought for in the perithecia or globular pockets forming the base of the plant and flanking the upright stem. Unfortunately they were sterile in the specimens examined. But a copy of such spores was taken from *Pflanzenfamilien,* a large illustrated

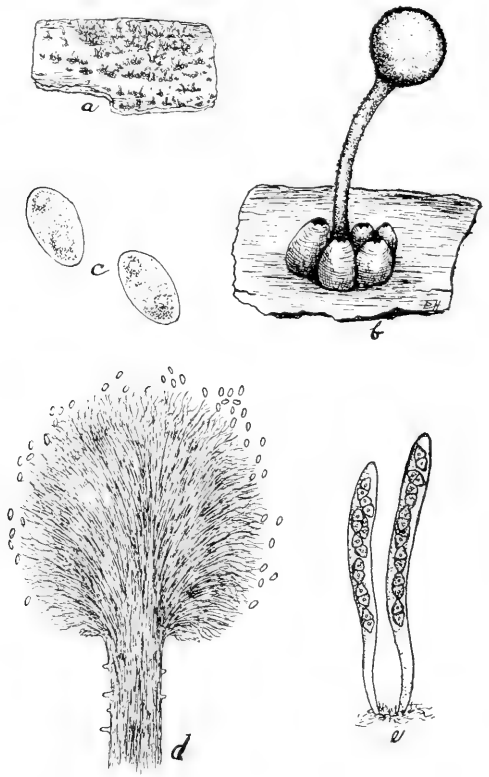

Fig. 250.—SPHAE-RO-STIL'-BE CIN-NA-BA-RI-NA. A bark-loving fungus, occuring in the Southern States and southward. Figures made from specimens collected in Jamaica, except *e* which was copied from Pflanzenfamilien. Drawings by Edith Hyde.

German botany, and shows the spores of a closely related species.

This second kind of spores are borne in an enlarged elongated cell, called an *ascus;* the spores are accordingly called ascospores. In this case there are eight spores in each ascus and each spore consists of two parts, that is, each is two-celled.

Sphaerostilbe cinnabarina has been reported from Ceylon, Mexico, Cuba, and the Southern United States. When it was first found in Cuba it was named *Stilbum cinnabarinum*, by Montagne, a French botanist, who had however only the upright capitate stem—at least that is the portion to which the original description refers. Later when the basal bulbs, bearing the ascospores, were found and described, the correct place for this fungus in classification was recognized; accordingly it was placed in the genus Sphaerostilbe. There was no occasion of course for changing the first species-name;—and therefore, the plant is called in botanical literature *Sphaerostilbe cinnabarina*. The name Stilbum cinnabarinum is a synonym, and alludes to the conidial stage only.

NOTES FROM MUSHROOM LITERATURE. VI.

W. A. Kellerman.

The report of the state botanist, 1905, New York State Museum Bulletin 105 Botany 9, by Charles H. Peck, was issued August, 1906. In size, character, etc., it is similar to the several preceding reports. The species of fungi illustrated by the colored plates are the following: Marasmius longistriatus Pk., Clitopilus squammulosus Pk., Entoloma flavifolium Pk., Boletus acidus Pk., Tricholoma unifactum Pk., Lactarius rimosellus Pk., Lactarius serifluus (DC.) Fr., Russula albida Pk., Russula flavida Pk., Russula sordida Pk., Russula subsordida Pk., Russula viridella Pk., Russula variata Banning, Clavaria conjuncta Pk., and Hypomyces lactufluorum (Schw.) Tul. Nearly twenty new species of fungi are described, many of them belonging to the groups of Mushrooms. A short section of the Report is devoted to edible Fungi; besides the description, a short general account is given of each of the species tested; the following are included: One species of Tricholoma, two of Lactarius, four of Russula, and one each of Clavaria and Hypomyces.

A New Entoloma from Central Ohio.—Under this title George F. Atkinson describes a mushroom in The Journal of Mycology for November, 1906. Our Figures 251 and 252 were made from the photographs of the plants. We reproduce also Professor Atkinson's entire article, which is as follows:

"Specimens, notes and photograph of a fungus that proves to be new were received from Prof. W. A. Kellerman. The following diagnosis is given:

Entoloma subcostatum Atkinson n. sp.—On grassy ground, Campus, Ohio State University, Columbus, Ohio. Coll., R. A. Young, Com. W. A. Kellerman. No. 4920. Received Nov. 1, 1906.

Plants gregarious or in troops or clusters, 6-8 cm high; pileus 4-8 cm. broad; stems 1-1.5 cm. thick.

Pileus dark gray to hair brown or olive brown, often subvirgate with darker lines; gills light salmon color, becoming dull; stem same color as pileus but paler, in drying the stems usually becoming as dark as the pileus.

Pileus subviscid when moist, convex to expanded, plane or subgibbous, not umbonate, irregular, repand, margin incurved, flesh white, rather thin, very thin toward the margin.

Gills broad, 1-1½ cm. broad, narrowed toward the margin of the pileus, deeply sinuate the angles usually rounded, adnexed, easily becoming free, edge usually plane, sometimes connected by veins, sometimes costate, especially toward the margin of the pileus.

Basidia 4-spored.

Spores subglobose, about six angles, 8-10 μ in diameter, some slightly longer in the direction of the apiculus, pale rose under the microscope.

Stems even, fibrous striate, outer bark subcartilaginous, flesh white, stuffed, becoming fistulose.

Odor somewhat of old meal and nutty, not pleasant; taste similar.

Related to E. prunuloides Fr. and E. clypeatum Linn. Differs from the former in dark stem and uneven pileus, differs from the latter in being subviscid, even stem and pileus not umbonate and much more irregular, and differs from both in subcostate gills."

Several New Mushrooms.—On p. 234 we gave Professor Atkinson's descriptions of some new species and now make room to continue the quotations:

Fig. 251.- Entoloma subcostatum, Atkinson. See text.

AMANITA FLAVORUBESCENS Atkinson n. sp.—Plants scattered or gregarious, sometimes with the bases joined, 10-14 cm. high, caps 6-10 cm. broad, stems 6-12 mm. thick. PILEUS convex to expanded, smooth, with very faint striae on the margin, covered with thick, chrome yellow, floccose patches of the volva, margin of pileus yellow, center wood brown to raw umber, flesh thin, yellowish even under the brown cuticle over the center. GILLS long elliptical free, white, not crowded. BASIDIA clavate, 40-50x 9-11 μ, 4-spored. SPORES oboval, granular, smooth, 8-10x6-8μ. TRAMA of cap floccose, outer layer more compact and the threads slender. STEM even, with an ovate bulb, floccose scaly with fine floccose yellow scales above, and with reddish scales below. ANNULUS thin, membranous, yellow, 3 cm. from the apex of the stem, sometimes tearing into fragments. VOLVA yellow, breaking up into fragments.

This species is near *A. rubescens*, but the margin of the pileus, the volva, annulus and the upper part of the stem is canary yellow. Bruises of the pileus and the upper part of the stem do not turn red, (or only slightly so and very tardily), but bruises of the lower part of the stem turn slowly reddish. Ground, Coy Glen, Ithaca, N. Y., July 22, 1902, C. H. Kauffman, C. U. herb. No. 9884. The species has also been received from Connecticut and from Pennsylvania

AMANITOPSIS ALBOCREATA Atkinson n. sp.—Plants 10-13 cm. high, pileus 5-8 cm. broad, stems 6-12 mm. thick. PILEUS convex to expanded, viscid when moist, white, or pale maize yellow in the center, or sometimes entirely pale maize yellow, finely striate and minutely tuberculate on the margin, covered with floccose patches of the volva which are easily removed when moist, but in drying become firmly agglutinated to the viscid surface; flesh very thin except at the center, white. GILLS rounded in front, narrowed behind, 3-6 mm. broad, free or slightly adnexed, edge floccose. BASIDIA 30-45x7-10 μ, 4-spored. SPORES globose, white, smooth, granular when young, with a large oil drop when old. Subhymenium of globose cells 6-12μ in diameter. TRAMA of gills thin, middle layer of parallel cells, and from these the branches diverge as they descend in the trama. TRAMA of cap, inner portion of large cells, surface of minute slender threads. STEMS cylindrical, slightly tapering upward, white, minutely floccose mealy scales, hollow, abruptly enlarged below into a bulb. VOLVA ocreate, the limb narrow as in *A. pantherina*, sometimes very slight, the stem also sometimes with floccose patches of the upper part of the volva in irregular concentric rings on the lower part of the stem, the upper part of the volva forming floccose patches on the pileus.

This species differs from *A. nivalis* Grev., in the ocreate volva, that of *A. nivalis* Grev. being vaginate. *A. nivalis* of Peck, 42d Rept. N. Y. State Mu., p. 48, is probably identical. Ground in woods, Ithaca, N. Y. C. U. herb. No. 6097, Cascadilla woods, Miss Fisher, July 9, 1901; No. 9757, west shore Cayuga Lake, July 14, 1902, Miss A. T. Young; No. 9822, Beebe Lake woods, July 12, 1902, H. H. Whetzel.

BOLETUS CHAMAELEONTINUS Atkinson n. sp.—Plants 9-11 cm. high, pileus 8-10 cm. broad, stem 2 cm. thick. PILEUS convex, thick, flesh 2 cm. thick at the center, drab to hair brown, subtomentose and with minute appressed scales, later rimose areolate something like *B. scaber*, but the chinks not so deep; flesh white tinged with yellow, changing first to reddish then to blue, the red appearing first in the upper half, later spotted red and blue. TUBES convex, depressed around the stem, first yellowish, then reddish, in age the mouths tinged with red; tubes small, mouths round or uneven, changing to blue where bruised. SPORES olive yellow under the microscope, elliptical to oblong, smooth, 12-15x4-5μ. STEM reddish all

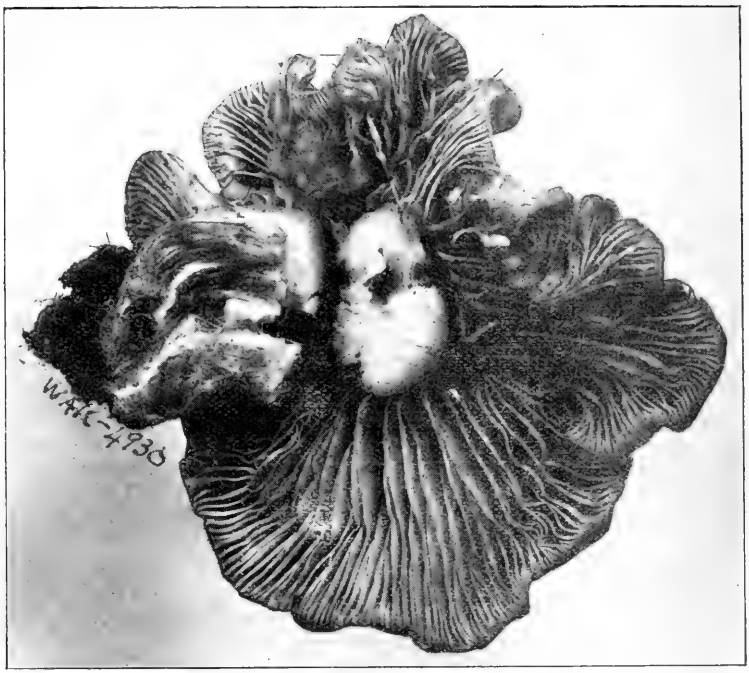

Fig. 252.—ENTOLOMA SUBCOSTATUM. See text.

over or only at top and bottom, reticulate or dotted as in *B. luridus,* even or slightly enlarged below; flesh yellow, deep red just under the surface, center yellow changing to blue. Ground woods, Ithaca, N. Y. C. U. herb. No. 9842, July 19, 1902, and other dates.

BOLETUS UMBROSUS Atkinson n. sp.—Plants 8-10 cm. high, pileus 5-9 cm. broad, stems 1.5-2 cm. thick. PILEUS convex then expanded, fleshy, subtomentose and in age cracking into very fine areoles somewhat as in *B. subtomentosus;* flesh whitish very slowly changing to flesh color then brown; pileus mummy brown to walnut brown. TUBES convex, at first white, then becoming pale brown, in age deeper brown, when bruised becoming dark brown. STEM same color as the pileus but paler, broadly and irregularly furrowed or rugose longtiudinally, with very minute dark points seen under the lens. Base of stem tapering into a short root. West shore Cayuga Lake, July 29, 1902, C. H. Kauffman, C. U. herb. No. 13067.

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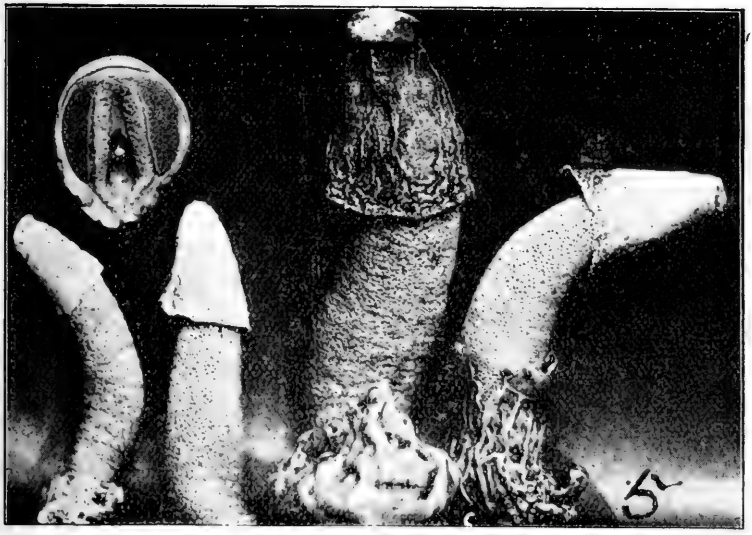

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Columbus, Ohio, July, 1907.

A PHALLUS NUMBER.

Professor W. H. Long of the State Normal School, Denton, Texas, has published in a recent Number of the Journal of Mycology, an extended account of the Phalloideae or Stink-horns of Texas, illustrated by several half-tone illustrations of the species. We devote this number of the Bulletin to this subject, reproducing Professor Long's plates, and a fair portion of the interesting text of the article.

THE PHALLOIDEAE OF TEXAS.

BY WILLIAM H. LONG.

The fall of 1902 was unusually wet for this State and cold weather was late in coming, as our first good frost did not occur until Nov. 22. Such climatic conditions brought forth a wealth of fungi; the Basidiomycetes and Gastromycetes being especially abundant. It was the good fortune of the writer to collect and have photographed five species of that unique and interesting group of Gastromycetes—the *Phalloids.*

In an old sandy field, that had not been ploughed for seven or eight months, four species were found, viz: *Mutinus caninus, Phallus rubicundus, Phallus impudicus* var. *imperialis,* and *Simblum sphaerocephalum.* This field was on the north slope of a hill that was originally covered with post oak (*Quercus minor*) and black jack (*Q. nigra*), but the trees had been cut off for some years and the old stumps were in various stages of decay.

At the base and in the immediate vicinity of these rotting stumps the plants mentioned were usually found. On the margin of this field in the grassy unbroken sod *Simblum texense* was collected. This field was planted in wheat in the fall of 1901 and was used as a pasture for cattle during 1902.

Nearly all of the photographs secured were taken by a local photographer on cloudy days and in some instances when the rain was falling, as this group will not admit of delay if photographs of the freshly expanded plants are desired. Some here reproduced therefore do not show details as well as could be desired.

Fig. 253.—PHAL'LUS IM-PU'DI-CUS var. IM PE-RI-A'LIS. Plants (1) grown from eggs (2). Phot. W. H. Long, Texas.

The abundance of material at hand of some species made it possible for the writer to determine the relative values of the various characters of a given species.

The following characters were found to be constant for any given species, viz: Color of stipe, pileus and eggs, surface markings of cap, structure of stipe as to number, shape and openings of the chambers; variable characters were: Shape of both stipe and pileus within narrow limits, presence or absence of a veil, size of stipe and cap and shape and size of eggs.

Take the cap of *Phallus impudicus* for instance. It was invariably white and strongly reticulate, but its size and shape was very variable, in some plants being very unsymmetrical but more or less conic to campanulate but even in specimens only two inches tall the surface had the characteristic crests and ridges. On some specimens no veil could be detected, while on others there was a strongly developed veil, but this point will be discussed more in detail later in this article.

In *Simblum texense* the variation in shape and size of pileus and stipe was very marked; the stipe being cylindrical, fusiform, clavate, attenuate downward or upward, terete or angular, while its color and structure was constant; the pileus likewise was very variable as to shape and size, some specimens being deeply constricted at juncture of pileus and stipe, while in others there was no constriction. Some had the Simblum characters well defined, while others looked more like a Lysurus with short arms than a Simblum. Indeed it is difficult to determine the genus of this plant from the ordinary field specimens.

The first specimens found of *Phallus impudicus* var. *imperialis*, consisted of two separate bunches of eggs. One bunch of four eggs from a common rhizomorph, the other of eight plants, also from a common root. All of the eggs in the first group were infested by the larvae of some unknown fly (*Muscidae*), also several eggs in the second group. This is the first instance to the writer's knowledge of an insect attacking the eggs of any of the Phalloids, although it is well known that various species of flies (*Muscidae*) eagerly suck the syrupy mass of spores as the gleba deliquesces by this means the wider distribution of the spores is accomplished; while the passage through the digestive tube of the fly may aid in the germination of the spores. A miscroscopic examination of the excreta from the flies that are feeding on the deliquescent gleba shows it to be composed largely of spores, apparently unharmed. This syrupy mass acts on them like a dose of salts, producing a kind of diarrhoea.

