

MYCOLOGICAL NOTES

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THE GENUS LYCOPERDON IN EUROPE.

CHARACTERS:—The genus *Lycoperdon* embraces puff-balls, without a distinct stem, with flaccid peridia opening by definite mouths, spores not pedicellate and mixed with capillitia.

The peridium is flaccid and disperses the spores by collapsing directly opposite to the nature of the peridia of the *Bovista* series. It opens by a definite mouth; those species which have peridia brittle breaking away from the gleba are removed to the genus *Calvatia*.

The development of the sterile base varies much in the same species and is of little specific value. The cells of the sterile base are usually large and evident. In one section (polymorphum) they are minute. The capillitium is usually long, branched colored threads; in one section (*pratense*) hyaline or light colored, and sometimes septate.

The cortex or exoperidium, sometimes smooth, but usually bears spines varying from minute to large. These spines are usually in fours, separate at the base the apices connivent. The nature of the cortex is one of the best of specific characters. We present on our plates enlargements (about 4 diameters) of the cortices of most of the species. These figures were made from dried specimens and the cortices are shriveled and not as distinct as they would be had the figures been made from fresh plants.

The color of the gleba when very young is white, as the plants ripen, it turns yellowish or olive, finally brown, or in one series (*atropurpureum*) when fully ripe it is dark purple. The spores can be divided into two series. 1st, the large rough spores 5–8 mic. in diameter; 2nd, the medium or small spores 4–5 mic. in diameter, and smooth or slightly rough. All plants with a purple gleba have large rough spores. The spores are borne on the basidia on long sterigmata. These are caducous and as the spores ripen, fall away. In the series with the large, rough spores the fallen pedicels remain mixed with the spores but in the small spored series they largely disappear from the ripe gleba.†

HISTORY:—Linnaeus called all “puff-balls” and some that are not “puff-balls” *Lycoperdons*.‡ He did not know enough mycology to avail himself of Micheli’s earlier and much better work with the families of these plants. Persoon adopted largely the ideas of Michel-

†We consider pedicellate spores the best and plainest character in the puff-ball family and we would class all species of the *Lycoperdaceae* with pedicellate spores in the genus *Bovistella*. But one European species, which has not been so referred, *Bovistella pedicellata*, is affected by this view.

‡A tip for the name changers. Linnaeus first called the plants *Conoplea* “full of dust.”

ius, and he was honest enough to say so, but he changed most of the family names of Michelius because "the names are little harmonious they have been suppressed."†

In tracing back the species of the genus *Lycoperdon* in the museums and literature of Europe, little that is definite can be unearthed previous to Vittadini. It is certain that the old botanists Vailant, Michelius, Schaeffer, Bulliard gave some very bad cuts of these plants. Many of them cannot be even identified at this day. The early botanists who gave names, Linnaeus, Batsch and Fries in his *Systema*, worked mostly with these old figures, and as a result their work is as vague as the old figures. Persoon got his ideas of the genus *Lycoperdon* directly from plants but it was before the days of the microscope and his characters are largely drawn from their size form and color, which characters are of little value in specific distinction. Besides the vast amount of pioneer work that Persoon did prevented him from getting definite ideas of the species of *Lycoperdon*. This is evident from his herbarium where he has labeled many of his plants with a ? mark. I was much disappointed in not being able to decide definitely as to the most of Persoon's species.

Vittadini was the first author to do clear and concise work with the genus. He plainly points out the characters of his species, and gives good illustrations of them. His specimens, correctly labeled, are found in the museums of Kew and Paris to-day. Almost every one of Vittadini's species can be definitely known.

Much confusion has been introduced into the history of European *Lycoperdons* through the work of Bonorden who wrote shortly after Vittadini. Through the kindness of Dr. Magnus I had inquiries made but was unable to find that he left any specimens. He was a close observer, too close in fact, for he observed and recorded many unimportant details such as the color of the plant at different stages of its growth, which details are of no value and tend only to confuse. He described thirteen "new species" which has proven an unlucky number for most of them are unrecognizable. Fuckel issued exsiccatae of many of Bonorden's species and as both lived in the same region, Fuckel's specimens are often taken as a kind of commentary on Bonorden's species. Fuckel misnamed such common species as *Lycoperdon gemmatum*, which no one should mistake, and I feel that not much dependence can be placed on his interpretation of Bonorden's puzzling species. We have adopted a couple of Bonorden's names but we adopt them on Dr. Hollós' interpretations. In this connection, we will state that we believe the Doctor reached his conclusions thereon mostly from the appropriate names Bonorden gave plants; thus "fuscum" for the dark species; "cupricum" for the copper colored species, etc. At any rate, they are good names for the plants and we think the Doctor was wise in adopting them.

†This was before the days of modern advertising methods of affixing men's names to the names of plants. If a plant was misnamed or bore an uncouth or inharmonious name the old botanists simply changed it and gave a better name to the plant. It is a pity that the same principle cannot be followed to-day but under the present advertising system it would lead to too much fraud. If such a method were in vogue however, what chance would the Hungarians have with their "*Disciseda Debrececiensis*" or the Russians with their "*Secotium michailowskjanum*."

A recent work by Dr. Hollós "Gastromycetes Hungariae 1903" has much to commend it. The fine plates are the best that have ever been published. It is the only work excepting Vittadini's issued in Europe from which I think a student can reach correct conclusions concerning the views of the author. I consider that there are two very serious faults in the Doctor's work which I shall not now enlarge upon except in a foot note.† With the exception of Vittadini's and Hollós' works, little deserving of extended notice has been done in Europe. The greatest master of European agarics, Fries, published but one work on the gastromycetes. In his earlier days "Systema" appeared which although largely drawn from books and figures has had more influence in establishing nomenclature than any other one work.

SECTIONS OF THE GENUS.—We would divide the *Lycoperdons* of Europe into the following sections.

"ATROPURPUREUM" SECTION.—Gleba dark purple when fully ripe. Plants that are collected young however the gleba remains olive or umber.

Spores large 5–8 mic., rough, mixed with fallen pedicels. Capillitium colored.

"GEMMATUM" SECTION.—Gleba brown when mature. Columella prominent. Capillitium light colored, whitish to the eye when freed from the spores. Spores small or medium, 4–5 mic., smooth or slightly rough.

"PRATENSE" SECTION.—Gleba brown, distinct from sterile base. Capillitium light colored or hyaline, sometimes septate. Spores small or medium, smooth.

"POLYMORPHUM" SECTION.—Plants of a decided yellow cast. Cortex small, nodular or furfuraceous. Capillitium deeply colored. Sterile base none, or well developed with minute cells. Spores small or medium, smooth (in some species slightly rough).

"SPADICEUM" SECTION.—Characters as previous section excepting the cells of the sterile base are large.

†1st. The Doctor's nomenclature apparently has but one object in view—the addition of the word "Hollós" to new combinations. It is all done under the plea of "priority" and one might suppose from the space devoted to its discussion that the Doctor was an earnest advocate of this system. Such happily is not the case, as the Doctor's work testifies. In scores of instances the Doctor used better judgment and adopts the names in use merely citing in his synonyms prior references and gives no reasons for not adopting them in his nomenclature.