A third insect was found feeding on all the Phalloids except *Simblum texense*—a species of dung beetle or "tumble bug" (*Geotrupes opacus* Hald.). The beetles first attack the stipe. One was found on the stipe of *Phallus impudicus* eating a circle around it, thereby cutting it down; its mate was at the base of the plant, busily engaged in digging a hole in the ground; when the stipe fell both beetles attacked it.

This species of dung beetle apparently makes no balls but digs holes under the mass of dung on which they may be feeding. It is interesting to note that the same process was followed while feeding on the Phalloids. They eat the stipe down to the ground but do not attack the volva; the entire stipe and cap was often devoured so that nothing was left but the stump of the stipe in the volva and the numerous holes that the beetles had dug near by. I found specimens of *Phallus rubicundus*, *Phallus impudicus*, *Mutinus caninus*, and *Simblum sphaerocephalum*, all attacked and eaten by this beetle, but strange to say, not one plant of the many specimens found of *Simblum texense* was eaten—probably because this plant has not the foetid odour so characteristic of this group.

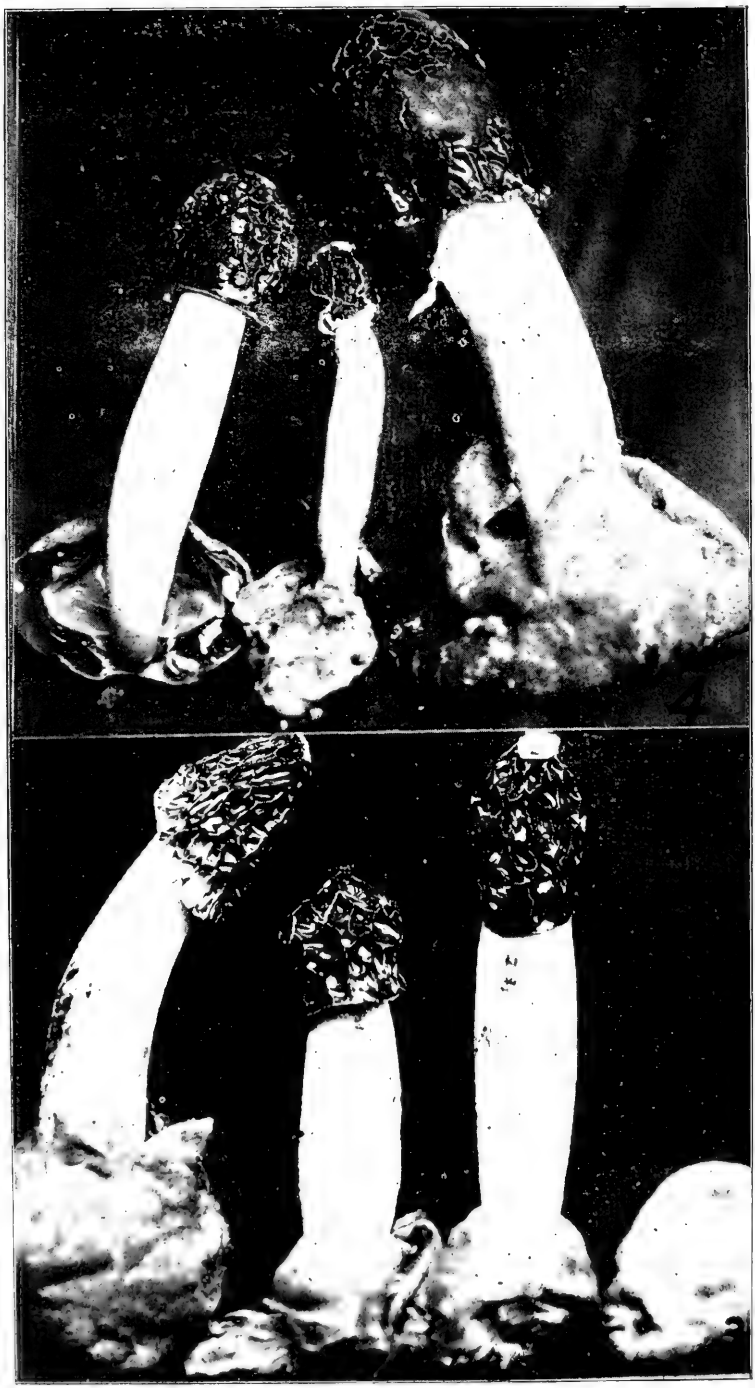

Fig. 254.—PHAL'-LAS IM-PU'-DI-CUS var. IM-PE-RI-A'-LIS. Typical plants (3) and plants showing veils (4). Phot. W. H. Long, Texas.

At one time I had about one hundred and fifty to two hundred eggs of the various species of Phalloids in my "incubator" and during the course of their expansion it was noticed that cold had a marked effect on the elongation of the stipe—in all cases checking it; and when the thermometer was below or near freezing point stopping all elongation. This was so marked that I had to resort to artificial heat to get some of my eggs to expand. This indicates that the elongation of the stipe or receptaculum is a growth process as advanced by Errera and Burt. The large number of eggs of the various species of Phalloids that I collected, together with the cool weather during November, forced me to devise some means whereby I could with little trouble hatch them, as there was no hot house convenient. At first, I used with fairly good success the following plan. I took a pine box one and a half to two feet deep and covered the bottom with clean white sand to the depth of eight to ten inches. The eggs were then washed and wrapped with tissue paper, leaving only the upper part free; they were then put into holes in the sand with only the upper and free surface exposed, the sand being previously thoroughly wetted. The box was then covered with glass and placed near a wood stove and every eight or twelve hours—usually once at night and again early next morning, a gallon of water, hot as the hand could stand, was poured over the eggs and on the sand; by this means the sand and the air in the interior of the box was kept warm and moist. Eggs of *Phallus impudicus*, *Phallus rubicundus*, *Mutinus caninus*, and *Simblum texense* were thus hatched. The writer found great trouble in getting the eggs of *Simblum texense* to hatch in a moist chamber on account of a species of white mould attacking and destroying them. In warm weather all that is necessary is to keep the sand wet and the box in the sun light with the glass over it. Some sixty to a hundred eggs of *Simblum texense* were expanded by this means.

A careful study of the specimens of *Phallus impudicus* and *Phallus rubicundus*, as they were expanding, seems to indicate that *Dictyophora* is not a good genus. Many of the plants, especially of *Phallus impudicus*, showed veils of varying degrees of permanency—from a mere film to one of appreciable thickness, and in every respect, as to texture, size, thickness, and position comparable to the so-called veil of *Dictyophora ravenelii*.

This veil in *Phallus impudicus* and *Phallus rubicundus* lies in the unexpanded plant as a zone of tissue next to the stipe. As the stipe elongates this membrane usually ruptures at edge of cap or beneath it, then as elongation continues bands and shreds of it may be left on the stipe. It will be found in one of three places and sometimes in all of them; first, as a veil hanging from top of stipe beneath the cap; second, as a distinct membrane in bands and patches on the stipe; third, as an enveloping sac-like membrane around the base of the stipe inside of the volva; here it seems to be a prolongation of the inner cup-like membrane of the volva that fits closely to the base of the stipe inside of the volva; this membrane like that of *Phallus ravenelii* is not composed of pseudoparenchyma, but in every other respect it is a true veil.

That those species with a persistent, well developed, meshed pseudoparenchymatous veil, like *Phallus duplicatus*, deserve special rank seems not proven—for intergrading forms of more or less persistent and well defined veils are present in many species of Phallus; furthermore, the presence of a well defined veil in *Phallus impudicus*, the original type of the Phallus genus, would make this genus have as one of its characters a veil and the genus *Dictyophora* would now be identical in all respects to Phallus and would therefore be reduced to synonomy.

The veils in my specimens were especially pronounced in plants that were slow in opening both in *Phallus impudicus* and *Phallus rubicundus*

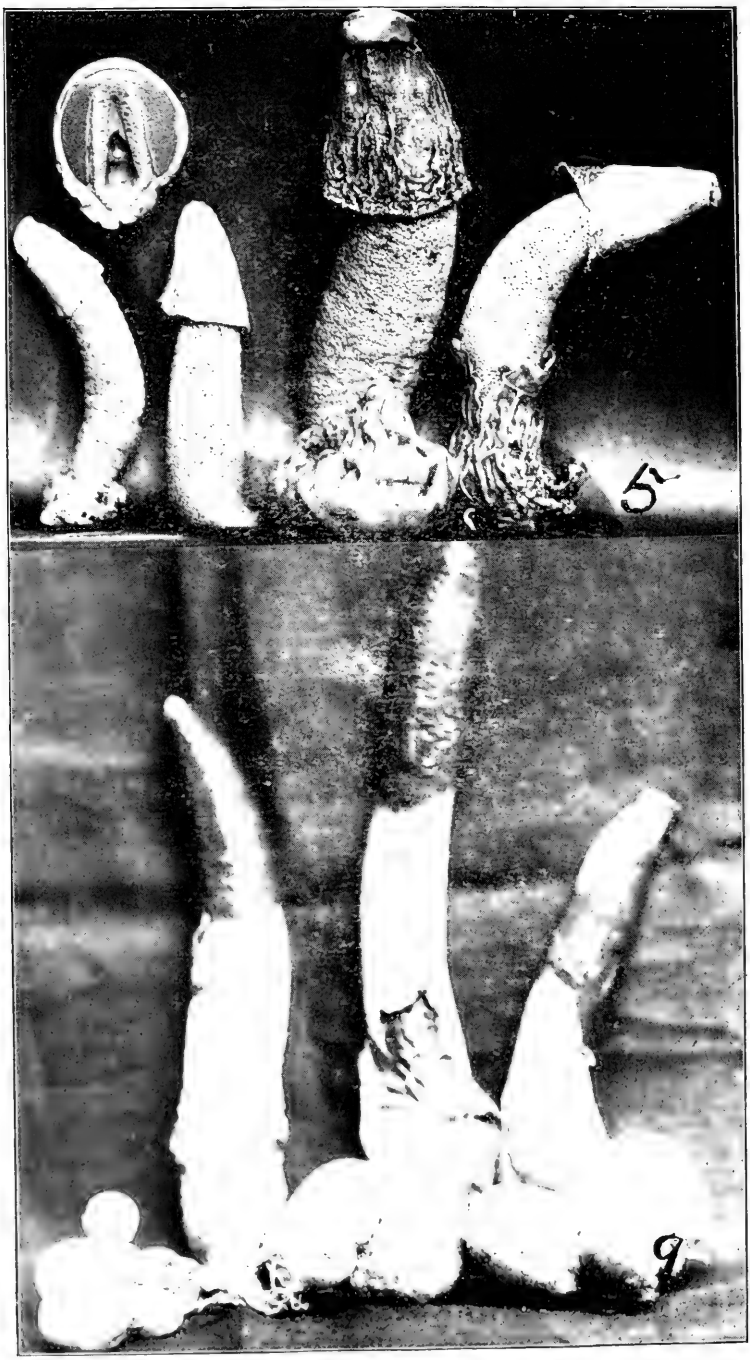

Fig. 255.—PHAL'-LUS RU-BI-CUN'-DUS (5) and MU-TI'-NUS CA-NI'-NUS (9). Phot. W. H. Long, Texas.

Those eggs that had been some three or four weeks in the "incubator" usually had thicker and more permanent veils than those that opened two or three days after collecting, while those found in the open fields had veils well developed if eggs opened during rainy weather. Also those plants that opened after cold weather came had veils. Specimens of *Phallus rubicundus* collected at Austin, Texas, during April, May and June, have no sign of a veil of any kind, not even the alcoholic material (of which I have some ten to fifteen specimens), shows any trace of a veil. Considering these facts, it would seem that this layer of tissue that sometimes tears lose and forms a veil and sometimes does not, acts as an organ of nutrition in which is stored, or through which passes, food to be used by the stipe and cap; if this be the case, then in warm, damp weather the maturing stipe and cap would use most of this in their development, so that at elongation of plant no real veil would appear. In other words, it would cling to the under side of the cap and to the inner surface of the volva; but if the amount of water during the growing season was in excess of the quantity usually present, then this tissue with others would be more strongly developed than normally and, therefore, would be more likely to appear as a veil at maturity of the plant; or if from any cause, as cold, removal from earth, etc., the later development of plant should be checked, then this tissue would appear as a veil; this is only an hypothesis, the proof of which remains yet to be worked out. At any rate the fact remains that in these two species the veil may or may not be present, and when present may be a mere thin membrane or one of appreciable thickness and permanency that will and does persist when the plants are dried or when kept in fluids. The presence of a veil on *Phallus impudicus* has been noted and discussed before by Van Bambeke, also by Ed. Fischer.

Phallus impudicus, L. var. *imperialis*, *Schw.* This was our most abundant Phallus in the Fall of 1902. It was first collected October the twentieth and specimens were found from then till the middle of January, 1903. On October the twentieth the two large bunches of eggs were found in a low, damp place, rich in vegetable debris, one bunch was so badly eaten by the fly larvæ that none of the eggs hatched, but two of the eggs of the larger bunch hatched. This bunch is seen in photograph No. 1, then No. 2 shows it with two eggs hatched, and some had been removed from bunch being destroyed by the larvæ.

Explanation of Figures 252-256.

Fig. 253.—Group of 8 eggs of *Phallus impudicus* var. *imperialis* from a common rhizomorph (2); and expanded plants from group of same.

Fig. 254.—*Phallus impudicus* var. *imperialis*, typical plants (3); also plants showing veils; the middle plant a dried specimen with veils still pendent below pileus. (4).

Fig. 255.—*Phallus rubicundus*, showing rugosity of pileus; all specimens from Austin, Texas, and alcoholic material (5); *Mutinus caninus* (9).

Fig 256.—*Phallus rubicundus*, non perforate plant (6); plants showing shreds of veil on stipes and one plant perforate (7); plants showing veil at base of pileus and remnant of volva at apex (8).

(*Excerpt from Journal of Mycology.*)

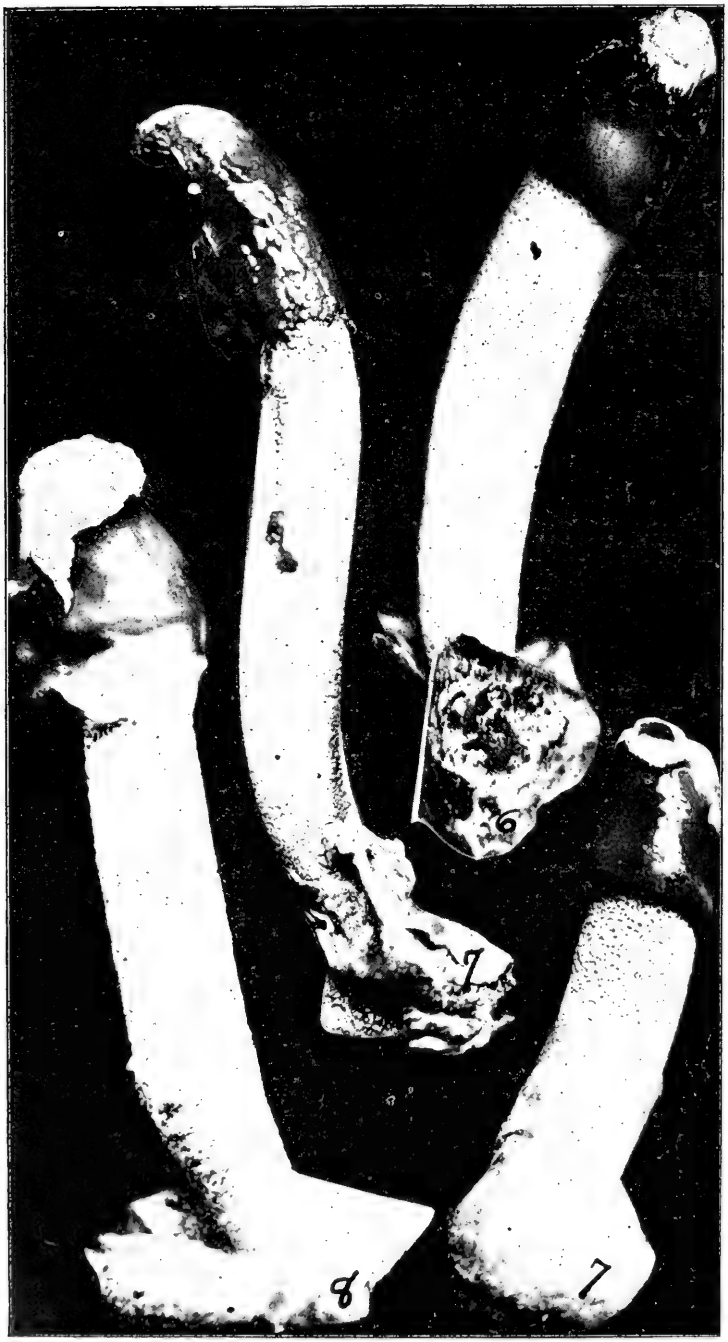

Fig. 256—Paeʹlus ru-bi-cunʹdus. W. H. Long, Texas.

VOL. V. AUGUST, 1907 NO. 80

MYCOLOGICAL BULLETIN

W. A. KELLERMAN, Ph. D. OHIO STATE UNIVERSITY

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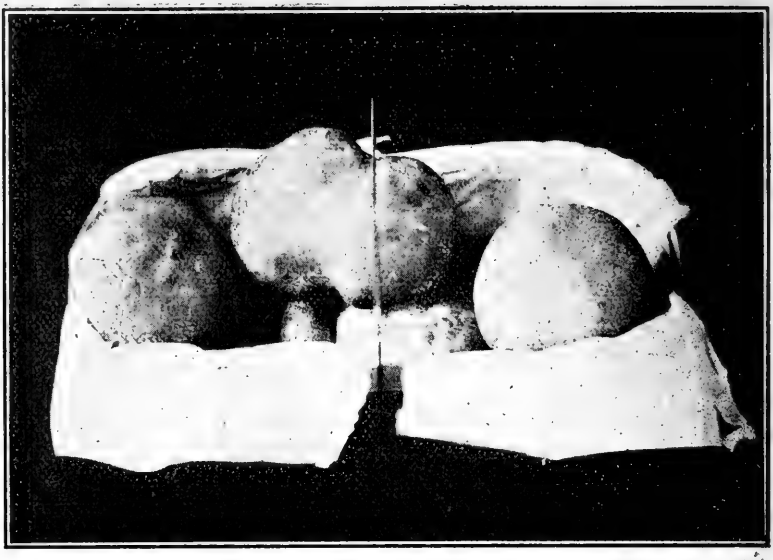

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Mycological Bulletin

No. 80

W. A. Kellerman, Ph. D., Ohio State University.

Columbus, Ohio, August, 1907.

A LACTARIOUS NUMBER.

Those interesting mushrooms that exude a milky or colored juice—shall we call them *Lactaria* as Persoon did in 1797, or *Lactarius,* as the great mycologist Fries did between forty and fifty years later, and which name has been in continuous use since?—Well, these *Lactariae* or the *Lactarii* will take precedence in this No. of the Bulletin. We have previously published a portrait of only one Lactarius as follows: Lactarius volemus (p. 219).

No additional photographs are at hand and we call on our subscribers for help. But we find recent articles by Miss Burlingham, a student of these plants in Columbia University, New York, most *apropos* and therefore levy tribute on her, see below.

NOTES FROM MUSHROOM LITERATURE. VI.

W. A. KELLERMAN.

A very interesting and very useful article containing "Suggestions for the Study of the Lactariae," by Gertrude Simmons Burlingham, is published in the June number of Torreya.

It will be noticed that the author adopts the name *Lactaria,* which she says was used by Persoon in 1797, thus antedating the *Lactarius* of Fries by nearly half a century.

A large portion will be copied, regretting only that we have not space enough for the entire article. The introductory part is as follows:

"There are only a few species of *Lactaria* which can be identified positively from dried specimens in the absence of field-notes. Furthermore, one who is not more or less familiar with the distinguishing characteristics of the species in this genus may make seemingly ample notes and yet omit some of the vital points, with the result that much otherwise valuable material becomes worthless or even misleading. Any such waste of time and material is especially lamentable in view of the fact that only a few scattered regions in the United States have been explored at all for any genus of the fleshy fungi. Approximately ninety species and varieties of *Lactaria* have been reported from the United States, fifty

FIG. 257. LAC-TA'-RI-US TRIV-I-A'-LIS. Cap plumbeous or faint lilac color. Gills and milk white. Columbus, Ohio, August, 1907.

of which have been described as new species; but of this number only five have been described from States west of the Alleghany Mountains, while from the majority of the States west of this line no species whatever have been reported. An economic as well as a scientific interest attaches to the genus, since *Lactaria deliciosa* and *Lactaria volema* are among the choicest of the esculent mushrooms, and several other species are considered nearly as palatable.

"The generic characters are conspicuous. The exudation from cuts and bruises in the flesh or gills, of a white or colored juice having the consistency of milk, is usually sufficient to mark the specimen as a *Lactaria*.. In common with the *Russulae, the Lactariae* have a vesiculose structure which gives the flesh of both the stem and the pileus a cellular appearance much like pith, and in consequence of this structure, the flesh is readily broken and is never fibrous or tough, and the stem is never cartilaginous. The genus is characterized also by the occurrence in many species of concentric bands of deeper color on the surface of the pileus, producing what is termed a zonate pileus. The *Lactariae* are found chiefly in woods or on the border of woods, and they vary in size from species with the pileus less than 2 cm. broad to species having a pileus 15 cm. or more across.

Minute directions are then given as to observation and study of the milk, the pileus, the gills, the stem and habitat. As to color, she says: "One of the distinguishing points of a species is the color of the pileus. Not only is this a variable character, but two collectors may describe the same color in different terms. Much difficulty can be avoided if a collector uses some standard color scheme, as Saccardo's *Chromotaxia.* Perhaps the most complete and satisfactory color chart is *Repertoire de Couleurs* published by the French Society of 'Chrysanthemistes,' which gives 365 distinct colors in various tones, including the reproduction of the colors recognized by Saccardo. The color description should be made as soon as possible after collection and should include the color of young, mature and old specimens. If the pileus is zonate, the zonation should be described carefully."

Concerning the collection and preserving she says: "Of course, it is of primary importance that the different specimens or "numbers" gathered should be kept distinct. This is easily accomplished by carrying in the collecting basket a supply of various sized paper sacks, and a species may then be placed in a bag with the accompanying field-notes. Like care must be used during the process of drying the mushrooms; for the mushrooms must be dried and preserved, since the descriptions are as useless without the dried specimens as are the latter without field-notes. The *Lactariae* may be dried successfully by spreading them on a wire screen which may be put under the kitchen stove or suspended about three feet above it. Oven heat is liable to be too great for the best results. When possible, three or four typical specimens of a species should be preserved, representing both young and mature condition. When dry, the mushrooms, together with the field-notes, may be transferred to paper sacks again, or to suitable boxes, and filed away for future study and identification. If some time is to elapse before this study is to be undertaken, something like naphthaline flake ought to be put in the boxes to protect the mushrooms from the attacks of the larvae of moths and carpet beetles.

These points and others are summed up in the shape of a blank for descriptive notes, just the thing to carry in the field, and use in the laboratory, as follows:

FIG. 258. LAC-TA'-RI-US VO-LE'-MUS. Edible. Dark orange cap; gills and milk white. Columbus, Ohio, August, 1907.

Miss Burlingham's Blank for Lactaria

Locality ..... Date.....

Habitat .....

Milk

color ..... change..... taste.....

Pileus

shape .....

color, zonate or azonate .....

surface, dry or viscid .....

glabrous or pruinose, squamulose, pubescent, tomentose..

.....

margin, glabrous, pruinose, downy tomentose.....

even or striate .....

Stem

color ..... shape .....

surface, dry or viscid .....

glabrous, etc .....

substance, solid, or lax, becoming hollow.....

Gills

color.....does the color change with age?.....

where bruised .....

number, distant or close .....

arrangement, entire or branched, number of series.....

Spores

color in mass .....

Flesh

color, does it change where broken?.....

odor .....

Size of plants .....

Solitary or gregarious .....

Additional Notes or Sketches

By .....

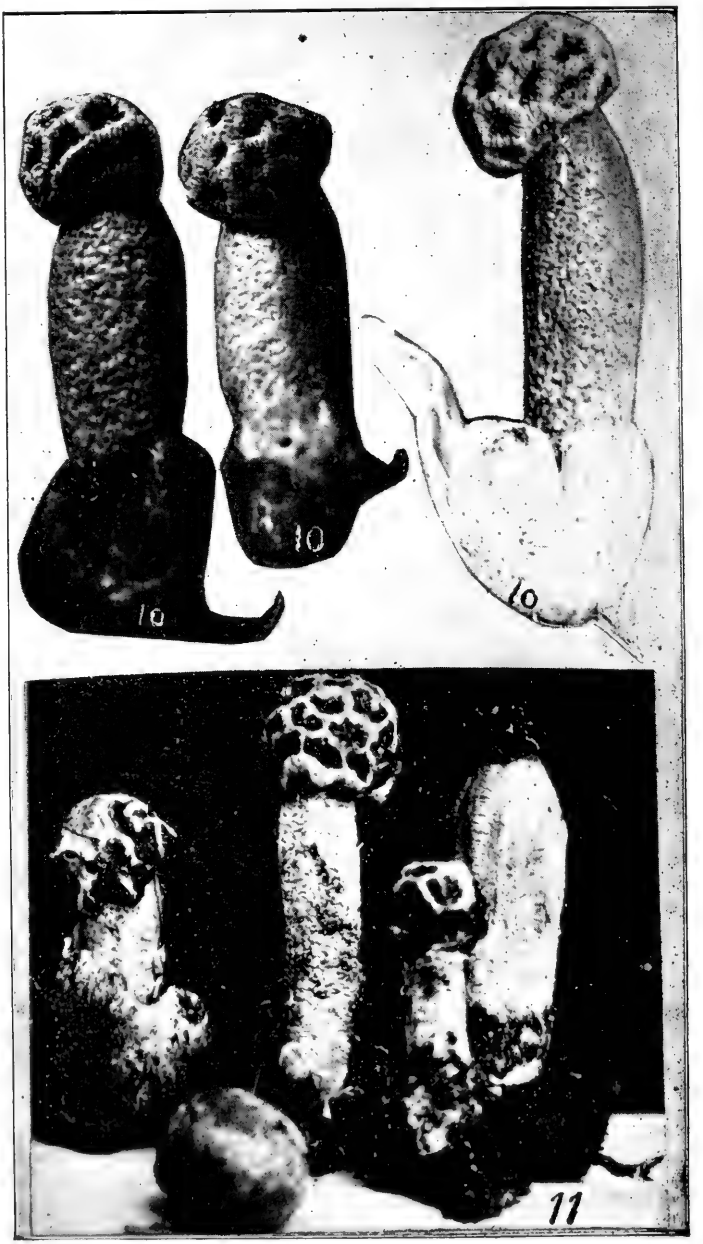

FIG. 259. SIM'-BLUM SPHAE'-RO-CEPH'-A-LUM (10) and SIM-BLUM TEX-EN'-SE. Prof. W. H. Long. See Phalloideae in previous Number.

More About the Same Plants by the Same Author.

Miss Burlingham previously published an interesting article on "Some Lactarii From Windham County, Vermont," in the Bulletin of the Torrey Botanical Club, describing five new species and giving an excellent key for all the species encountered in that region. The new species are Lactarius aspideoides; Lactarius Bensleyae; Lactarius isabellinus; Lactarius minusculus; Lactarius nitidis, and Lactarius oculatus.

The key bases the first division exclusively on the color of the milk, as follows:

Milk bright colored from the first, wounds often turning greenish.... ..... Section I
Milk at first white, then changing color ..... Section II
Milk white and unchanging .....Section III

Under Section I the colors mentioned are orange, (*L. deliciosus*); saffron-yellow (*L. chelidonium*); dark red (*L. subpurpureus*), and indigo-blue (*L. indigo*).

Under Section II three division lines are drawn, namely: Milk becoming sulphur-yellow; Milk becoming salmon, and Milk becoming lilac.

Fig. 260. Rus'-su-la ni'-ti-da. Cap red; gills white but soon turning deep yellowish. Taste very bitter. Woods, Columbus, Ohio, August, 1907.

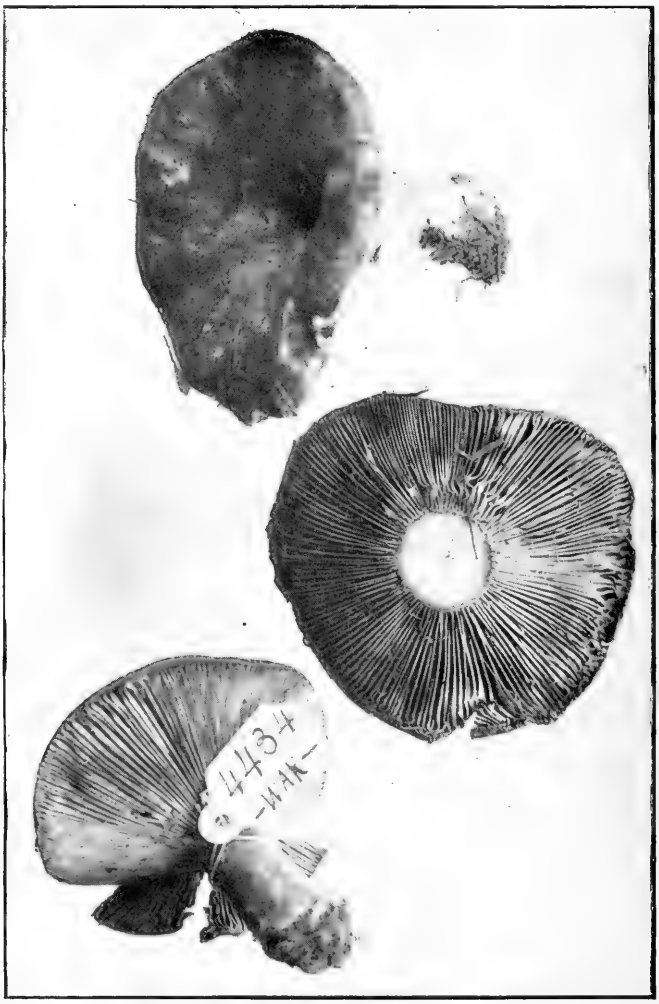

FIG. 261. LAC-TA'-RI-US DL-LI-CI-O'-SUS. Edible. In damp woods, July to October. A widely-distributed plant well known in Europe, the specific name suggesting the estimate in which it is held by mycophagists. Color, some shade of orange or mottled, and with concentric bands. Photo from specimens furnished by Supt. M. E. Hard, Chillicothe, Ohio.

The Mycological Bulletin is issued Monthly, Price 25c. Copies of Vol. II (1904), Vol. III (1905) and Vol. IV (1906) may be had for 50 cents each, or cloth bound copies for 75 cents No copies remain of Vol. I (1902). Address W. A. Kellerman, Columbus, Ohio

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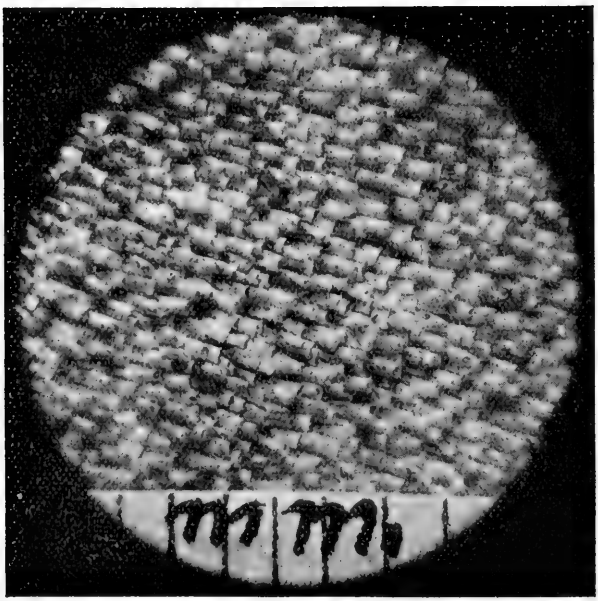
W. A. KELLERMAN, Ph. D. OHIO STATE UNIVERSITY



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Mycological Bulletin

No. 81

W. A. Kellerman, Ph. D., Ohio State University.

Columbus, Ohio, September, 1907.

Last year a paper was published in the Memoirs of the Torrey Botanical Club, New York, by H. J. Banker, a student of the Hydnums. The treatment amateurs at least would regard as revolutionary, and this suggests that a number of the Bulletin be devoted to the subject as there presented. No illustrations were included in the paper. The substance is given below.

NOTES FROM MUSHROOM LITERATURE. VII.

W. A. KELLERMAN.

The paper that will be discussed here is entitled: A Contribution to a Revision of the North American Hydnaceae, by Howard James Banker. It was published as No. 2, Vol. 12, of the Memoirs of the Torrey Botanical Club.

Professor Banker is the first American botanist to take a hand in the splitting up of the old genus *Hydnum*. Several European mycologists have undertaken the task, some of their work being accepted in the paper under discussion.

After this carving out of the Linnaean genus Hydnum the numerous genera, which Professor Banker recognizes, there remain only six of the American species, namely *Hydnum albo-magnum, Hydnum album, Hydnum repandum, Hydnum caespitosum, Hydnum washingtonianum and Hydnum sublamellosum.*

A "Hydnum" then to be a *true Hydnum*, must be *terrestrial, mesopodous* [*i. e.*, with a stipe or stem attached at the *middle* of the pileus], and *fleshy;* the plants are white, red or yellow; and the spores are smooth, not roughened.

A list is here compiled to show the new names proposed for the North American species:

Fig. 262. FIS-TU-LI'-NA HE-PAT'-I-CA. Beefsteak fungus. Edible. This is a soft fleshy, red species belonging to the family *Polyporaceae;* but the tubes are separate and free—see Fig. 264 of the tubes magnified. It grows in decaying parts as crevices of trees and stumps, from midsummer to early autumn. It is a widely distributed species; rarely common in any region and not often abundant. Photographs were made from specimens collected at Sugar Grove, Ohio.