2nd. Had the Doctor devoted himself to the subject matter of his book "The puff-balls of Hungary" he would have issued a very excellent work for the Doctor has a good knowledge of that subject. But unfortunately, he has not done this. He skims around in the Library at Berlin and picks out a multitude, (I counted 31 in 7 pages of his synonyms) of plants that grew in Africa, Asia, North and South America and of which he never saw a specimen, and proceeds to reduce them to synonymy. I refer only to specimens still preserved, that could have been seen, and should have been seen, before any author takes such wholesale liberties with them. He arranges them in rows covering 46 pages, an evidence of a vast amount of labor and work (clerical). A large part of this is only guess work and some of the conclusions that the Doctor reached by this method are far from the facts. A few may be cited as instances.

"That *Bovista abyssinica* is a synonym for *Bovista plumbea*." *Bovista abyssinica* is a *Lycoperdon* and does not belong to the genus *Bovista*.

"The entire description of *Diplocystis Wrightii* is explained on an unripe still closed *Geaster mirabilis*." This was a good guess when the Doctor first published it, for he knew nothing about it, and under the circumstances one guess is as good as another. After the publication however, of a photographic plate showing that *Diplocystis Wrightii* has no resemblance whatever to *Geaster mirabilis* such statements should have no place in a scientific work.

"All species of *Diploderma* are based on unopened geasters." Some of them are nearer related to phalloids in their spores than they are to geasters.

We could multiply these examples many times but enough we think have been given to show that a large part of this section of the Doctor's work is purely speculation. This is very unfortunate for great expense and much labor have been put on the publication and we would be pleased could we give the entire work our unqualified approval.

THE "ATROPURPUREUM" SECTION.

LYCOPERDON ECHINATUM (Plate 41).—Plants obovate or pear shape, with slender, white, fibrous roots. Cortex of long *black* spines 3–4 mm. long, thickened at the base, with connivent at the apex falling off and leaving the peridium *reticulate* with circles of minute spinules that surround the large spines. Sterile base of large cells. Gleba dark, finally purplish. Spores large, 6–7 mic. rough, mixed with fallen pedicels.

This species is at once and readily recognized by its long, coarse spines such as are found with no other European species. The American form has more slender spines. It does not seem as though it could be confused and yet Fries referred Persoon's plant to a variety of *Lycoperdon gemmatum* (sic.) and redescribed it as *Lycoperdon constellatum*.

Specimens in our Collection.

England, Anna L. Smith, Wm. L. W. Eyre.

France, E. Boudier, X. Gillot, Prof. Lagarde

Hungary, L. Hollós. Switzerland, Denis Cruchet.

LYCOPERDON HOYLEI.*—This plant agrees with *echinatum* in everything excepting that the sterile base is compact and composed of very minute cells. It bears the same relation to *echinatum* that *polymorphum* does to *spadiceum*. We have seen only the type specimen at Kew which was collected in England.

LYCOPERDON ATROPURPUREUM (Plate 42).—Plants varying much in shape and size from little pear shaped specimens an inch in diameter to large turbinate plants with a thick stem.† Sterile base formed of large cells. Cortex on upper portion of fine, stellate, connivent spines about 2 mm. long, usually reduced below to scattered, furfuraceous spines. The degree of coarseness or fineness of the spines varies in different collections. In old specimens the spines fall off leaving the surface smooth. Gleba varying much according to age, at first olive, then dark umber‡ finally (if the plant ripens naturally) dark purple. Capillitium colored, branched. Spores large, 5–7 mic. rough, mixed with fallen pedicels.

This is a frequent plant in Europe but varies so much in the cortex nature that it has received a number of names. In tracing it back we do not feel as though we can go beyond Vittadini§ and certainly we can not find a more appropriate name than he applied to it.

†Prof. Patouillard finds about Paris specimens so closely resembling Bulliard's plate of *Lycoperdon hiemale* as to raise the question whether *Lycoperdon atropurpureum* was not the original of the much discussed and variously interpreted plate.

‡If the plant is collected before it is fully ripe the gleba never changes beyond the umber state, hence in collections colors of various specimens are found umber and purple that do not seem at first to be the same plant.

§Characteristic specimens from Vittadini are found in several of the museums of Europe.

If we go back to Persoon we find he called the plant by three names,† none of them as appropriate as Vittadini's.

SYNONYMS.—*Lycoperdon decipiens* (Flo. Alg.) *Lycoperdon asterospermum*.‡

Specimens in our Collection.

Sweden, L. Romell, C. G. Lloyd. *Germany*, Johanna Schultze-Wege.

France, A. Acloque, J. Lagarde. *Italy*, O. Mattiolo.

Austria, A. Weidmann, G. Bresadola. *Hungary*, L. Hollós.

Portugal, Rev. C. Torrend.

LYCOPERDON UMBRINUM* (Plate 43).—No plant is more variable than *atropurpureum* in the nature of cortex, specimens varying in all degrees from those with granular, furfuraceous cortex to those with distinct, cruciate spines. The former form we call *Lycoperdon umbrinum*, following Persoon. Persoon applied the name however, to the form with dark spinules. The usual form has the spines light colored, (*Lycoperdon molle*, Persoon, *Lycoperdon glabellum* Pk).

Specimens in our Collection.

Sweden, Erik Haglund, C. G. Lloyd.

Germany, Johanna Schultze-Wege, Otto Jaap.

France, N. Patouillard, Monsieur Maingaud, L. Rolland.

Italy, M. Bezzi, O. Mattiolo. *Austria*, Rev. G. Bresadola, Jos. Rompel.

Hungary, L. Hollós. *Spain*, T. de Aranzadi. *Portugal*, Rev. C. Torrend.

LYCOPERDON DELICATUM* (Plate 44, fig. 1).—This is a form globose depressed, differing only in shape. The cortex is of the *umbrinum* type in the only specimen we have.

Specimen in our Collection.

Portugal, Rev. C. Torrend.

LYCOPERDON ELONGATUM* (Plate 44, fig. 2, 3 and 4).—This is a cylindrical form that usually grows in moss. The cortex is of the *umbrinum* type.

Specimens in our Collection.

Germany, Johanna Schultze-Wege. *Portugal*, Rev. C. Torrend.

LYCOPERDON VELATUM (Plate 44, fig. 5, 6, 7 and 8).—Plants obovate or piriform. Sterile base of large cells. Cortex *double*; the inner of minute fascicled spines, densely covering the peridium; the outer of a loose soft membrane or veil completely covering the

†He gave a good illustration of the form with dark, reduced spines under the name *Lycoperdon umbrinum* and emphasized the dark color and minute nature of the spines. 2nd, he called the plant with minute, light colored spines *Lycoperdon molle* and although all subsequent workers, Masee, Morgan and Hollós have been enabled to determine "*Lycoperdon molle* Persoon," none of their plants have any relation to Persoon's. A specimen of Persoon's *molle* is found in Hooker's herbarium. It has large, rough, purple spores. A modern writer describes the spores as small, smooth and olive and subsequent writers have fitted to this description various plants not failing to add "Persoon" as authority for their work. Persoon himself did not seem to have much definite idea about *Lycoperdon molle*. In his herbarium I found three specimens so labeled, two being this species, and one *Lycoperdon gemmatum*. In addition there are four or five plants that he has labeled with a ? and none of them I think are this species. 3rd, *Lycoperdon hirtum* is the name Persoon applied to the form with well developed spines.

‡Montagne describes this plant as differing from *atropurpureum* in having no cells to sterile base. The type is a mere fragment and it is impossible to use it with exactness as a type.

plant in its early stages and as the plant develops, breaking up into ragged pieces which partly adhere loosely to the inner cortex or finally fall away. Gleba brown, then purplish. Capillitium colored. Spores large, 6–8 mic. rough.