NEW NAMES FOR OLD HYDNUMS

as given in Professor Banker's Monograph

Hydnum abietinum—now given as Hericium laciniatum.
Hydnum adustum—now given as Steccherinum adustum.
Hydnum agaricoides—now given as Steccherinum agaricoides.
Hydnum albonigrum—now given as Phellodon alboniger.
Hydnum atroviride—now given as Sarcodon atroviridis.
Hydnum aurantiacum—now given as Hydnellum floriforme.
Hydnum blackfordae—now given as Sarcodon blackfordae.
Hydnum boreale—now given as Hydnellum suaveolens.
Hydnum brunneo-leucum—now given as Grandiniodes flavum.
Hydnum caput-ursi—now given as Hericium caput-ursi.
Hydnum carbunculus—now given as Hydnellum carbunculus.
Hydnum cervinum—now given as Sarcodon imbricatus.
Hydnum compactum—now given as Hydnellum floriforme.
Hydnum conchiforme—now given as Steccherinum ochraceum.
Hydnum concrescens—now given as Hydnellum concrescens.
Hydnum conigenum—now given as Hydnellum conigenum.
Hydnum coralloides—now given as Hericium coralloides.
Hydnum coriaceo-membranaceum—now given as Phellodon coriaceo-membranaceus.
Hydnum crispum—now given as Hericium coralloides.
Hydnum cristatum—now given as Sarcodon cristatus.
Hydnum croceum—now given as Hericium croceum.
Hydnum cyathiforme—now given as Phellodon tomentosus.
Hydnum cyaneotinctum—now given as Hydnellum cyaneotinctum.
Hydnum daviesii—now given as Steccherinum ochraceum.
Hydnum delicatum—now given as Phellodon delicatus.
Hydnum discolor—now given as Steccherinum agaricoides.
Hydnum erinaceus—now given as Hericium erinaceus.
Hydnum fasciatum—now given as Phellodon fasciatus.
Hydnum fasciculare—now given as Hericium fasciculare.
Hydnum fennicum—now given as Sarcodon fennicum.
Hydnum ferrugineum—now given as Hydnellum sanguinarium.
Hydnum flabelliforme—now given as Steccherinum rhois.
Hydnum flavum—now given as Grandiniodes flavum.
Hydnum floriforme—now given as Hydnellum floriforme.
Hydnum fuligineo-violaceum—now given as Sarcodon fuligineo-violaceus.
Hydnum glabrescens—now given as Steccherinum reniforme.
Hydnum graveolens—now given as Phellodon graveolens.
Hydnum humidum—now given as Hydnellum humidum.
Hydnum hybridum—now given as Hydnellum floriforme.
Hydnum imbricatum—now given as Sarcodon imbricatus.
Hydnum laciniatum—now given as Hericium laciniatum.
Hydnum laevigatum—now given as Sarcodon laevigatus.
Hydnum nigrum—now given as Phellodon niger.

Fig. 263. FIS-TU-LI'-NA HE-PAT'-I-CA. The Beefsteak fungus. The same plant shown in Fig. 262, there the upper, here the lower side. Unfortunately the tubes forming the fruiting surface cannot be seen, but Fig. 264 shows them plainly.

Hydnum ochraceum—now given as Steccherinum ochraceum.
Hydnum parasiticum—now given as Steccherinum strigosum.
Hydnum plumarium—now given as Steccherinum ochraceum.
Hydnum plumarium—now given as Steccherinum plumarium.
Hydnum pulcherrimum—now given as Steccherinum pulcherrimum.
Hydnum putidum—now given as Phellodon putidus.
Hydnum ramosum—now given as Hericium laciniatum.
Hydnum reinforme—now given as Steccherinum reniforme.
Hydnum reniforme—now given as Steccherinum reinforme.
Hydnum rhois—now given as Steccherinum rhois.
Hydnum scabripes—now given as Sarcodon scabripes.
Hydnum schiedermayeri—now given as Hericium croceum.
Hydnum scrobiculatum—now given as Hydnellum scrobiculatum.
Hydnum septentrionale—now given as Steccherinum septentrionale.
Hydnum spongiosipes—now given as Hydnellum velutinum.
Hydnum stratosum—now given as Leaia stratosa.
Hydnum strigosum—now given as Steccherinum strigosum.
Hydnum suaveolens—now given as Hydnellum suaveolens.
Hydnum tinctorium—now given as Echinodontium tinctorium.
Hydnum tomentosum—now given as Phellodon tomentosus.
Hydnum vellereum—now given as Phellodon vellereus.
Hydnum velutinum—now given as Hydnellum velutinum.
Hydnum zonatum—now given as Hydnellum zonatum.

The purpose and nature of the monograph, the general remarks, and the distribution of the Hydnaceae will be given in Professor Banker's own words, which are as follows:

"The following paper is intended to include a revision of all the pileate forms of the family of the Hydnaceae, which have been found on the continent of North America and its adjacent islands north of the Isthmus of Panama. A few resupinate forms have been included by reason of their close relationship to pileate forms, but in general they have been excluded. The reason for this arbitrary limitation of the scope of the work is the impossibility of adequately treating the resupinate forms and referring them to their proper species until such time as the Berkeley types can be thoroughly examined by one familiar with our American plants.

"The Hydnaceae represent one of the smaller families of the Basidiomycetes, there being not more than five hundred known species in the family, and of these not more than two hundred have been reported within the geographical limits of this paper. With a few exceptions the species are not common and generally appear to be quite local in distribution. The task, therefore, of getting suitable material on which to base a revision of the family has proved more difficult than was at first anticipated. Nor are the herbaria of collectors as helpful as one would have a right to expect. The published descriptions of species of this family are frequently incomplete and inadequate to fully discriminate the species, so that it is possible often to include several different species under the one description. Collectors are inclined to refer specimens according to some conspicuous feature, such as a scaly pileus or a zonate pileus, and then pay little attention to other apparently minor characters. Owing to the local character of the distribution of these plants, combined with the comparative rarity with which they are found, few discover that the plants

which they are referring to a given species are very different from the plants which others are referring to the same species. Moreover, assuming that the species is common and well known, no field notes are considered necessary. As a result much confusion has arisen in our conception of these species. Occasionally mycologists, who have received specimens from all parts of the country, have noted that certain species present remarkable variations, but as the material thus received is usually fragmentary, without suitable notes, and is received only at rare intervals, they have generally contented themselves with noting that the form is an unusual one.

"In the extensive collections of the New York Botanical Garden, brought together from very many different sources, the confusion in species is very evident. This is conspicuously seen in the forms referred to *Hydnum imbricatum* L. and *H. zonatum* Batsch. As to the former species, nearly everything with a scaly pileus has been referred to it, while the latter has been made to include almost everything with a zonate pileus.

"While herbarium specimens often clearly show that they represent distinct species, so great is the change that these plants undergo in the process of drying that one rarely feels justified in attempting a description of new species from such material without satisfactory field notes. On the other hand, the securing of fresh material or at least of ample and accurate field notes is a difficult and discouraging task. During six years of careful watching for specimens of the *H. imbricatum* allies, it has been the writer's fortune to find but two of the scaly-capped forms in the field; likewise but one of the forms commonly referred to *H. zonatum*, has come within his observation. Of more than forty specimens found in the her-

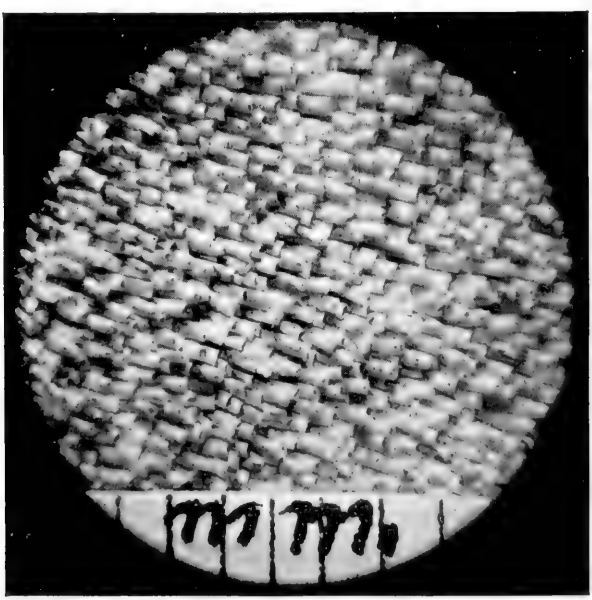

Fig. 264. The tubes forming the fruiting surface of FIS-TU-LI'-NA HE-PAT'-I-CA, considerably magnified as shown by the millimeter scale. See Figs. 262 and 263.

baria referred to these two species, not one was accompanied by descriptive notes that were of any value. Yet we have at least a half dozen good species here represented, could the distinctive characters be clearly established.

"The species of this family are not only comparatively rare and local in distribution, but they are often intermittent in appearance. The writer once found three different species in a space not over ten feet square, and a fourth in the same woods a short distance away. But not one of the four was found anywhere in that region in the next four successive years, although the ground was searched over repeatedly each year.

DISTRIBUTION.

"The geographical distribution of these plants appears to be largely influenced by latitude. But collections of Basidiomycetous fungi from the region west of the Mississipi river have been so few and incomplete that general conclusions respecting distribution in this region can not be confidently drawn. The following areas may be recognized as possessing each a characteristic and somewhat distinctive hydnaceous flora. (1) The northeastern United States south to North Carolina and Tennessee and west to the Great Plains. (2) The Southern States west to Lousiana. (3) The Gulf region including the West Indies and the immediate borders of the Gulf. (4) The north Pacific coast including Oregon and Washington. It seems probable that Canada and northern New England to Greenland may represent another distinct floral distribution, but collections in this region have been too meager to suggest more than a possibility. These remarks on distribution are based on specimens actually seen by the writer, and do not include the various species reported in catalogues and local floras without accompanying specimens. The material examined has come chiefly from the following states: Maine, Massachusetts, Connecticut, New York, New Jersey, West Virginia, Ohio, Indiana, Kentucky, Alabama, Louisiana, Cuba, Honduras, Oregon, Washington. This study of distribution cannot be satisfactorily supplemented by published local floras, for in consequence of the confused conception of species in this family, such lists are wholly unreliable except when verified by actual specimens, and these are often lacking. A comparison of two collections on which such floras have been based, quickly reveals how utterly untrustworthy are these lists of species as a means of determining distribution. The plants referred to *Hydnum imbricatum* by Alabama collectors are totally distinct from the plant referred to the same species by the New England botanists. Professor Earle has noted that *Hydnum repandum* as collected by him in Connecticut, was a very different thing from the plant of that alliance with which he had been acquainted in Alabama.

"It is hoped that the present contribution may lead to a clearer conception respecting the species of this family and be a means of stimulating a more exact study of the distribution of these plants. It can hardly be expected that all confusion has been removed or that all errors have been avoided. The source of many of our present difficulties is to be traced back to the work of early European botanists, whose material is either inaccessible or has long since passed into an irrecoverable oblivion. The author believes that in the majority of cases, with respect to the species included in this paper, he has formed a clear conception of them in his own mind and has endeavored to present that conception as definitely and distinctly as he was able in the accompanying descriptions and synopses. Whether he has in all cases made an absolutely correct determination, especially in the case of species referred to old European types, he cannot state with complete confidence."

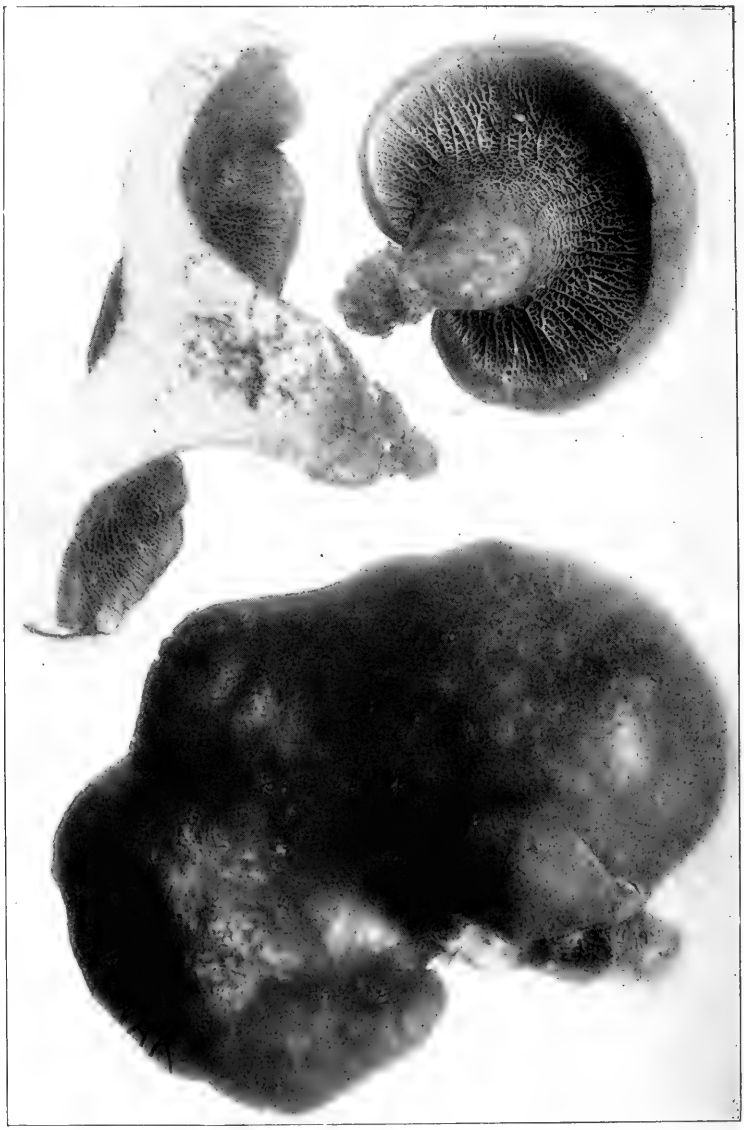

Fig. 265. PO-LE-TI'-NUS FO-RO'-SUS. A fleshy reddish-brown plant, belonging with the preceding species illustrated in this Number to the family *Polyporaccae*. The hymenium or fruiting layer is described as composed of broader radiating lamellae connected by very numerous more narrow anastomosing branches or partitions and forming large angular pores. Collected in the woods at Sugar Grove, Ohio.

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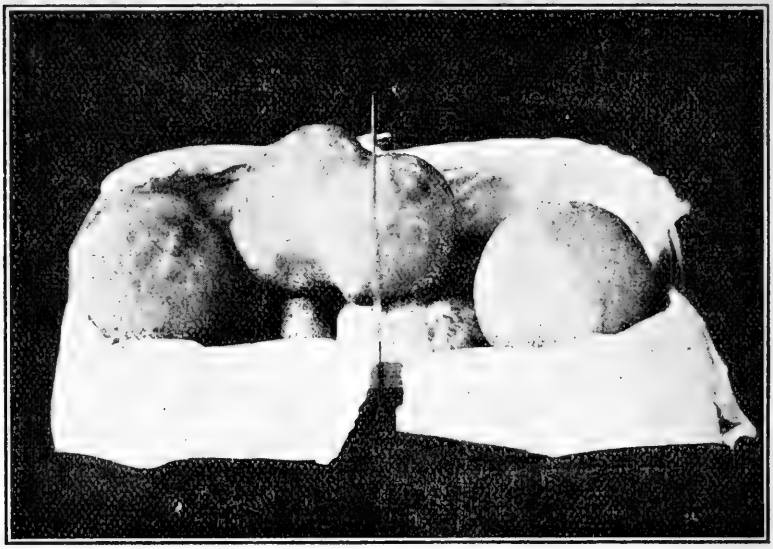

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Mycological Bulletin

No. 82

W. A. Kellerman, Ph. D., Ohio State University.

Columbus, Ohio, October, 1907.

MOSTLY ABOUT POLYPORI.

Though C. G. Lloyd's Mycological writings are most generally distributed to a wide circle of readers, it is probable that many patrons of the *Bulletin* do not receive all that he publishes. We therefore think it advisable to reproduce here portions as far as space permits.

NOTES FROM MYCOLOGICAL LITERATURE, VIII.

W. A. KELLERMAN.

Mr. C. G. Lloyd of Cincinnati published Letter No. 10 from Paris, July, 1906, and from this interesting and instructive communication we make the following excerpts:

"There have been about *twenty-eight hundred* polyporoids 'described,' not counting the several hundred 'synonyms' given by Fries. From the United States alone there are about five hundred 'species' recorded. Fungi are widely distributed plants. The fungi of Europe and the United States are practically the same. We do not question but the larger part of these twenty-eight hundred are synonyms, but it is a large task to find out what they are and to learn the species that are 'good.' We shall devote most of our time in the immediate future to work on the European species, for it is self-evident that as the first and most of the work has been done with European species, and as the American species are largely the same, one must first acquire a knowledge of what occurs in Europe in order to be in position to judge as to those of America.

"There has been so much changing of names lately in the Polyporii that we feel it well to state our position in this regard. The most and best systematic work on Polyporus was done by Fries. His system and names have been in general use for two generations, and are familiar to all. We therefore feel that no attempt should be made to change them excepting in very exceptional cases. It has become quite a fad lately to look up dates of synonyms and shuffle the names around on such evidence.

Fig. 266. CLI-TOC'-Y-BE LAC-CA'-TA. EDIBLE. Growing in woods, fields, roadsides and other waste places, as Professor Atkinson says, quite easily recognized from the whitish scurfy cap when young, pale red or tan color when mature, the gills pink or purplish, though the spores are white. The character of the gills is evident in photograph which was made from specimens collected near Columbus, Ohio, July 27, 1907.

latest work. As to the extra European species, some two thousand or more, they have been mostly described at four centers—Upsula, Berlin, London, and Paris. There are without question many reduplications of names. The only thing that can be done as I see it is to hunt up and study these specimens where they exist, and then take the first name, unless there are good reasons for not taking it. As to genera, the question is not so simple. The genus Polyporus is too large and should be broken up, but I fell that as much of the old should be retained as possible, particularly the four leading sections with which we are all familiar. Also the allied genera, Trametes, Daedalea, etc., notwithstanding that the same plant often exhibits forms that 'throw it into another genus.' The leading ideas of the genera are simple and well known, and no system of classification can be devised that does not have its objections and 'exceptions.'