This is a rare plant in Europe and but one collection has reached us. The peculiar cortex is well represented in some of the earliest figures.† Vittadini's figure shows the outer cortex too thick but the specimen he left (see Plate 44, fig. 8) is very characteristic.

Specimen in our Collection.

France, N. Patouillard.

LYCOPERDON CUPRICUM (Plate 45).—Plant with white, fibrous roots. Sterile base of large cells. Cortex of fine, appressed, stellate, connivent spines which fall away and leave the peridium smooth and polished. Columella prominent. Gleba dark umber.‡ Spores medium, 4–5 mic. rough.

The prominent character of the plant is the bright copper color. After the spines fall the smooth polished surface appears like a sheet of copper. There is one discrepancy with the original description. The spines while small *are* "discernible without a glass." The appropriate name that Bonorden gave it leaves to my mind no doubt of its reference. However, the color is poorly shown in Hollós' figure which is unfortunate as *the color is the character* of the plant. A few specimens of *Lycoperdon atropurpureum* we have with color of peridium tending toward this species, which we refer to *atropurpureum* on account of the purple gleba and larger, rougher, spores.

Specimens in our Collection.

Denmark, J. Lind. Germany, Johanna Schultze-Wege.

Austria, A. Weidmann. Spain, T. de Aranzadi.

LYCOPERDON FUSCUM (Plate 45).—Plants varying from pear shape with scanty, sterile base to stalked with well developed base.§ Cortex very minute stellate black spines, densely covering all portions of peridium and very uniform in size. In old specimens they partially fall off leaving the peridium at first reticulate finally smooth. Peridium of a dark brown color. Gleba umber brown, very rarely it takes a purplish tint. Spores medium 4–5 mic. rough.

I accept this plant in the interpretation of Dr. Hollós as I know nothing of Bonorden's plant. It is rare in Europe but I have collected it abundantly one season growing in woods over leaves at Eglon, W. Va., in the United States. The dark color of the plant is noticeable, and the minute, tufted black cortex spine characteristic.

Specimens in our Collection.

Belgium, Madame Rousseau. France, J. Lagarde. Portugal, Rev. C. Torrend.

†Viz. Vaillant t. 16, f. 4, and Michelius t. 97, f. 3, also though exaggerated I think in Michelius t. 97, f. 2. A very early name based on this figure is *Lycoperdon mammaeforme* Persoon, and I am surprised that Dr. Hollós did not dig it up and adopt it or Batsch's earlier name *Lycoperdon lanatum* based on the same figure.

‡I think it becomes purplish though I have never so seen it.

§The only three collections we have from Europe are small, oval specimens but in the United States no species varies more in shape.

THE "GEMMATUM" SECTION.

LYCOPERDON GEMMATUM (Plate 46).—Plants usually turbinate, with a globose head, and a cylindrical well developed base. It takes a number of forms, sometimes more globose with a thicker stem, sometimes more elongated, almost cylindrical; sometimes it is distinctly lacunose. Cortex of *soldered* warts like little "gems" that fall away and leave scars on the peridium.† These warts vary in shape. Some have a thickened base tapering rather abruptly to slender apex; most are thick and pyramidal. All are surrounded at the base by a circle of minute spinules which remain after the wart has fallen forming the "scar." In old weathered specimens these spinules finally fall away leaving the old peridium smooth. Lycoperdon gemmatum can always be easily recognized by these peculiar soldered warts or the scars where they have fallen. Sterile base usually well developed of large cells. Columella prominent. Capillitium colored,‡ branched threads. Gleba olivaceous, then brown. Spores small 4 mic. minutely rough.§

This is one of the two very common species of Lycoperdon in all temperate countries. It grows usually on ground in woods, rarely on logs. Sometimes it is caespitose, generally more scattered. The various forms are hardly worth separate mention. Yellow forms are not rare. I have often collected a little rigid form in clayey soil. When particularly robust the plant is usually lacunose.

SYNONYMS.—There seems to be a tradition among writers that there is a Lycoperdon perlatum that should be separated from Lycoperdon gemmatum. I never could grasp the difference between them. Persoon's specimens of perlatum are the ordinary form of gemmatum *tout-a-fait*. There is also a tradition that there is a plant differing from gemmatum that should be called Lycoperdon excipuliforme. I do not know the plant but Scopoli based this name on Vaillant's figure, surely of Lycoperdon gemmatum. If there is such a plant it should be given another name.

Specimens in our Collection.

Sweden, L. Romell, Erik Haglund, C. G. Lloyd.

Denmark, J. Lind. England, Annie L. Smith, Wm. L. W. Eyre.

Belgium, Madame Rousseau, C. Vam Bambeke.

Germany, Johanna Schultze-Wege, W. Krueger, Otto Jaap.

Switzerland, Denis Cruchet.

†I hold that all specimens with "soldered" warts that I have seen belong to this species. I do not know whether the warts of this species are really "soldered" from originally separate spines or whether the usual spines of other species are split by the growth of the peridium from one original "soldered" wart. It is a question that can only be settled by a series of observations and cross sections of the warts of the cuticle of very young specimens. Observations of the mature plants would tend to the latter conclusion and Prof. Massee who has done some work in this line tells me it is his conclusion. However, that that may be, Lycoperdon gemmatum is the only species to my mind where large warts remain "soldered" on the mature plant.

‡When the spores are shaken out the capillitium both of gemmatum and piriforme has a whitish appearance to the eye.

§In water under a quarter objective they appear smooth. Boiled in lactic acid to swell the epispore minute spines can be seen. One author describes the spores of Lycoperdon gemmatum as smooth in one of his books and as rough in another. Smoothness or roughness of Lycoperdon spores is largely a question of magnification. To my mind a spore to be called rough should be plainly seen to be rough mounted in a drop of water and under a quarter objective.

France, N. Patouillard, Monsieur Maingaud, L. Rolland, J. Lagarde, A. Acloque.

Italy, O. Mattiolo. *Austria*, Jos. Rompel, A. Weidmann.

Hungary, L. Hollós. *Portugal*, Rev. C. Torrend.

Yellow forms—*Sweden*, L. Romell. *France*, M. Barbier, N. Patouillard. *Austria*, J. Brunnthaler, Jos. Rompel.

LYCOPERDON NIGRESCENS (Plate 47).—Plant with sterile base of large cells. Cortex of stiff black spines, 2 mm. long, in clusters of four and surrounded at base by minute warts. The large spines fall off leaving the surface reticulate with the minute warts. Gleba olive-umber without purple. Spores medium, 4–5 mic. slightly rough. Pedicels caducous.

This name is based on a specimen in Persoon's herbarium. Persoon published it as a form of *gemmatum* which it can well be considered. Bulliard's plate 340 has warts of this nature but the general plant has more the aspect of *gemmatum*. *Lycoperdon nigrescens* differs from *gemmatum* in the separate black warts not coalescing into one, but I suspect all degrees of more or less coalescent warts occur, connecting the two forms.

Specimens in our Collection.

Sweden, L. Romell, Erik Haglund, C. G. Lloyd.

Austria, A. Weidmann, Jos. Rompel. *Scotland*, Mary L. Miles.

LYCOPERDON PIRIFORME (Plate 48).—Plants usually pear shaped, growing generally densely gregarious on old stumps, logs, etc. Long, white, fibrous, mycelial strands penetrate the rotten wood and are always a noticeable character of this plant.



Fig. 83

Cortex of minute, fasciculate spines, subpersistent, and evenly spread over the peridium. Sometimes they have a tendency to coalesce into nodules. Sterile base usually well developed, sometimes almost absent, of small cells. Columella prominent (fig. 83†). Gleba olivaceous, then brown. Capillitium colored, long, branched. Spores small 4 mic. globose, smooth.

This is one of the two very common species in all temperate countries. It generally grows on logs and stumps but occasionally is found on the ground, from mycelium that I think remains where wood has rotted. As it grows on logs it is generally caespitose and compressed. On the ground I have seen it more scattered and regular in form.

Specimens in our Collection.

Sweden, L. Romell. *Belgium*, Chas. Van Bambeke. *England*, Wm. L.W. Eyre.

Scotland, Mary L. Miles. *Germany*, Otto Jaap. *Switzerland*, B. Studer.

France, L. Rolland. *Austria*, J. Brunnthaler, A. Weidmann, P. Magnus.

Hungary, L. Hollós.

†By carefully removing the peridium, the central gleba attached to the columella is shown in an oval form as in figure 83.

LYCOPERDON DESMAZIERES* (Plate 49).—An elongated, cylindrical form of *Lycoperdon piriforme* is rather frequent in Europe but much rarer in America. It has every character of the usual form excepting the strong development of the sterile base and its elongated shape.

The plant is represented in several museums in Europe through Desmazieres' *exsiccatae* where it is called *Lycoperdon piriforme* var. *excipuliforme*. We do not use such a cumbersome name, and *excipuliforme* cannot be used as a binomial on account of uncertainty now attached to this name in the literature of Europe.

Specimens in our Collection.

Sweden, C. G. Lloyd. *England*, Annie L. Smith.

Belgium, Madame Rousseau. *Germany*, Johanna Schultze-Wege.

Switzerland, Denis Cruchet. *France*, L. Rolland.

LYCOPERDON SEROTINUM* (Plate 50).—A form of *piriforme* occurs in which the cortex is broken up into areas. We call this *serotinum*, following Hollós, but know nothing as to Bonorden's plant. We are not sure but this is also *tessellatum* but we shall reserve this name to apply to a form with *indurated areas* (Plate 50) which we know only from America.

Specimens in our Collection.

Sweden, L. Romell.

THE "PRATENSE" SECTION.

LYCOPERDON PRATENSE (Plate 34).—Plant depressed, globose, bowl-shaped. The peculiar shape which this plant takes (see plate 34), is characteristic. Cortex of short spines (about 2 mm. long), which fall away from the old specimens leaving the peridium smooth. Peridium opening by a large, irregular mouth.‡ Sterile base broad, of large cells separated from the fertile portion by a distinct diaphragm.§ Gleba olive then brown. Capillitium hyaline (or faintly colored), branched, sparingly septate threads. Spores globose, smooth, light colored, very uniform in size, 4 mic.

This is a common species in Europe but I could not trace it back definitely in European history beyond Vittadini. It is certainly his *Lycoperdon hiemale* but unfortunately, he took the name from Bulliard's plate, which, almost as certainly is not this plant. There is a tradition|| in Europe that it is Persoon's *Lycoperdon pratense* and we

‡In its dehiscence the species is intermediate between *Calvatia* and *Lycoperdon*.

§A peculiar character by which the species is easily known. Only distinctly marked in one other European species, *L. cruciatum*.

||All the indications that I could find point toward the truth of this tradition. It is so labeled in Desvaux's herbarium and he was contemporary and a co-worker with Persoon. Persoon's figure represents the shape and size well though the smooth surface is broken into little areas, a character the plant never takes in my observation. Persoon left no certain specimens but there are four specimens in his herbarium all labeled with a doubtful mark. I did not recognize them. Persoon states that the plant "comes in dry places and herbs and even in the woods among grass," (around Paris). This plant is common there to-day. Dr. Hollós refers Persoon's species to *Lycoperdon cruciatum* (or rather *Lycoperdon cruciatum* to it) but that species has never been collected about Paris.

adopt the name as it is necessary to have some name, and we would not wish to use a recent name for such a common plant. While common in Europe it does not to my knowledge occur in the United States.†

Specimens in our Collection.

Sweden, L. Romell. *Denmark*, J. Lind. *England*, Annie L. Smith.
Belgium, Chas. Van Bambeke.
Germany, P. Magnus, Otto Jaap, Johanna Schultze-Wege.
France, N. Patouillard, L. Rolland, M. Barbier, A. Acloque.
Austria, Rev. G. Bresadola, A. Weidmann, Jos. Rompel.
Hungary, L. Hollós. *Holland*, Rev. C. Torrend.

LYCOPERDON CRUCIATUM (Plate 51).—Peridium globose or usually depressed, often plicate beneath, and with a strong root. The sterile base of large cells usually occupies one quarter to a third of the interior. Sometimes in small specimens almost none. Cortex of strong cruciate spines about 2 mm. long, which adhere together and peel off in patches from the peridium. This peculiar method of cortex separation is characteristic of the species. The surface of the peridium after the separation of the cortex is dull, minutely furfuraceous, and dark brown in color. Gleba olive, when ripe dark brown, never purple. Capillitium colored, sparingly branched. Spores globose, small, 4 mic. smooth. Pedicels slender, caducous.

This plant is very rare in Europe, very common in the United States. In comparing the two plants we note that the diaphragm separating the fertile from the sterile portion is more strongly marked in the European plant. Otherwise we note no difference. Rostkovius gave a characteristic illustration and we have always used his name. If Dr. Hollós in digging back for an old name had contented himself with stopping at something definite, Vittadini's name, *marginatum*, we should have adopted that name for the purpose of uniformity, for although Vittadini's illustration is abnormal as to shape, we are convinced from his specimens it is the same plant. But when the Doctor digs up *Lycoperdon pratense* of Persoon and *Lycoperdon papillatum* of Schaeffer, both of them contrary to the traditions and scanty evidence that exist in Europe, we cannot follow him. In digging for an old name, if one wants to antedate the definite work of Vittadini and Rostkovius, everything points to *Lycoperdon candidum* of Persoon.

Specimens in our Collection.

Italy, O. Mattiolo. *Austria*, A. Weidmann, Rev. G. Bresadola.
France, "Herault Dorat" Spec. from Museum, Paris.

†We have now an accumulation of several hundred collections of *Lycoperdon* from the United States which will be our next task to carefully work over and study. We do not remember having seen this plant among them.

THE "POLYMORPHUM" SECTION.

LYCOPERDON POLYMORPHUM (Plates 34 and 52).—

Plants belong to the yellowish series, varying much in the development of the sterile bases. There exists a continuous series from plants with well developed stem-like sterile bases (*L. polymorphum* typical); to subglobose plants with scanty sterile bases (*L. cepaeforme*); to little, globose specimens devoid of sterile bases (*L. pusillum*). The nature of the sterile bases differs from that of most other *Lycoperdons*. It is compact, very similar in general appearance to the fertile portion, and composed of minute cells not visible to the naked eye. Cortex of minute nodular, granular or furfuraceous spines. Gleba at first bright yellow, then brown but never purple. Capillitium deeply colored, branching threads. Spores globose, small 3–4 mic. smooth.