"In Europe for the last twenty years there have been three men working on dividing the polyporoids into new genera. First, Karsten, then Quelet, then Patouillard. Each has proposed his own system and his own names, and neither has met with much general favor, because, in my opinion, of the vast array of new names. Mycologists in general refuse to learn a new language in order to work with old plants. I think many good ideas are expressed in their work, but they would have been better received had they been used to subdivide the old genera, not to replace them. In America, Mr. Murrill is a little late in taking up the work, for most of it has been done before—at least three different ways. To re-christen the ideas of his predecessors and further add to the Babel of new names, is only making a bad position worse. As the European work has mostly failed to meet with favor for this very reason, I can foresee no other fate for the American."

SAMPLE COMMENTS ON A FEW COMMON SPECIES.

"FOMES LEUCOPHAEUS.—The very commonest Fomes in our country. It is so close to Fomes applanatus of Europe that I do not believe that any one would note the difference on a casual examination of the two plants, and it is not strange that the plant has been universally called Fomes applanatus in most all American literature. European mycologists have been using the microscope on the spores of Fomes, and when I sent the plant there it was noted that it had smooth spores, while the spores of Fomes applanatus are rough. It was published in Mycological Notes in 1901 (page 60), which I think was the first time attention was drawn to this popular error which had persisted in American mycology up to that date. Recently it has been announced that Leveille first called the plant "megaloma," but I think that is largely guess work, and I have thus far been unable to find any confirmatory evidence, but have found positive proof that Leveille determined and published the plant as "Polyporus applanatus."

"POLYPORUS LUCIDUS.—The correct genus to which this plant belongs is now known as Ganoderma, consisting of species with "varnished" pilei and colored spores. Most of them, I think, are better called Fomes, but this species with us is not perennial, hence not properly a Fomes. It is therefore a question whether to call it Polyporus lucidus, Fomes lucidus or Ganoderma lucidus. It has been known, however, under the specific name "lucidus" for more than a hundred years, and it is purely chimerical to try to change that.

"POLYSTICTUS PERGAMENUS.—A very common plant in the United States, usually growing on oak. It is claimed that as the original grew on pine it is not the same as the common species in the United States, and the name Polystictus pseudo-pergamenus has been proposed. However, the plant is generally known as Polystictus pergamenus. It is a curious fact that this is a very rare plant in Europe, and it was recently brought into the museum

Fig. 267. Pax-il'-lus at'-ro-to-men-to'-sus. Photograph of the dark brown specimens collected on rotten wood at base of tree, at Sugar Grove, Ohio, August 10, 1907, by Supt. Hard, Mrs. Blackford and the Editor. .

at Paris as a great rarity. It is called in France "Polystictus simulans, Blonski."

"SCHIZOPHYLLUM COMMUNE.—A very common species all over the world and in every country, hot and cold, where I have ever been. At Cincinnati it has a special liking for the maple. It has been known as "commune" for two generations, but recent date dictionary investigators have called it Schizophyllum alneum, in my opinion a stupid change for a plant thas *is* the most *common* species, that occurs everywhere, and grows in many countries and thousands of localities where alder does not grow.

THE MYCOLOGICAL SITUATION IN AMERICA.

"I have to write so many letters to my correspondents in reply to inquiries as to what literature to buy in order to study mycology that I feel it will save time to issue a printed letter on the subject.

"Unfortunately there is no one book of much service. I always advise my correspondents to first buy Atkinson's "Mushrooms, Edible, Poisonous, etc." It is the best book we have. It is only a primer and does not consider one of twenty of the agarics you will meet every season, but you can derive from it a general idea of classification. I believe he should have all praise for what he has done, not hiding the fact that there is a great deal of room to do much better as he learns more of the subject.

"The next book of service is Miss Marshall's "Mushroom Book," chiefly on account of the pictures which are much better than the text. Like the preceding it is purely elementary and considers only a few common species.

"Dr. Herbst's 'Fungal Flora of the Lehigh Valley,' Pennsylvania, is a very useful book because it considers many common plants that every one will meet. Unfortunately the illustrations are very poor.

"When you have begun to get an insight into the genera, buy Stevenson's 'British Fungi.' It is chiefly a translation of Fries, but it is all the more valuable on that account. Fries was the great master of agarics in Europe, and universally held to be the best authority, but his writings are in Latin, and while they are court of final resort, you will not need them until you reach the 'new species' stage.

"Massee's 'British Fungus Flora,' four volumes, is the latest English work and is largely used in England. The arrangement of the genera departs from all other works and it is so difficult to find anything in it that I rarely use it. It always reminds me of a house I saw on the Midway where everything was upside down.

"The fungi of Europe and America are for the most part the same species, and thus any European work will be of service in America. It is my firm belief that the greater part of the plants in America that have been described as new species, are European plants not recognized. Failure to identify the American plants from the conflicting accounts and illustrations that have been given of them in Europe is to no man's discredit. To reach conclusions when working with agarics in Europe is a task difficult enough: in America it is impossible. If American mycologists had any practical way of learning the American names for the agarics they meet it would be a great help.

"It is my experience in America that about two out of three plants one meets agree with the descriptions just enough so that one thinks it may be the species, and differ just enough so that one doubts it. So that you are in a more uncertain position when you finish your determination than when you began it. This is the fault of the way in which the matter is presented. Professor Peck knows the New York plants and could write *systematic* work, presenting the plants by *contrast* and pointing out the

Fig. 268. HE-BE-LO'-MA RE-PAN'-DUM. Collected in a heavily manured cabbage patch on the farm of the Ohio State University, July 14, 1907, and identified by Professor Morgan. Only one species (not this one) of Hebeloma is figured and described by Professor Atkinson. He says: "The genus corresponds with *Tricholoma* of the white spored Agarics. All the species are regarded as unwholesome, and some are considered poisonous. The species largely occur during the autumn. Few have been studied in America." The color was dark fulvous or sometimes buff.

differences between them so that they could be recognized. I think I reflect the wish of every American mycologist when I express the hope that he may undertake *A Manual of New York Agarics.* I used the word 'New York' because it is the New York species that Professor Peck knows, and fungi are such widely spread plants that it would serve as a manual for the entire country. American mycology is embarrassed with a lot of 'dried specimens' descriptions of agarics which for the most part are rubbish and should be crossed off the 'literature.' It is impossible for a man to draw up live characters from dead plants that lose the most of their real characters in drying. Such work only confuses the facts and should be ignored in any work that wishes to be of real service.

"Not counting Boudier, the best illustrations of the agarics of Europe in my opinion are the old works of Bulliard, Sowerby, and Greville, and in the Flora Danica. The most useful series is Cooke's plates because it embraces all common species and for the most part is fairly well done. If you have funds to buy but one series of illustrations, by Cooke's. They cost about one hundred dollars. With all Cooke's faults, he did a great deal to popularize mycology in England, and I wish we had a Cooke in America.

Fig. 269. Rus'-su-la e-met'-ca.. Poisonous. On the ground in thin moist forests, where there is much decaying and disintegrated wood. The photograph from which the cut was made, is of specimens collected in the Paint Creek region near Chillicothe, in August, 1906. The cap is pink or rosy, darker in age. It is very acrid in taste, said to be an emetic, and is poisonous, according to "authorities," but MacIlvaine says he eats it.

Fig. 270. Po-ly'-po-rus pi'-ci-pes. Like several other Polypores this is said to be good enough to eat when quite young, but it is more interesting in other ways. It is one of the striking common forms, our cut from photographs of specimens in which the pores are just making a beginning; but when mature they are yet very small; the fruiting surface is white and the pores are round, yellowish with age. When the pallid state of the cap is completed it gradually becomes chestnut—this and its peculiar form commanding universal attention. Collected at Chillicothe, Ohio, August, 1907.

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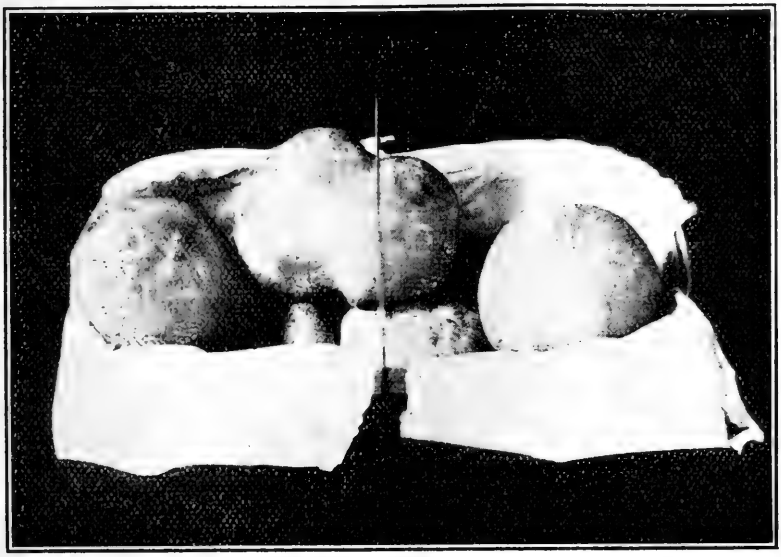

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Mycological Bulletin

No. 83

W. A. Kellerman, Ph. D., Ohio State University.

Columbus, Ohio, November, 1907.

A MODERATE VARIETY THIS TIME.

We present several specimens of beauty or interest—the striking *Calvatia*, and the beautiful *Sarcoscypha*, one of the most charming of the attractive Pezizas, furnished us by the skillful photographer, Mr. G. D. Smith of Akron. We will have opportunity later to see other specimens of his handiwork. Teachers who see these may be interested to know that Mr. Smith will furnish copies of his photos at a very moderate price.

DESCRIPTION AND PICTURE OF CALVATIA ELATA AND SARCOSCYPHA FLOCCOSA.

G. D. SMITH.

CALVATIA ELATA.

The peridium is globose above and plicate below where it is abruptly contracted into a long stem-like base. The base is slender, cylindrical, and sometimes pitted. When in its prime condition the entire plant is a rich cream color. The cortex consists of a coat of persistent granules or spinules. The inner peridium is white or cream colored becoming brown or olivaceous. The mass of spores and capillitium is usually brown. The threads are very long and branched. Spores are usually globose and even but may be sometimes slightly warted. I found this beautiful specimen last September growing in a sphagnum swamp near Akron, Ohio. The cut shows it natural size.

SARCOSCYPHA FLOCCOSA.

This species belongs to the Discomycetes and has a long slender stem which broadens out into a slender goblet-shaped cup at the upper end. The entire plant outside the cup is covered with short hairs while the rim of the cup is beset with long, strigose hairs. The inside of the cup is a deep red color while the outside of the entire plant is a very delicate pink.

The plants photographed are shown natural size and were found growing in a rich shady woods near Aron, Ohio, on July 1, 1907.

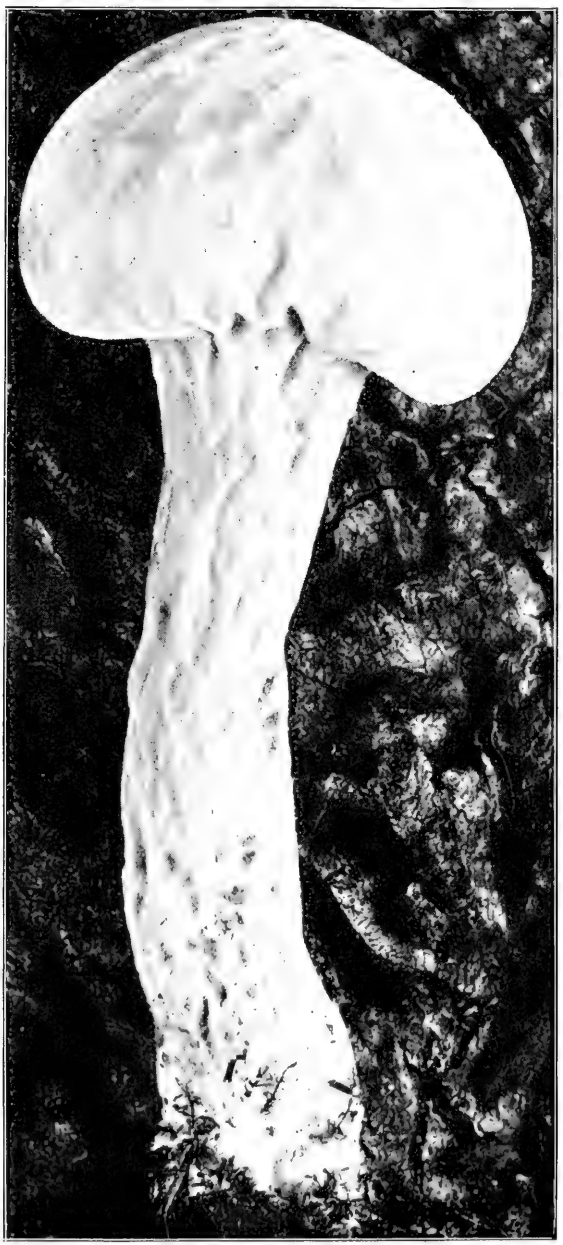


Fig. 272. Cal-va'-ti-a e-la'-ta. See page 367.

NOTES FROM MUSHROOM LITERATURE. IX.

W. A. KELLERMAN.

The report of the State Botanist, 1906, Charles H. Peck, was published July, 1907, being Bulletin 116, Botany 10, New York State Museum. It can be purchased of the New York State Education Department, Albany, for 35 cents per copy. It is dispensable to every student of our Mushrooms. These new species by Dr. Peck are included: Amanitopsis pulverulenta, Boletus subpunctipes, Collybia campanella, Cortinarius validipes, Entoloma minus, Flammula expansa, Hygrophorus burnhami, Marasmius phyllophilus, Mycena albogrisea, Omphalia pusillissima, Peckiella hymenii, Pleurotus terrestris, Russula foetentula, Russula modesta, Russula pectinatoides, Tricholoma hirtellum, Phallogaster whitei, Hymenogaster anomalus, Leptonia transformata, Hygrophorus ruber, Hygrophorus serotinus.

Remarks and observations of a few species are here transcribed.

"Boletus nigrellus Pk.—A form of this extremely rare species was found in Sand Lake, in which the pileus is yellowish or greenish yellow when fresh, and its flesh as well as the tubes and stems slowly changes to a dingy flesh color and then to black or black where wounded, as in the type.

"Cantharellus cantharellus (Schw.) Fr.—A form of this Mushroom occurred plentifully the past season near Menands. The hymenium was distinctly marked by branches and anastomosing.

"Paxillus panuoides Fr.—A singular form of this species was found by Dr. H. von Schrenk growing on pulp paper that had been stored for a considerable time in an enclosure where there was not much light. Both habitat and place were unusual and evidently had a modifying influence on the character of the specimens. Some of them were four inches long, including the narrowed stem-like base, and two or three inches broad. They were nearly white when fresh, but in drying they gradually assumed a yellowish tint approaching the normal color of the species."

About half dozen pages are devoted to the Edible Fungi, the following being fully described and illustrated by colored plates: Tricholoma hirtellum (new species), Tricholoma nudum, Clitocybe amethystina, Clitocybe ochropurpurea, Russula compacta, Russula earlei, Russula pectinatoides (new species), Russula uncialis, Agaricus micromegathus, Boletus frostii, and Boletus rugosiceps.

The New York species of Hygrophorus are described and keys furnished to the species of the three groups into which the genus is divided. Prof. Peck says: "The waxy character of the hymenium is the chief distinguishing character of the genus; the lamellae are usually thick, distant, or sub-distant, and their hymenial surfaces somewhat separable from the trama. Many species with decurrent gills are similar in appearance to species of Clitocybe, but such species may generally be distinguished by their distant lamellae and their viscid pileus and stem." Forty-two species are included in the monograph.

The New York species of Russula, 59 species, are similarly treated. Dr. Peck, after giving the technical description, says: "This genus is closely related to the genus Lactarius, from which it is easily distinguished by the absence of the milky juice. * * * The pileus is destitute of concentric zones, but in the genus Lactarius such markings are frequent. The red colors which are so conspicuous and common in this genus are rarely, if ever, seen in Lactarius. In both genera many species have a mild or an agreeable flavor, and many others have an acrid, hot or peppery taste. This disagreeable flavor is generally destroyed in cooking so that nearly all the species that have been tried have been found to be edible."

A New Naucoria.—The illustration shown as Fig. 373, represents a new species recently described by Professor Atkinson in the Journal of Mycology. His statements in full are as follows:

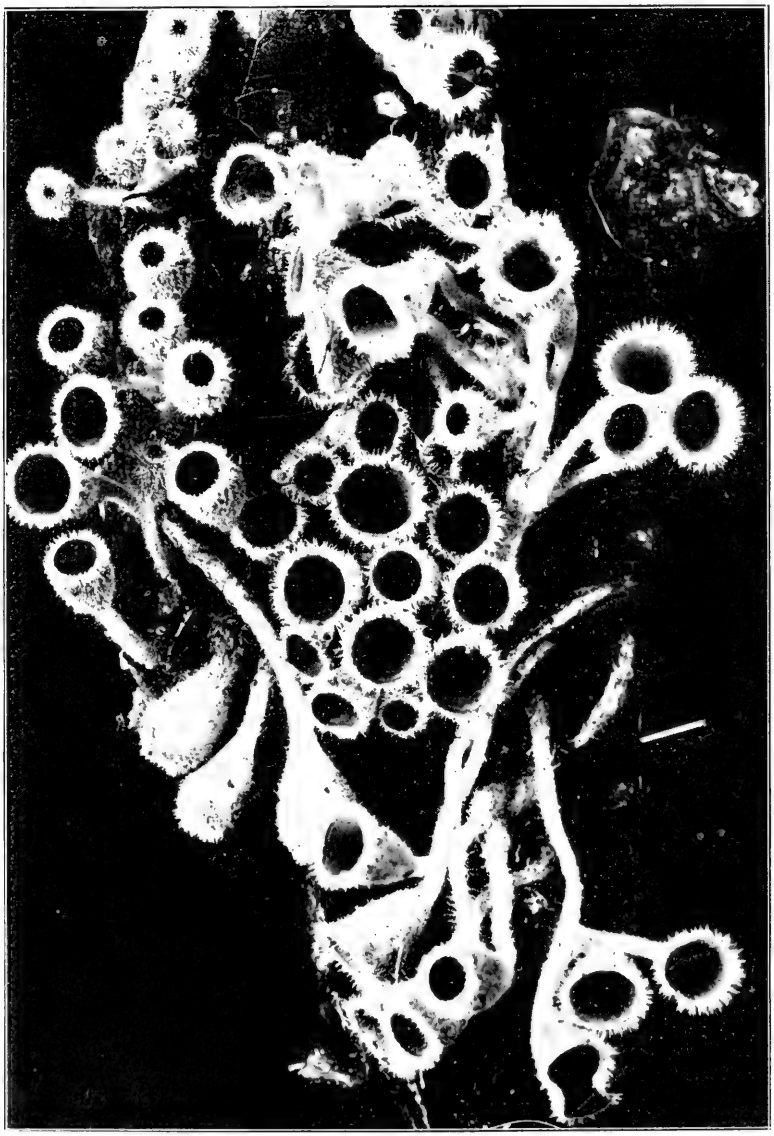


FIG. 273. SAR-CO-SCY'-PHA FLOC-CO'-SA. Picture of a common and beautiful Peziza which is described on page 367. Photo by G. D. Smith, Akron, Ohio.

Material received from Prof. W. A. Kellerman and Supt. M. E. Hard, Central Ohio, prove to be undescribed species of fungi. The diagnoses of one of these forms is given below; it is also illustrated by a half-tone from photograph made by the collector.

NAUCORIA PALUDOSELLA ATKINSON N. SP.—Growing on living sphagnum, other mosses and on rotten wood, Sphagnum moor, Buckeye Lake (Cranberry Island), Ohio, W. A. Kellerman 4461, Sept. 1905, and M. E. Hard and W. A. Kellerman, Oct. 1906. (4916, W. A. K.)

Plants 6-8 cm. high; pileus 2½-3 cm. broad; stems 3-4 mm. thick.

Pileus viscid when moist, convex to expanded, in age somewhat depressed, clay color, darker over center, often with appressed clay brown scales with a darker color.

Gills raw umber to Mars brown (R), emarginate, adnate, sometimes with a decurrent tooth, easily becoming free.

Cystidia on sides of gills none, edge of gills with large hyaline thin-walled cells, subventricose, sometimes nearly cylindrical, abruptly narrowed at each end with a slight sinus around the middle.

Spores subovate to subelliptical, smooth, 7-9x4-5 *u*, fuscous ferruginous, dull ochraceous under microscope.

Stem same color as pileus but paler, cartilaginous, floccose from loose threads or in some cases abundant threads over the surface, becoming hollow, base bulbous, the extreme base covered with whitish mycelium.

Veil rather thick, floccose, disappearing leaving remnants on stem and margin of pileus when fresh.

DESCRITION AND ILLUSTRATION OF PECK'S PSATHYRELLA HIRTA.

W. A. KELLERMAN.

An interesting little Agaric appeared recently in the soil of a bed in the Ohio State University Conservatory. It confined itself to a very small area, the plants usually standing a short distance apart. When young it was very conspicuous by reason of the rather large tufts of white hairs that completely covered the small pileus. It takes on a deep dull orange color (fourth shade of orange, Prang's system) when the cap expands, and then the hairs mostly have disappeared. When quite mature none or only traces of the hairs remain—so easily do they vanish especially by application of water, (outside the greenhouse the rain of course would have the same effect.)

Specimens of the plant (as No. 4915) were sent to Professor Peck who identified it as a species which he described in the 50th Annual Report of the New York State Museum (1898), p. 107. I quote his description in full:

"Psathyrella hirta *n. sp.*—Pileus thin, hemispherical or convexs, adorned when young with erect or spreading tufts of white, easily deterible and quickly evanescent hairs, hygrophanous, brown or reddish-brown and slightly striatulate when moist, pale grayish-brown or dingy whitish when dry, flesh subconcolorous; lamellae broad; moderately close, adnate and often furnished with a decurrent tooth, at first pallid, becoming blackish-brown or black; stem flexuose, squamose, hollow, shining, white; spores elliptical, black, .0005 to .00055 in. long, .00025 to .0003 broad.

"Subcaespitose; pileus 4 to 6 lines broad; stem 1 to 2 in. long to 1 to 1.5 lines thick.

"Dung or dungy ground in shaded places. Adirondack mountains. July.

"The species has some points of similarity to *Psathyra gossypina* and *P. pennata,* but its adnate lamellae and black spores distinguish it from

FIG. 274. NAU-CO'-RI-A PAL-U-DO-SEL'-LA. A new species found on Cranberry Island (sphagnum swamp), Buckeye Lake, Central Ohio. See description on other page.

both. The hairs of the pileus are coarse and vanish so easily that they are preserved with difficulty in the dried specimens." (Charles H. Peck.)

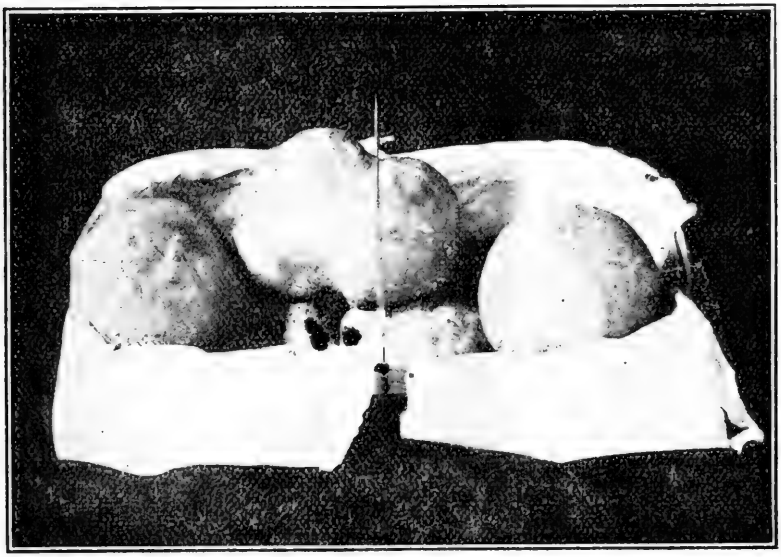
The illustration, Fig. 276 (on last page), shows plants in various stages of development. The dense floccose tufts are seen plainly on the young specimens, and even on those quite well developed. Specimens in age showing these tufts of hairs most conspicuously were selected for the photograph. From the specimens on the left scarcely any are to be seen. The plants are but 3 cm. high, the caps about one and a half cm. wide, and the stems one to two mm. in diameter.

Specimens later were sent to Professor Atkinson, who considers them *Deconica atrorufa,* (named by Schaeffer originally as *Agaricus atrorufus*); some others use the name *Psilocybe atrorufa* for this. A final decision may yet have to be deferred in reference to this plant. Unfortunately the greenhouse bench gave way and the soil in which specimens were growing had to be removed. It is hoped that plants may be found later and their taxonomic status satisfactorily settled.

FIG. 275. NAU-CO'-RI-A PAL-U-DO-SEL-LA. Same species as Fig. 274. This shows better the *yellow* strands of mycelium at the base of the stem, by means of which the attachment to the sphagnum is intimately secured. See description of the species on other page.

Fig. 276. PSATH-Y-REL'-LA HIR'-TA. A neat little mushroom found growing in the greenhouse, thought worthy of more extended notice, therefore see page 371.

The Mycological Bulletin is issued Monthly, Price 25c. Copies of Vol. II (1904), Vol. III (1905) and Vol. IV (1906) may be had for 50 cents each, or cloth bound copies for 75 cents. No copies remain of Vol. I (1902). Address W. A. Kellerman, Columbus, Ohio.



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VOL. V. DECEMBER, 1907 NO. 84

MYCOLOGICAL BULLETIN

W. A. KELLERMAN, Ph. D. OHIO STATE UNIVERSITY

INDEX TO VOLS. I-V

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Edited and Published by
W. A. KELLERMAN

Press of VANCE-POLAND CO.
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Mycological Bulletin

No. 84

W. A. Kellerman, Ph. D., Ohio State University.

Columbus, Ohio, December, 1907.

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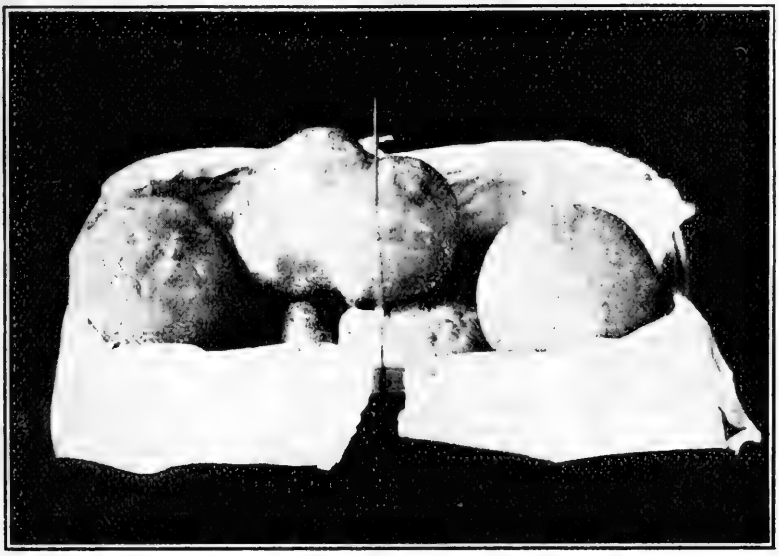
INDEX TO ILLUSTRATIONS, VOLS. I-V



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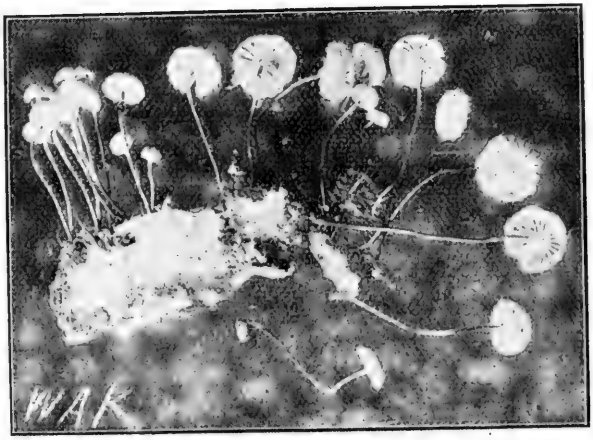
MYCOLOGICAL BULLETIN

W. A. KELLERMAN, Ph. D
OHIO STATE UNIVERSITY



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Mycological Bulletin

(Nos. 85 to 96)

Volume VI

1908

W. A. Kellerman, Ph. D.
Ohio State University

COUMBUS, OHIO
Press of The Poland Company

PROFESSOR A. P. MORGAN AT HIS HOME PORCH

From a kodak picture taken a short time before his death; Mrs. Morgan is on the right

Mycological Bulletin

No. 85

W. A. Kellerman, Ph. D., Ohio State University

Columbus, January, 1908

QUIN-QUEN-NI-UM.

It may not be amiss to set mile-stones for the BULLETIN for each five years. Accordingly we have given an Index for Volumes I-V, during which time the pagination was continuous; those who wish to bind them into one volume will appreciate a single index for all. The value is still enhanced by indexing the illustrations separately from the subject matter.

Our second quinquennial period begins with this issue, and accordingly we begin again with page 1. The practically unchanging list of steady subscribers is appreciated, and suggests that the BULLETIN is organized on a satisfactory basis. However, it is believed that a type somewhat larger will be welcomed, and we hope nothing of neatness will be thereby sacrificed; in fact, we are sure the appearance will be improved.

DEATH OF PROFESSOR A. P. MORGAN.

W. A. KELLERMAN.

The death of Professor Morgan has removed from us a genuine naturalist, an eminent mycologist, and splendid man.

But it is a pleasure to state that the deep interest in nature, particularly the vegetable world, which his daily life, study, and publications evinced, had nothing of sordid motive—this was not a means of accumulating wealth or even a method of earning a livelihood. His latter twenty-three years, on the farm, were quite favorable to sympathetic enjoyment of nature and most fully embraced. My own visit at his home a summer or two ago, with a short ramble through his fields and woods, put me in touch with a type of naturalist too rare these later days; revealed to me a soul alive to the beauties of nature and responsive to her sweetest influences.

He devoted much study to the mushrooms and other higher fungi—not neglecting, however, other interesting plants, for example, Discomycetes, the Slime-moulds or Myxomycetes, etc.,

Most important for us of his numerous publications should be mentioned his Mycologic Flora of the Miami Valley, published in the Journal of the Cincinnati Society of Natural History, and his various papers on Agarics, published recently in the Journal of Mycology.

SUPT. HARD'S NEW BOOK ON MUSHROOMS

AN ADVANCE REVIEW BY W. A. KELLERMANN.

Now comes forth an announcement of a new book on MUSHROOMS by that mushroom-hunter, mushroom-eater, mushroom-writer, as it were, mushroom-fiend—but we have seen the MSS., and the pictures, and can quiet the mushroom public by saying that the book is all right. In natural history no one is "authority"—each one thinks for himself, speaks for himself; it is the plan we here adopt to give a single description of Mr. Hard's, and a few sample illustrations, which his publishers have kindly allowed me to use in advance. We take at random a description, say of AMANITA MAPPA, and it will appear as follows in the new book:

"AMANITA MAPPA FR. THE DELICATE AMANITA. POISONOUS.

"Mappa means a napkin; so-called from the volva.

"The pileus is two to three inches broad, convex, then expanded, plane, obtuse or depressed, without separable cuticle; margin nearly even; white or yellowish, usually with patches of the volva, dry.

"The gills are adnexed, close, narrow, shining, white.

"The stem is two to three inches long, stuffed, then hollow, cylindrical, nearly smooth, bulbous, nearly globose at the base, white, almost equal above the bulb.

"The volva with its free margin is acute and narrow. The ring is membranaceous, superior, soft, lax, ragged.

"Its color is quite as variable and its habits are much like A. phalloides, from which it can only be distinguished by its less developed volva which, instead of being cup-shaped, is little more than a mere rim fringing the bulb. The odor at times is very strong. It is found in open woods and under brush. Label it poisonous."

Those interested to know more about this publication, *Mushrooms Edible and Otherwise*, and to place orders at once, are referred to the author (Supt. M. E. Hard, Chillicothe, O.), but it may be added that it will be very comprehensive, describing and figuring practically all the mushrooms any one can find in this country; also explaining the structure of the plants, the descriptive terms used, classification; giving keys and directions for study, a glossary, recipes for cooking, and a chapter on Culture of Mushrooms.

The figures we use in this number of the BULLETIN, taken from the book now in press, are as follows:

Fig. 277. AMANITA MAPPA. Poisonous. Natural size. See description quoted above.

Fig. 278. COLLYBIA CONFLUENS. Edible. Natural size. Growing among leaves in the woods after warm rains, in tufts, sometimes in rows or lines. The cap is an inch to an inch and a quarter broad, reddish brown; stems two to three inches long, hollow, pale red, sprinkled with a mealy pubescence.

Fig. 279. CLAVARIA SPINULOSA. Edible. Color somewhat cinnamon brown throughout. In mixed woods, after frequent rains in August to October.

Fig. 280. TRICHOLOMA MACULATESCENS. The spotted Tricholoma, so-called because the cap in drying becomes more or less spotted. The cap is one ane a half to three inches broad, reddish-brown. Does not seem to be very common.

Fig. 281. CANTHARELLUS FLOCCOSUS. The Woolly Cantharellus. Edible. The cut from a photograph by C. G. Lloyd. It is elongated, funnel-shaped or trumpet-shaped, ochraceous yellow, one to two inches broad at the top, and never more than four inches high.

Fig. 277. AM-AN-I'-TA MAP'-PA. From Hard's new book on Mushrooms.

Fig. 278. Col-lyb'-i-a con'-flu-ens. From Hard's new book on Mushrooms.

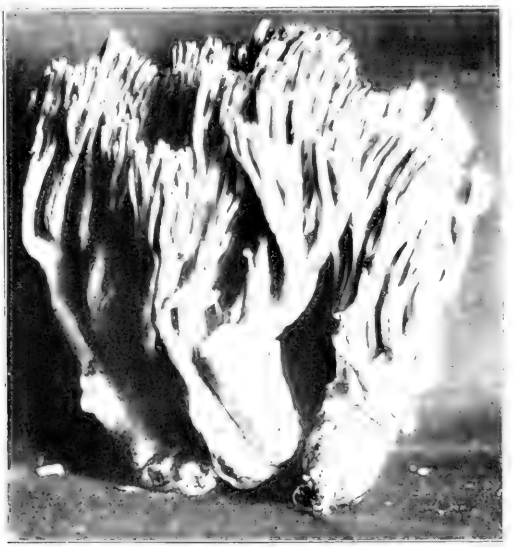

Fig. 279. CLA-VA'-RI-A SPIN-U-LO'-SA. From Hard's new book on Mushrooms.

Fig. 280. TRI-CHO-LO'-MA MAC-U-LA-TES'-CENS. From Hard's new book on Mushrooms.

Fig. 281. CAN-THA-REL'-LUS FLOC-CO'-SUS. From Hard's new book on Mushrooms.