This plant was first well described by Vittadini and we have adopted his name. His specimens are still in existence and he was the first to point out the peculiar sterile base character by which the plant is distinguished from most other known *Lycoperdons*. In addition his name is peculiarly appropriate for there is no more polymorphic species known. There is a tradition in Europe that the plant is *Lycoperdon furfuraceum* of Schaeffer. This is probable, but at the same time Schaeffer's old crude cut fits *Lycoperdon spadiceum* as well as it does this plant and as long as we keep these two species distinct we cannot go back consistently to this old cut for our name. The typical form with well developed base is not rare in Europe,[†] but I have seen no more finely developed specimens than I received from Rev. C. Torrend, Portugal, which we have used in the photographs for our plate.

Specimens in our Collection.

Sweden, L. Romell. *Austria*, J. Brunnthaler.

Hungary, L. Hollós. *Portugal*, Rev. C. Torrend.

LYCOPERDON CEPAEFORME* (Plate 53, fig. 1, 2, 3, and 4).—This is only a subglobose form of *polymorphum* with a slight development of the peculiar, compact, sterile base. Judging from the specimens I have received, it is relatively rare in Europe but it is the common form in the United States.

Specimens in our Collection.

Belgium, Madame Rousseau. *Germany*, Otto Jaap, W. Krueger.

France, N. Patouillard, P. Hariot, X. Gillot, L. Rolland.

LYCOPERDON HUNGARICUM* (Plate 53, fig. 5, 6, 7, and 8).—Plants globose with none or very little compact, sterile base. Color yellowish then brown. Cortex minute nodular or granular spines. Capillitium colored. Spores medium, 4–5 mic. slightly rough.

We are somewhat in doubt as to our reference of this plant. Our specimens are so close to *Lycoperdon cepaeforme* that the only difference we can note is the slightly rough spores. We are not among those

[†]I do not recall having seen it from America though I may find it when I work over my American specimens.

who do not give to spores the same privilege of slight variation as to any other character. We think spore characters are of as much relative value as any other character, and no more.

Specimens in our Collection.

Belgium, Chas. Van Bambeke. *Italy*, M. Bezzi. *Portugal*, Rev. C. Torrend.

LYCOPERDON PUSILLUM* (Plate 53, fig. 9, 10 and 11).—The distinction between *Lycoperdon cepaeforme* with very little development of the sterile base and *Lycoperdon pusillum* with no sterile base is so slight that specimens of the same collection even, may embarrass the systematist. Still, the little form that occurs typically in Europe of *L. pusillum* is unique. Rarely over a centimeter in diameter it is perfectly globose, with a strong tap root and a furfuraceous cortex. The gleba does not tend to olive so strongly as in other forms of *polymorphum* but is a clear brown. We are unable to distinguish any marked difference in the spores as recently shown in a picture.

Specimens in our Collection.

Germany, Otto Jaap. *Austria*, A. Weidmann, Rev. G. Bresadola.

France, N. Patouillard. *Italy*, M. Bezzi. *Hungary*, L. Hollós.

THE "SPADICEUM" SECTION.

LYCOPERDON SPADICEUM (Plate 54).—Plants usually obovate with short stem-like sterile base of large cells. Color when young yellowish, becoming light brown when fully ripe. Cortex of minute nodular, granular or somewhat furfuraceous spines. Frequently we note on the peridium little white granules that seem to be of the nature of a lime deposit. Gleba at first olive, finally brown. Capillitium colored. Spores small, 4 mic. smooth.

We accept this name on the interpretation given by Dr. Hollós. Persoon left no specimen, and all that can be said is that the plant does not disagree with his scanty and rather vague description. The plant agrees with *Lycoperdon polymorphum* in everything excepting that it has large cells in the sterile base. In Australia there are intermediate forms connecting the two species.

SYNONYM—*Lycoperdon Cookei* (J. R. Mic. Soc. 87-714).

Specimens in our Collection.

Russia, A. de Jacewski. *Denmark*, J. Lind. *Belgium*, Madame Rousseau.

France, J. Lagarde, L. Rolland, N. Patouillard, A. Acloque.

Austria, A. Weidmann. *Hungary*, L. Hollós.

ADDITIONAL SPECIES.

Lycoperdon acuminatum, a little species that grows in moss on bark of tress, and *Lycoperdon oblongisporum*, also a little species with oval or oblong spores have been reported from Hungary. We have seen no specimens from Europe.

A number of plants have reached us that depart in some respects from the species as we know them, and which we are unable to refer satisfactorily to any known species. We might describe these as "new species" and give them a name but we feel that they are more probably aberrant forms, and that to "describe" and "name" them would only add to the difficulties and not to the elucidation of the subject. One robin does not make a summer, and one collection does not make a species.

From L. Romell, Sweden, we have a plant with large, rough spores of atropurpureum type but with a *white cortex* of thickened spines, cruciate, and on the order of gemmatum but not "soldered."

From Wm. Krueger, Germany, a plant apparently pratense but *bright yellow*,

From Annie L. Smith, England, a plant apparently a form of nigrescens, as to cortex and spores,, but shape of Desmazieres and notably *yellow* in color.

From Wm. Krueger, a plant we would call umbrinum if it were *not yellow*.

From C. Crossland, England, a plant similar to spadiceum in general appearance but spores rough. Perhaps a form of umbrinum but spores very small for that species.

Should enough of any of these forms reach us to justify the opinion that they are in any degree constant, we shall "describe" and "name" them, but for the present we think they had better be passed by.

CAULOGLOSSUM TRANSVERSARIUM.

(Plates 12 and 40.)

When we issued our plate 12 of *Cauloglossum transversarium* we did not have a very abundant supply of specimens and the figures were taken mostly from a collection we had seen in Ellis' herbarium. On our return from Europe last year, we found awaiting us a fine collection, both dried and in alcohol, that had been sent by Mr. A. S. Bertolet, from Fairhope, Alabama. These specimens give us quite a different idea of the shape the plant assumes from what we previously conceived and we consequently issue another plate (40) to illustrate this fine collection.

We think the plant is not as rare in the Southern States as is generally supposed. Mr. Bertolet certainly collected it abundantly. We found it well represented in the museums in Europe all from the collections of Curtis and Ravenel. Berkeley at first intended to call the genus "*Arthymenium*" but that is another story.

QUELETIA MIRABILIS.

Dr. Wm. Herbst, Trexlertown, Pa., kindly favors me with a correction of a statement in a previous issue regarding *Queletia mirabilis*. He says:—"The part stating the time is incorrect as occurring only once. I collected specimens for three years in succession, 1891, 1892 and 1893, most abundantly in 1892, none having appeared after 1893. The tan bark on which they grew became very much decayed and no fresh additions were made after the tannery was abandoned."

We thank Dr. Herbst for kindly correcting us in this matter, as the impression we had from him was that he had only collected it one season.

REV. G. BRESADOLA.



Foremost in the ranks of the mycologists of Europe to-day stands the man whose photograph we present above. We have been in close correspondence with him for years, and we believe he has a critical knowledge of mycology such as is possessed by few. On him we depended when we wrote our pamphlet on the geasters for advice in the treatment of names of synonyms. In every instance where we followed his advice, his views have since been confirmed by the independent investigations we have made in Europe. We received his photograph as a matter of friendly regard and its appearance in Mycological Notes will be as much of a surprise to the donor as it is a pleasure to us to be able to present it to our friends.

MITREMYCES RAVENELII UPSIDE DOWN.