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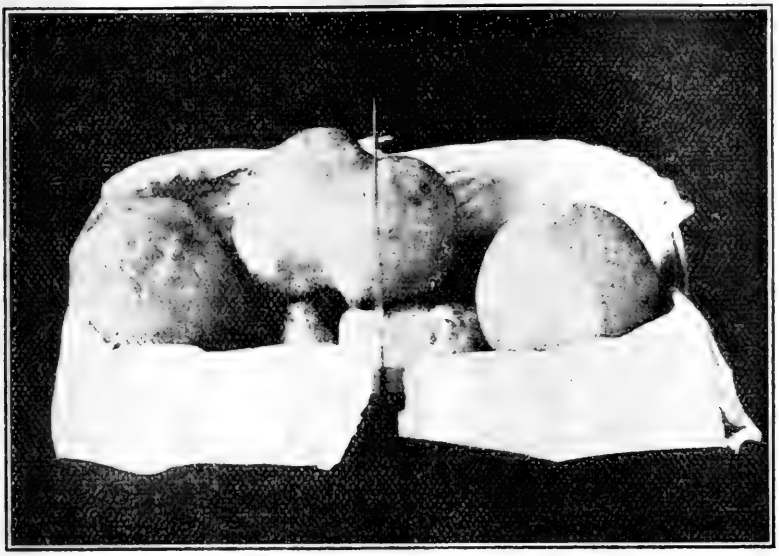

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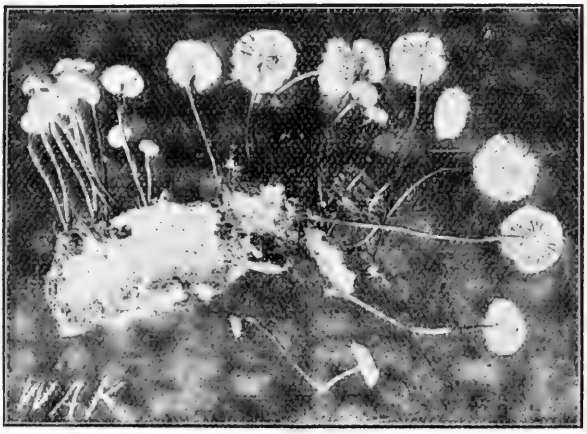
VOL. VI. FEBRUARY, 1908 No. 86

MYCOLOGICAL BULLETIN

W. A. KELLERMAN, Ph. D
OHIO STATE UNIVERSITY



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Mycological Bulletin

No. 86

W. A. Kellerman, Ph. D., Ohio State University

Columbus, February, 1908

BUT A WORD BY THE EDITOR

We can not eat moulds, but we can study them. Supt. Sumstine gives us another lesson—this time dealing with some rare species. His outline drawings give faithfully their appearance under the microscope.

The illustration of the Puff-balls will be enjoyed by all. Mr. Smith has promised many specimens of his handiwork, and when we have good photographs we can get good half-tones. We are indebted to him also for some account of the pear-shaped Lycoperdon.

MORE MOULDS

DAVID R. SUMSTINE.

About 200 species of Moulds have been described. After deducting the probable synonyms and excluded species, there remain about 130 good species. Of this number only twelve or possibly fifteen species have been reported for America. This is a very small number for our country compared with the whole number of known species.

The European mycologists have carefully studied the life history of many European species, but the American forms have received very little attention.

In my critical study of the family *Mucoraceae*, two interesting species were recently found. These species, however, do not belong to the family *Mucoraceae*. The spores are not enclosed in a sporangium as in the common black mould, but are borne singly or in chains on enlarged cells.

PIPTOCEPHALUS REPENS Van Tieghem. This species can be easily recognized by the dichotomously branched conidiophores and the chains of conidia on the ultimate branches. The general appearance reminds one of *Sporodinia aspergillus*. So far as I know, this is the first time that it has been reported for America.

CHAETOCLADIUM BREFELDII Van Tieghem et Le Monnier. This is supposed to be parasitic on other moulds. It is known by its verticillately branched sporangiophores ending in a long sterile tip. The spores are borne singly on swollen parts of the branches.

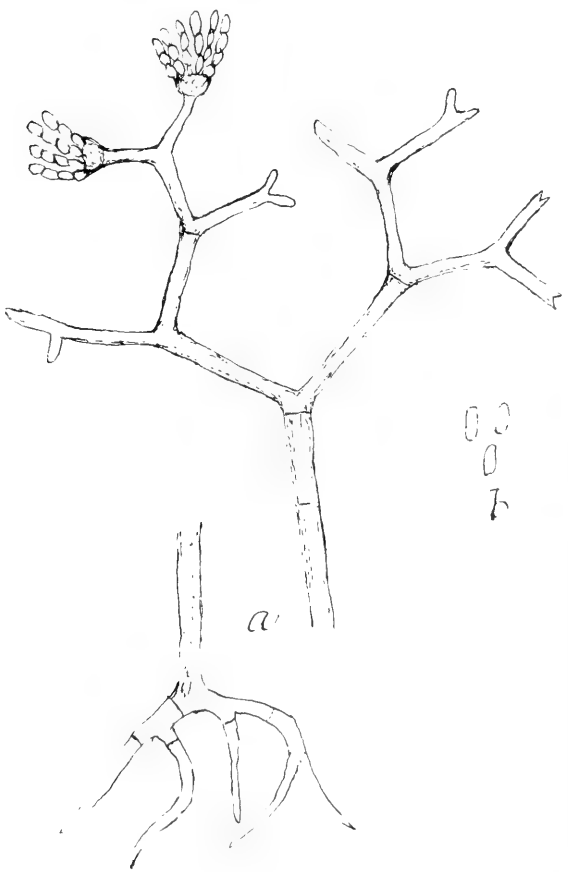

Fig. 282. PIP-TO-CEPH'-A-LUS RE'-PENS. See article on Moulds.

Both moulds were found on the dung of the camel, growing with other moulds. The greatly enlarged drawings will give an idea of the general appearance of these two species.

Specimens of moulds from the readers of the MYCOLOGICAL BULLETIN would be appreciated.

Wilkinsburg, Pa.

EXPLANATION OF FIGURES.

Fig. 282. a—Sporangiophore of Piptocephalis repens; b—Spores of same.

Fig. 283. a Branch of sporangiophore of Chaetocladium brefeldii; b—Spore of same.

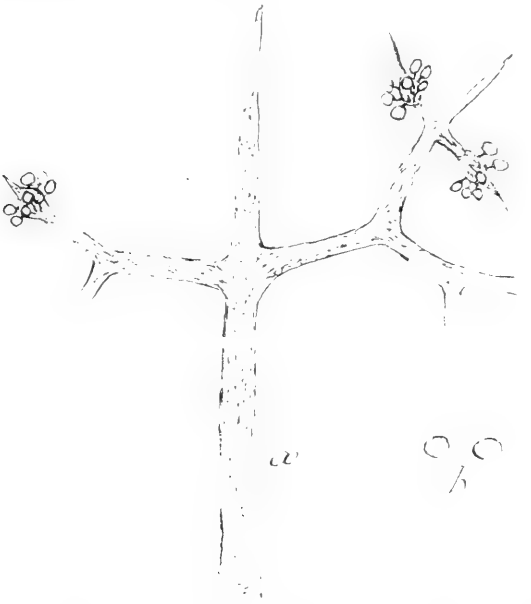

Fig. 283. CHAE-TO-CLA'-DIUM BRE-FEL'-DI-I. See article on Moulds.

NOTES FROM MUSHROOM LITERATURE, X

W. A. KELLERMAN.

The botanical journals are crowded with literature directly or indirectly interesting to those who pay attention to mushrooms. Many new species are being found; the old ones are being studied. Then, again, the list of edible species is being extended, and along this line the readers are sure to be interested. But too many accidents are occurring—cases of poisoning that would not occur if persons would avail themselves of information that may be found in any of the mushroom books.

It may be advisable in this connection to reproduce an account of poisoning by eating Amanitas, which Mr. O. E. Jennings published in the September Number of the Journal of Mycology. It is as follows:

"A Case of Poisoning by Amanita Phalloides.—The writer's attention was recently called by Judge J. D. Shafer, of Pittsburg, to a newspaper account of a fatal case of mushroom poisoning at the little village of Deep Valley, in the extreme southwestern point of Pennsylvania, and, acting upon Judge Shafer's urgent suggestion, the case was immediately investigated.

"It was found that the village physician, Dr. Philip Dinsmore, together with three other members of the family and Mr. Frank Roberts, the man-of-all-work, had eaten with the evening meal, between six and seven o'clock, Sunday, August 4, a mess of mushrooms gathered that afternoon by Mr. Roberts. There had been about a quart of the mushrooms and they had been prepared by frying in flour and butter. All ate of the mushrooms excepting one little girl.

"Between one and two o'clock the next morning all who had eaten of the mushrooms were taken violently sick, vomiting excessively and having an extreme diarrhoea. These symptoms continuing during Monday, Dr. H. C. Rice, of Freeport, Pa., was summoned and a treatment begun consisting of the sub-cutaneous injection of atropine and as far as possible the administration of narcotics and oleaginous purgatives.

"The vomiting and diarrhoea continued for about three days, other symptoms being sub-normal temperature, more or less delirium, and in the case of Dr. Dinsmore, severe muscular cramps of the limbs and extremities, and, evidently, of the muscular walls of the abdomen also, the patient dying early Thursday morning.

"At the time of the writer's visit (Saturday, August 10), Mr. Roberts had so far recovered as to be about, but the other three patients were still confined to their beds. The vomiting and diarrhoea had ceased, but there was considerable enlargement of the liver with distention of the gall-bladder and the patients were becoming jaundiced.

"Saturday morning Mr. Roberts escorted the writer to a little patch of about two acres of woods, lying at the base of the hillside along the creek, where the mushrooms had been gathered for the fatal meal. Two species were abundant, *Cantharellus* and the white form of *Amanita phalloides* Fr., and the latter species was indicated as the one composing the greater part of the mess taken. Other species indicated as having been also selected were *Amanitopsis vaginata* (Bull.) Roz., and *Russula emetica* Fr.—a very few. The only test applied in selecting the fungi had apparently been the pleasing appearance and the ten-

derness of the mushroom. Robert's identification of *Amanita* as composing the greater part of those eaten was independently verified by one of the patients, Dr. Dinsmore's sister, who had prepared the fungi for eating.

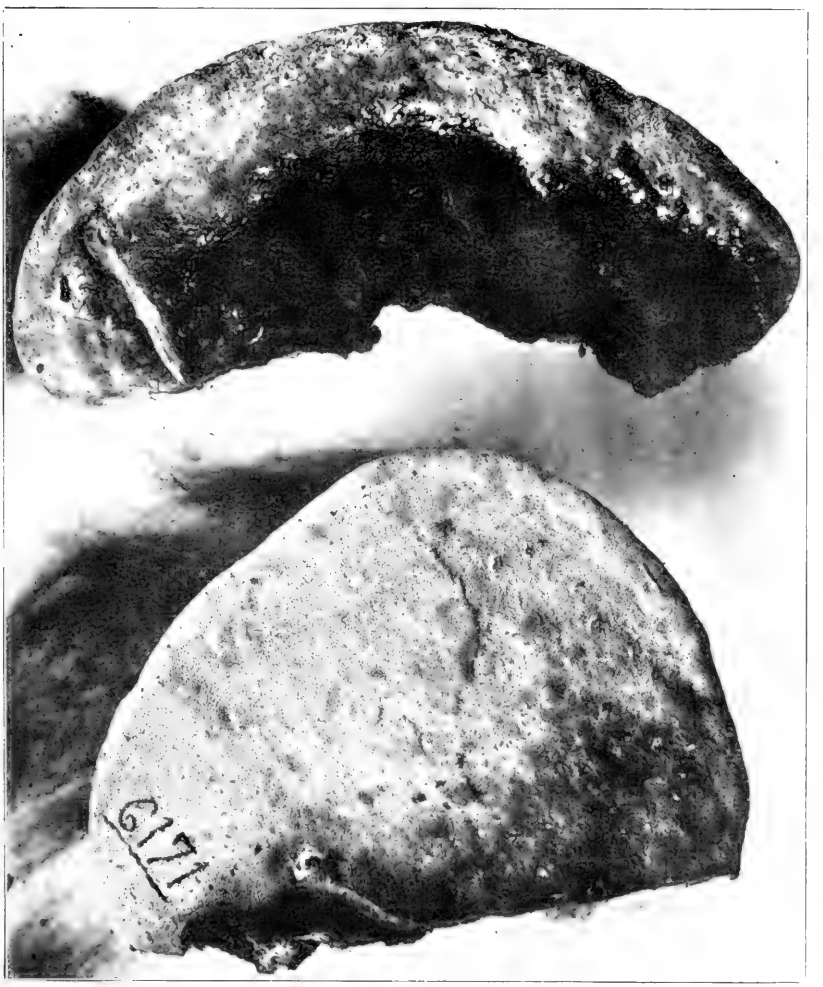

Fig. 284. Po-ly'-po-rus frax-i-noph'-i-lus. Ash-loving Polypore. A common woody fungus found on Ash trees. It attacks the trunks at wounds, or at exposed places where decay has begun. Specimens furnishing the photographs were collected near Chillicothe, Ohio.

"From the evidence obtained it is quite clear that the poisoning was due to the deadly Amanita, and it will be noticed that the symptoms exhibited were in close agreement with those ascribed to *phallin* poisoning by Chestnut, although Dr. Rice characterized the intestinal discharges as "serous" and not assuming the "rice-water" condition, and neither extreme salivation nor decided suppression of the urine was noticed.

"In connection with the supposed action of *phallin* in decomposing the blood corpuscles and in bringing about the escape of the blood serum from the system by way of the alimentary canal, it may be mentioned as a partial confirmation that the undertaker experienced considerable trouble in preparing the corpse for burial,—less than half the usual amount of blood could be extracted,—thus indicating a depletion of blood supply before death occurred."—O. E. Jennings, in *Journal of Mycology*.

THE PEAR-FORM PUFF-BALL

G. D. SMITH, AKRON, OHIO.

The pear-form puff-ball belongs to the genus *Lycoperdon*, which may be characterized by having a flaccid peridium which opens into a small, definite mouth at the top.

It has a capillitium of long-branched and intertwining threads. The spores are usually globose. They may or may not have a sterile base.

The cortex is sometimes smooth, but is usually covered with scales or spines. None of this genus are very large. The pear-form puff-ball—*Lycoperdon pyriforme*—is sometimes shaped like a pear, but more often it is globose, or where several are crowded together, it is flat, contorted, and quite irregular.

It grows on logs, stumps and even on the ground. Quite frequently it occurs in large clusters, or we may occasionally see it covering almost the entire surface of a decaying log. I have seen more than a bushel on one log.

The surface, when young, is nearly white, but soon becomes covered with brownish scales. It is supplied with an abundance of white mycelial threads that usually stick to it when pulled from the log on which it grows.

It is most abundant in the months of September and October, but I have found it in July and August. The October crop is usually the best for eating, as it does not begin to decay as quickly as in warm weather. It compares favorably in flavor with the other lycoperdons and, in its prime, it certainly ranks close to the gem puff-ball in beauty.

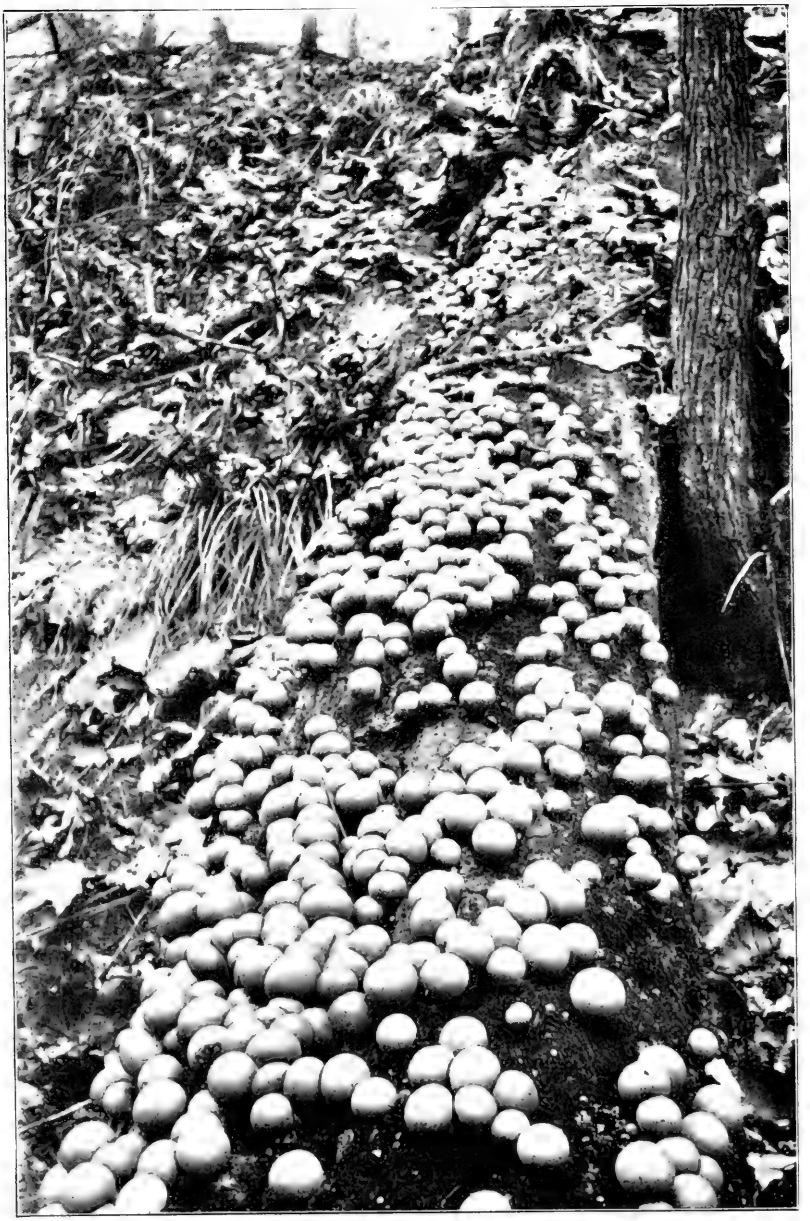

Fig. 285. LY-CO-PER'-DON PY-RI-FOR'-ME. Photo. G. D. Smith.

Fig. 286. Bo-le'-tus chry-sen'-ter-on. This is a common Boletus, having the flesh yellow, or golden within, as the name indicates. The tubes change to blue where wounded. Grows in woods and along mossy banks. McIlvaine says he has eaten plentiflly of this species, and that the flesh is sweet, delicate and toothsome. Photo, G. D. Smith.

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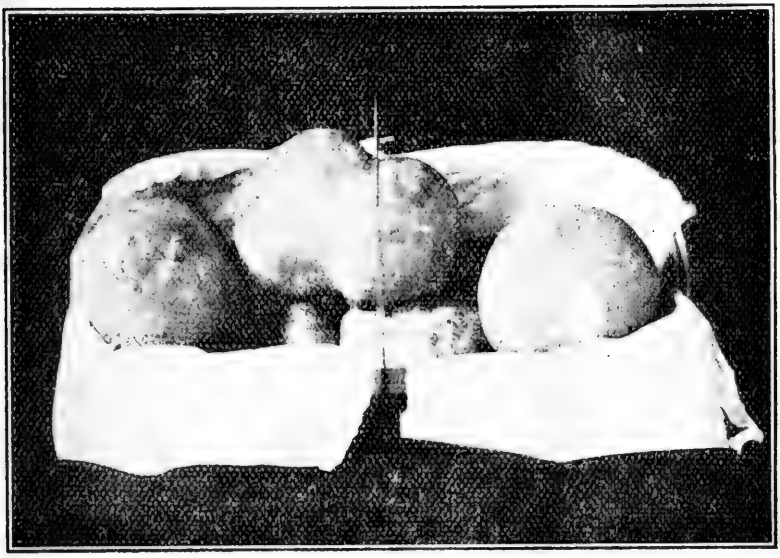

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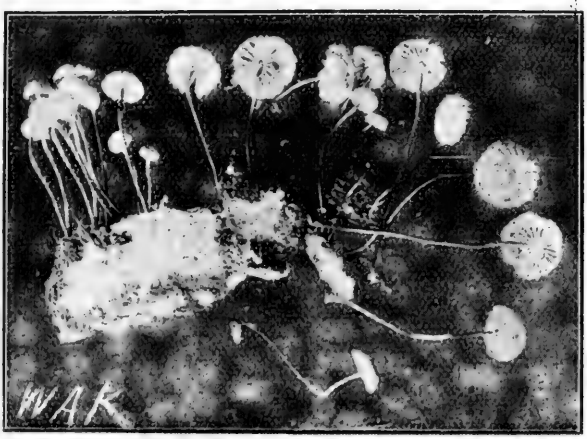
VOL. VI. MARCH, 1908 No. 87

MYCOLOGICAL BULLETIN

W. A. KELLERMAN, Ph. D.
OHIO STATE UNIVERSITY



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Mycological Bulletin

No. 87

W. A. Kellerman, Ph. D., Ohio State University

Columbus, March, 1908

BY WAY OF EXPLANATION

We are indebted again to Mr. G. D. Smith for an account and a picture of a very interesting thing. When you first find it in some shady place you will be puzzled to know whether it is phalloid, a puff-ball, or "egg" of something else, but it will prove to be a Phallogaster.

For the mushroom literature to report in this number we have decided to select Professor Beardslee's interesting comments on the Lepiotas of Sweden as compared with related forms in America, an article that was published last year in the Journal of Mycology. The mushrooms for the most part are cosmopolitan and studies of material in Europe is therefore apropos,—especially interesting if in the classic ground where Fries, the first great mycologist, collected and studied the species.

The note from the Youth's Companion touching a mycological bureau, will be read with interest.

PHALLOGASTER SACCATUS

G. D. SMITH, AKRON, OHIO.

This plant is rare in the United States. When young it somewhat resembles a tuber or a pear.

When I first met it, I took it at once to be a *Phalloid*, and its general appearance suggested to me the name of "Phallus tuberosa, but upon investigation, I found it had previously been given its present name, as printed above.

There has been some doubt about Phallogaster saccatus being a phalloid, but a close examination will show the same greenish gleba which, upon decay, gives forth an odor that can not be surpassed by any of the phalloids.

It also has the same spores and the same basidia and deliquesces in the same way. The center is white and somewhat translucent.

When it ripens, this whole central mass deliquesces and disappears, while the gleba also deliquesces, but clings to the inner

walls of the peridium, which soon breaks, giving the insects a chance to scatter the spores. This seems to be done largely by flies and the rove beetle.

The plants vary somewhat in size, from three-fourths inches to two inches in length, and from one-half to one inch in width. The color is light pink, purple or a little lavender in some places.

I have found them in only one locality, and that was in a rich, shady nook near the Cuyahoga river. They grew on the ground or on very much decayed wood, with an abundance of white mycelial threads attached to their base. Twenty or thirty grew close together, but not touching each other.

NOTES FROM MUSHROOM LITERATURE, XI.

W. A. KELLERMANN.

Careful study of species we know, or pretend to know, is urgently called for today. From the current literature pertaining to mushrooms we have selected the valuable comments on Lepiotas by Professor Beardslee, which he studied in Sweden and recorded in a recent number of the Journal of Mycology. The article is here reported in full:

"The Lepiotas of Sweden. The following notes on the species of Lepiota collected in Sweden by Mr. C. G. Lloyd and the writer during the summer of 1905 may be of interest in connection with the papers upon this genus which are appearing in the Journal.

"The number of species collected was not large, probably partly at least because work was necessarily stopped the first week of September. Doubtless other species might have been found in the same collecting grounds if work had continued a few weeks longer. The species detected were six in number, L. procera, naucina, rhacodes, cristata, metulaespora, and amianthina. Of Lepiota procera little need be said. It was found in the same surroundings in which it would have appeared in the United States and agreed with our plant in every detail. There is, however, food for reflection in the fact that this fine species which lends itself so well to description and illustration that it is easily recognizable, even by the amateur, has been reported from so many stations and is known to have so wide a distribution. Is it not at least possible that some of its relatives are also widely distributed, but owing to the greater difficulty of their recognition, are not so widely recognized? It is hard for one whose views on 'new species' are perhaps a little 'cranky' to account

otherwise for the facts, for instance, in regard to L. seminuda. This pretty species is abundant at Asheville, perhaps the most abundant species of Lepiota. Specimens and photographs have been seen by Bresadola, who has verified the determination, and

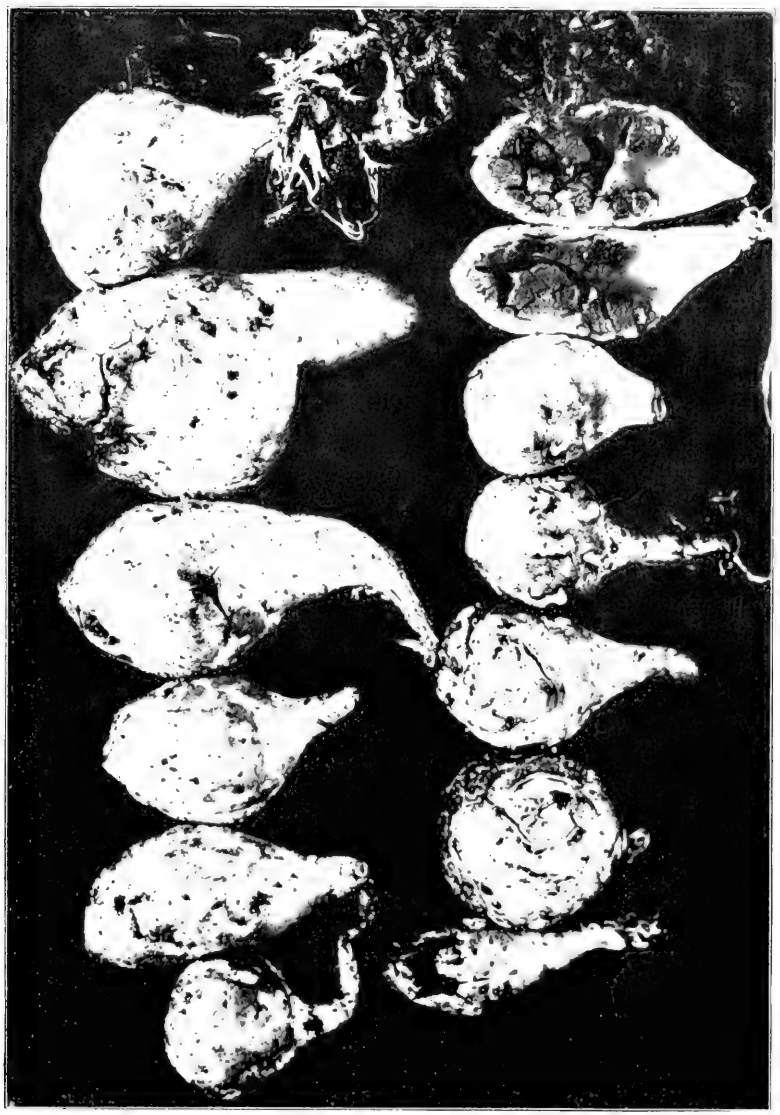

Fig 287. PHALLOGASTER SACCATUS. See article by G. D. Smith.

pronounced it correct in every detail. Still this species, so far as I know, is reported by only one collector, Prof. Morgan finding it at Preston. I greatly suspect that several of our new species will be found, on further investigation to be referable to this abundant and variable species.

"Lepiota rhacodes is a beautiful and striking species. As we found it it is large and robust, with a rounded almost hemispherical pileus, whose flesh is remarkably thick and firm, and which is covered with large, strongly revolute scales, which render it very striking. It is at once recognized by the student of the group at first sight. The flesh and gills redden when bruised as in L. Americana, but the red color is not as bright and the change is slower. This species is doubtless rare in the United States. I have never seen anything even approaching it, though it has been found in New England. Cooke's figure is not good, but it will easily be recognized when found from the description.

"Lepiota naucina was found only once, but then in some abundance in the parks at Stockholm. It is of course in outward appearance like our own L. naucinoides. The main point of interest was the form of the spores, as Fries stated that the spores of his species were round, which has led to the separation of our species, in which the spores are elliptical and apiculate. Upon examination, the spores were found to be identical with those of the American plant, and there can be no question that L. naucina as it is at present known to European mycologists, is identical with L. naucinoides. It seems hardly probable that the traditional plant has been incorrectly determined. It is much easier to believe that the form of the spores was originally given incorrectly. The species is plentiful in Sweden, and is, so far as I could learn, universally recognized as Fries' species.

"L. cristata and L. amianthina need no comment. They were in agreement with the plants known by the same names with us.

"The last species to appear at Drottningholm was an old friend, which is abundant at Asheville, and quite generally distributed in the United States. It belongs to a group whose status is at present unsatisfactory, the Clypeolariae. Our species need further examination and comparison with well authenticated specimens of the European species before we shall be certain of their identity. The species found is known in Europe as L. metulaespora. Fries considered it the same as Bulliard's species, L. clypeolaria, and so published it. Bulliard's plant is, however, different. It occurs in Sweden, but is not as common, and in spite of careful search I failed to find it. It is said to have a darker umbo and shorter spores than the true L. metulaespora. The plants we found were well marked by their soft appressed tomentose pileus, flocculose veil, and long spores. These were 15-20-

Fig. 288. TRI-CHO-LO'-MA FU-MES'-CENS. A set of specimens by Supt. Hard from his classic ground along Paint Creek, near Chillicothe, Ohio.

x 5-6 mic., and were spindle-shaped. The Asheville specimens have slightly shorter spores, but agree in all other details with the Swedish plants. At Asheville there are three species of Lepiota belonging to this group, L. metulaespora, floralis and a third species upon which I am unwilling at present to express an opinion. Possibly it may prove to be the true L. clypeolaria, though it seems at present doubtful. Lepiota floralis occurs rarely in open, sandy ground, and seems to correspond well with Ravenel's plant, which was found in his garden, from which he distributed at least three other new species, L. oligosarcus, fulvaster, and psilopus. These are all small species, and from the specimens examined can not be well understood. I have examined two of Ravenel's specimens of L. floralis, one in very good preservation at Washington, the other in the herbarium at Biltmore. The spores in the latter were examined and were rather larger than the measurements given by Morgan, being 11-13x-4-5 mic. and spindle-shaped. It is worth suggesting that this species needs further investigation before its status can be considered satisfactory. The conditions under which it is found suggest very strongly that it is only a depauperate form of L. metulaespora. An almost unbroken series of forms can be found in this region connecting the two species, and the points of difference are such as may well be explained by the fact that one form is found in sheltered places in woods and the other in sterile, sandy soil, in open places."—H. C. Beardslee, in the *Journal of Mycology*.

We give also a clipping from the Youth's Companion of November 14, 1907:

"Mushrooms.—A singular and very interesting and useful institution has been established in the little city of Tarare, near Lyons, France. It is a mycological bureau, where expert judgment is furnished concerning mushrooms brought to it for examination. The country round Tarare abounds with mushrooms, many of which are poisonous. Since the establishment of the bureau nobody buys mushrooms which do not carry its ticket of identification and guarantee, and all the country people from miles around bring their mushrooms for examination. One surprising result has been the discovery of scores of excellent edible mushrooms, which before nobody dared to touch."—The Youth's Companion.

Fig. 289. Bo-le'-tus fros'-ti-i. A very striking Boletus by reason of its red color (but this fades more or less with age and drying) and reticulated stem. It was first found by Frost in Vermont, but is widely distributed yet apparently not common. Do not eat this species—at least it must first be carefully tested. Specimens from Sugar Grove, Ohio.

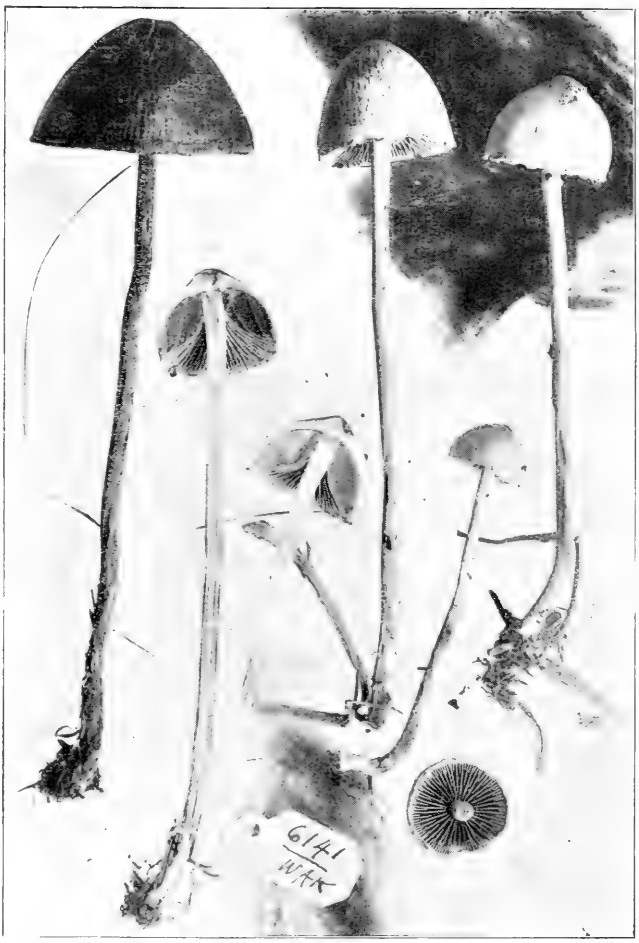

Fig. 290. PAN-AE'-O-LUS CAM-PAN-U-LA'-TUS. A very attractive species, common in rich soil and on horse dung. It is four to six inches high and the cap an inch wide. It is of a brownish color, but with a gray or lead-color tint. McIlvaine advises caution in case it is looked upon with gastronomic intent.

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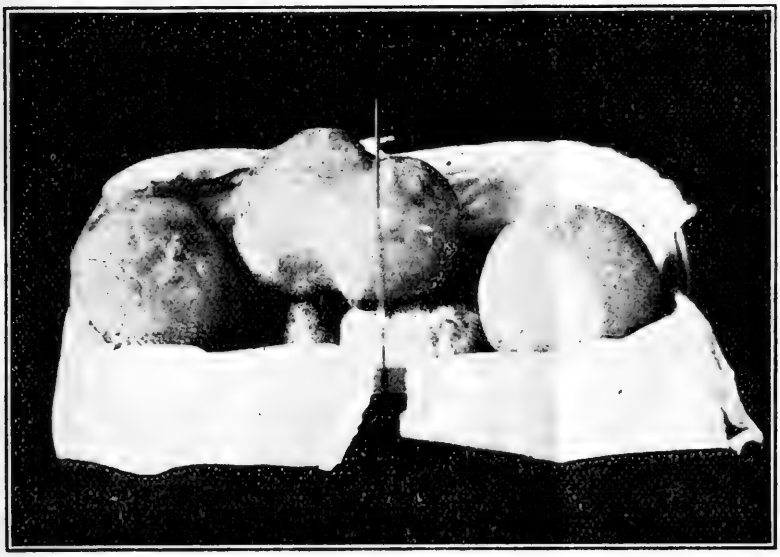

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