Those who have to do with printers always meet with trouble. There have been so many errors in Mycological Notes that we aimed to be particularly careful with the last issue and we think very few if any typographical errors got through. But we encountered a new trouble. In the last proof we saw of p. 201, the cut *Mitremyces Ravenelii* was correctly inserted. The pressman in underlaying the cut transposed it and in the article it appeared upside down. This matter is very annoying but we presume as long as one is dependent on printers he will always have his troubles.



Fig. 84

PRINCIPLES OF PRIORITY.

"We owe much to Mr. Lloyd who has never failed to wield his pen trenchantly when vagaries and inconsistencies are practiced in the zeal to establish a stable nomenclature. We do not believe that the principle of "priority" can be dethroned, but we do commend the view taken above, namely that it is absurd to attempt to overthrow a name because "*based on young specimens.*"—*Journal of Mycology, September, 1904.*

We have no desire to *dethrone* the "principle of priority" nor have we any intention of *enthroning* it as a little idol and then bowing down to worship it to the exclusion of better principles, viz. use, justice, and common sense. We firmly believe in "Priority" as long as it is based on anything definite and does not disturb names that are firmly established by years of general and definite use. For example, no one of the present generation has had any doubts about the meaning of the words Tremella, Polysaccum, Puccinia, Mitremyces, Cyathus. They were established by authoritative use before the present generation of mycologists was born.

It is just as futile for anyone now to try to change these names for sentimental, theoretical or personal reasons as to change the word "America" because that was not the original name applied to it by early explorers; or to change the name "Cincinnati" because that city was first called "Losantiville." Use makes all languages; it is the "natural law" of languages, and it cannot be overthrown by theorists who in a few instances may be honest but in the majority of cases are only working for personal conspicuity.

Nor do we believe in learning the genera of some man who has done original and creditable work, and from whom we get all our information as to the genera, and then go to digging about for some old, vague reference that we can interpret only in the light of his work, and proceed to blot out his established names. Such methods violate the first principles of common honesty and justice. If we adopt another man's ideas we should be honest enough not to juggle his names.

The modern "priorist" in botany is, to use an expressive term, "between the devil and the deep blue sea." If he follows his ignis fatuus into the vague regions of antiquity, his nomenclature becomes a jargon that nobody understands or cares to bother with, and such good work as he does, if he does any will surely by this same rule be lost in the abyss he opens up. If he attempts to use priority as a football to kick his own name forward, and ignores it where it does not serve this purpose he becomes a mere trickster and nobody is so obtuse as not to see through the scheme.

STATIONS FOR ANTHURUS BOREALIS.

In our last issue we made a request for additional stations of *Anthurus borealis*. Several have kindly favored us with information.

W. W. Stockberger sends us a specimen collected in the edge of a drain, August 20th, 1901, at Granville, Ohio.

Geo. B. Fessenden writes us, "In your note on *Anthurus borealis* you take note of the 'stocky form' of the photograph of the English plant collected by Mr. Carleton Rea. I would say that the specimens I

found several years ago at the Brighton Stock Yards were many of them fully as 'stocky' as Mr. Rea's. I found a few fully an inch in diameter and six or seven inches in length. I thought at the time they were an introduced species here, but they have been found in several localities since, all of the small variety. I found them several years ago at Holbrook growing in a tomato field.

C. C. Hanmer writes me that he has found it, at East Hartford, Conn., "all small specimens in a newly stocked lawn. It appeared in July and August, 1903."

Mr. Hanmer also writes that "E. A. White of Storrs, Conn., collected it there during the summer of 1904 in a potato field."

Geo. E. Morris, Waltham, Mass., writes, "Dr. Oscar E. Fischer, now president of the Detroit Myc. Club, found a single specimen near a heap of stable refuse in Allston, Mass., in the fall of 1898 or about that date."

"In November, 1900, the fungus came up in a tomato patch in Waltham, of course, long after the crop was gathered. It was abundant and was probably introduced in fertilizers."

It will be noticed that the stations given above are mostly Eastern and that the plant only occurs in locations tending to the conclusion that it is an introduced plant.

WANTED STATIONS AND PHOTOGRAPH OF *SIMBLUM RUBESCENS*.

This plant was originally collected on Long Island and I think like *Anthurus borealis* is of relatively rare occurrence. Rev. J. M. Bates finds it in Nebraska and has sent us a dried specimen. There is a record somewhere of its collection in Kansas by E. E. Bartholomew. W. H. Scudder gathered it at Washington, D. C. (cfr. Myc. Notes, p. 146). Charles McIlvaine writes us that he found a single specimen in Talbot Co., Maryland. It would be a special favor if some one will have a good photograph of the plant made for us. We would like to use it in the plates that we hope some day to present of the American phalloids. The original cut which we reproduce herewith (fig. 85) appears to be a good representation of the plant but we are partial to photographic reproductions.

If you know any facts as to its occurrence and localities, kindly favor us with the details.

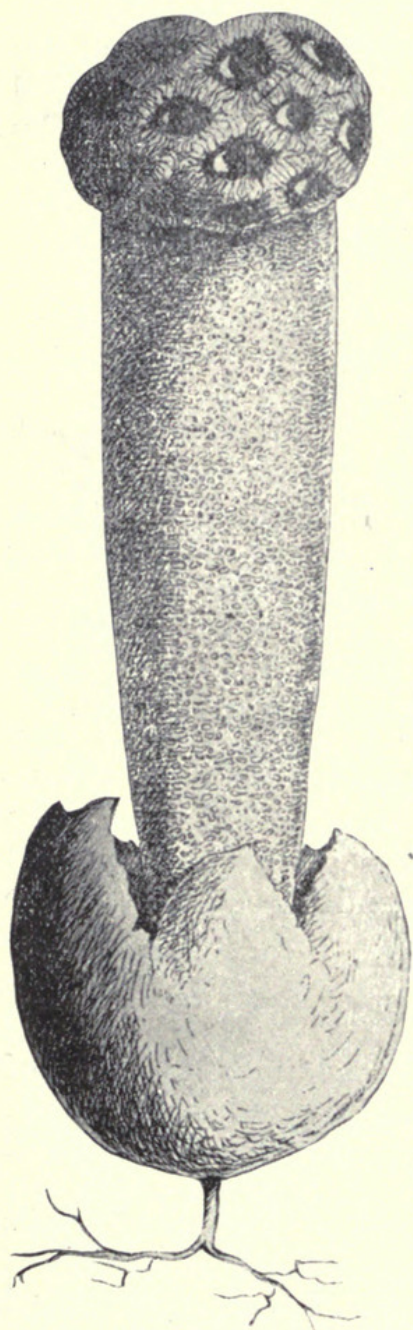


Fig. 85

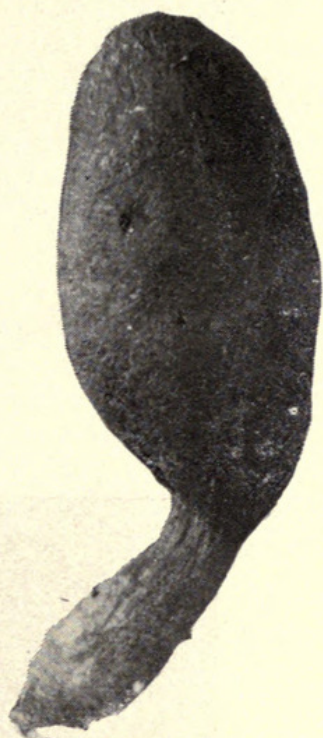


Fig. 1.

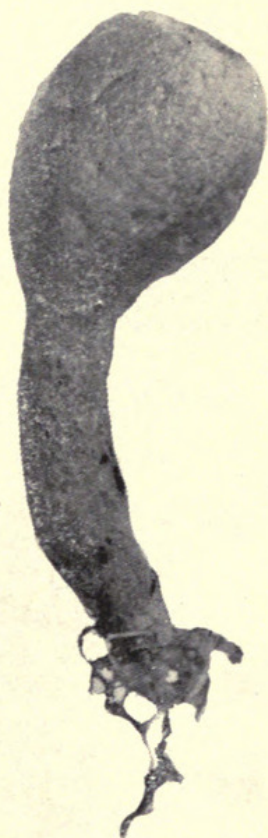


Fig. 2.



Fig. 3.

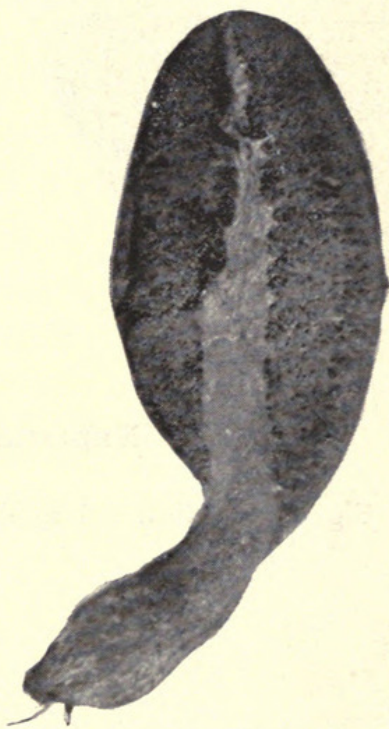


Fig. 4.

Explanation of Figures.

Fig. 1, 2 & 3 from alcoholic specimens from A. S. Bertolet, Alabama.
Fig. 4. Section. (Compare also Plate 12.)

CAULOGLOSSUM TRANSVERSARIUM.



Fig. 5.

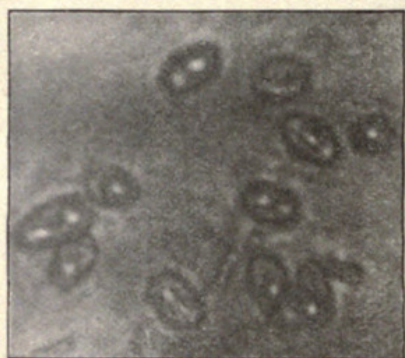


Fig. 6.

Explanation of Figures.

Fig. 5. Section enlarged 5 times. Fig. 6. Spores (x1000).

CAULOGLOSSUM TRANSVERSARIUM.

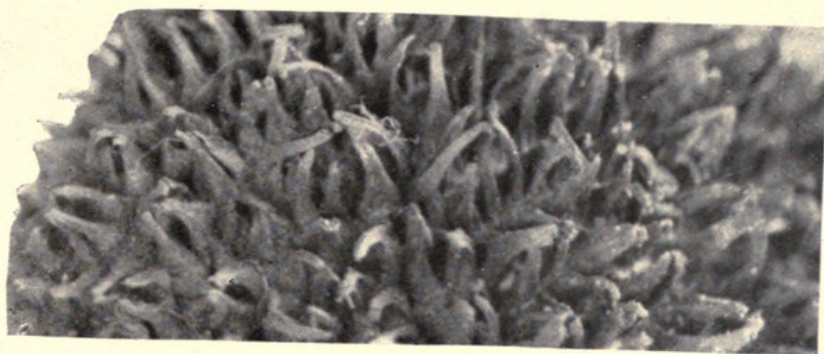


Fig. 1.

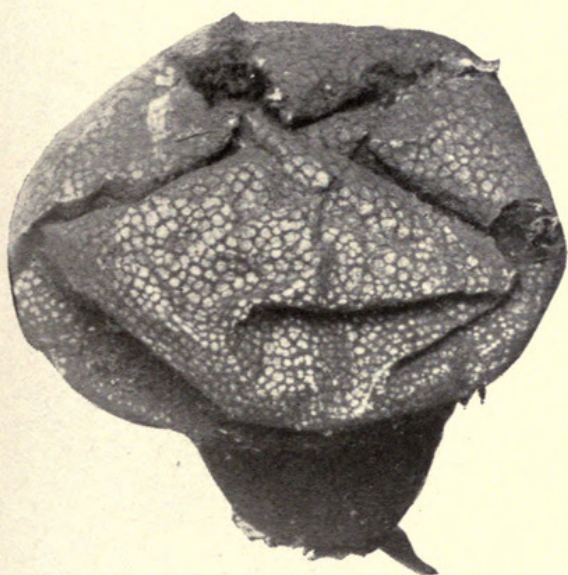


Fig. 2.



Fig. 3.

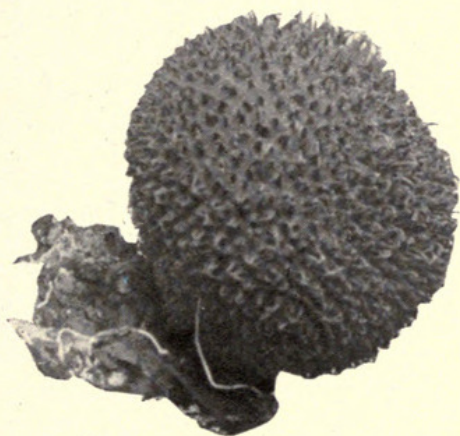


Fig. 4.



Fig. 5.

Explanation of Figures.

Fig. 1. Cortex enlarged four times. Fig. 2. Plant in herbarium of Prof. Magnus, Berlin. Figs. 3 and 5, from J. Lagarde, France. Fig. 4, from Wm. L. W. Eyre, England.

LYCOPERDON ECHINATUM.



Fig. 6.



Fig. 7.



Fig. 8.



Fig. 9.

Explanation of Figures.

Figs. 6, 7, 8 and 9. Plants from A. P. Morgan, Ohio.

LYCOPERDON ECHINATUM.

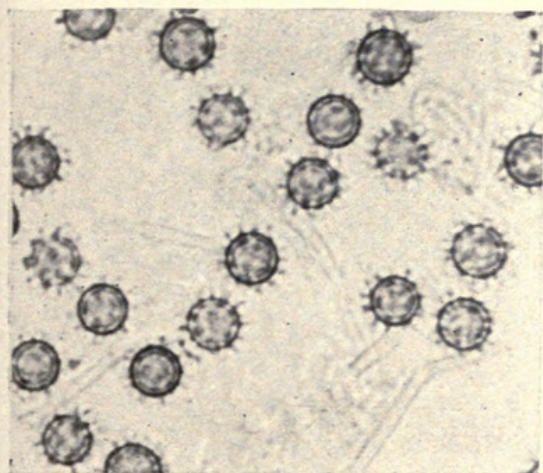


Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.

Explanation of Figures.

Fig. 1. Spores (x1000) Microphotograph by Prof. E. W. D. Holway.
Fig. 2. From Rev. C. Torrend, Portugal. Figs. 3 and 4. From J. Lagarde, France.

LYCOPERDON ATROPURPUREUM.



Fig. 5.

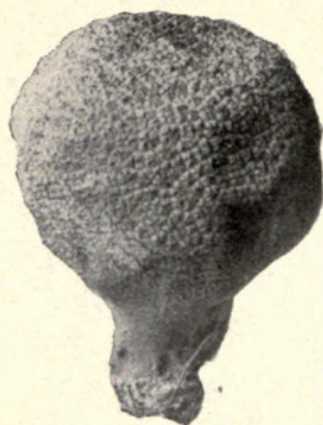


Fig. 6.



Fig. 7.



Fig. 8.



Fig. 9



Fig. 10.

Explanation of Figures.

Fig. 5. From L. Romell, Sweden. Fig. 6. Johanna Schultze-Wege, Germany. Fig. 7. O. Mattiolo, Italy. Fig. 8. A. Weidmann, Austria. Figs. 9 and 10. A. P. Morgan, Ohio.

LYCOPERDON ATROPURPUREUM.

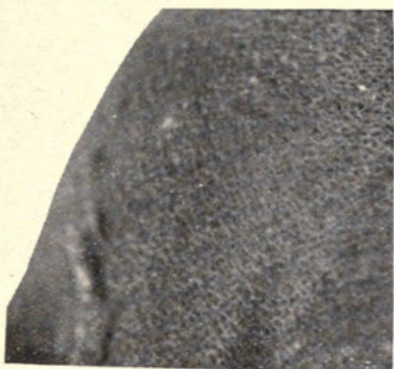


Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.



Fig. 5.



Fig. 6.



Fig. 7.



Fig. 8.

Explanation of Figures.

Fig. 1. Cortex enlarged. Fig. 2. From A. P. Morgan, Ohio. Fig. 3. Rev. C. Torrend, Portugal. Fig. 4. L. Rolland, France. Fig. 5. M. Bezzi, Italy. Figs. 6, 7 and 8, C. G. Lloyd, Sweden.

LYCOPERDON UMBRINUM.*



Fig. 9.



Fig. 10.



Fig. 11.



Fig. 12.

Explanation of Figures.

Fig. 9. From A. P. Morgan, Ohio. Fig. 10. M. Maingaud, France.
Fig. 11. C. G. Lloyd, Sweden. Fig. 12. N. Patouillard, France.

LYCOPERDON UMBRINUM.*



Fig. 1.

Explanation of Figure.

Fig. 1. Plant from Rev. C. Torrend, Portugal.

LYCOPERDON DELICATUM.*



Fig. 2.



Fig. 3.



Fig. 4.

Explanation of Figures.

Fig. 2. From Rev. C. Torrend, Portugal. Figs. 3 and 4. Johanna Schultze-Wege, Germany.

LYCOPERDON ELONGATUM.*



Fig. 5.



Fig. 6.



Fig. 7.



Fig. 8.

Explanation of Figures.

Fig. 5 and 6. Plants from N. Patouillard, France. Fig. 7. Plant in herbarium Desvaux, Museum of Paris. Fig. 8. Type specimen from Vittadini, at Kew.

LYCOPERDON VELATUM.

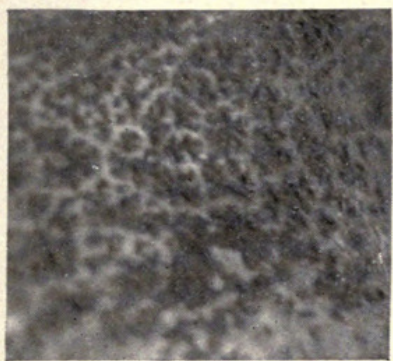


Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.



Fig. 5.

Explanation of Figures.

Fig. 1. Cortex enlarged. All plants from A. Weidmann, Austria.

LYCOPERDON CUPRICUM.

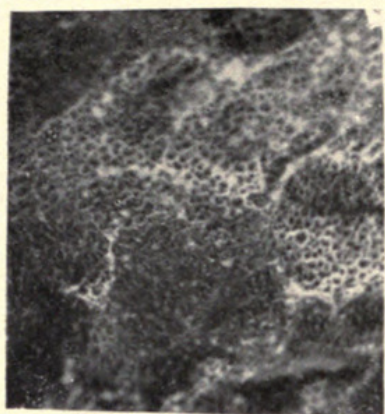


Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.



Fig. 5.



Fig. 6.



Fig. 7.

Explanation of Figures.

Fig. 1. Cortex enlarged. Fig. 2. From J. Lagarde, France. Fig. 3. Rev. C. Torrend, Portugal. Figs. 4, 5, 6 and 7, C. G. Lloyd, West Virginia.

LYCOPERDON FUSCUM.

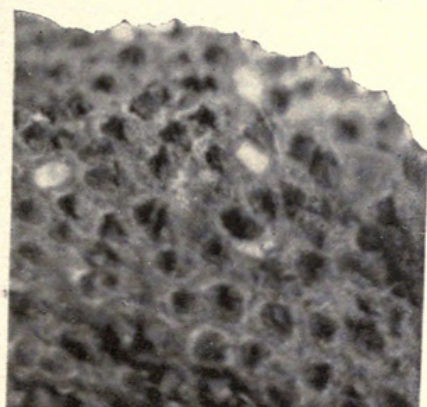


Fig. 1.



Fig. 2.

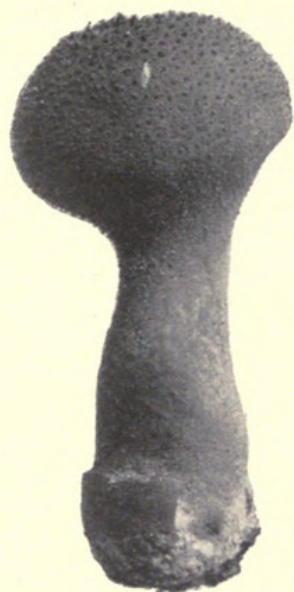


Fig. 3.



Fig. 4.



Fig. 5.

Explanation of Figures.

Fig. 1. Cortex enlarged. Figs. 2 and 5. From L. Romell, Sweden. Fig. 3. L. H. Watson, Illinois. Fig. 4. C. G. Lloyd, Cincinnati.

LYCOPERDON GEMMATUM.



Fig. 6.



Fig. 7.



Fig. 8.



Fig. 9.



Fig. 10.

Explanation of Figures

Figs. 6 and 9. From C. G. Lloyd, Cincinnati. Fig. 7. L. Romell, Sweden.
Fig. 8. Annie L. Smith, England. Fig. 10. Johanna Schultze-Wege, Germany.

LYCOPERDON GEMMATUM.

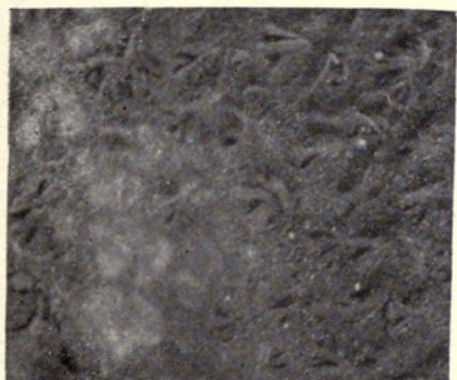


Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.

Explanation of Figures,

Fig. 1, Cortex enlarged. Fig. 2, Plant from Mary L. Miles, Scotland. Figs. 3 and 4, C. G. Lloyd, Sweden.

LYCOPERDON NIGRESCENS.



Fig. 5.



Fig. 6.



Fig. 7.



Fig. 8.

Explanation of Figures.

All from C. G. Lloyd, Sweden. Figs. 3, 5 and 6 were photographed from fresh specimens.

LYCOPERDON NIGRESCENS.

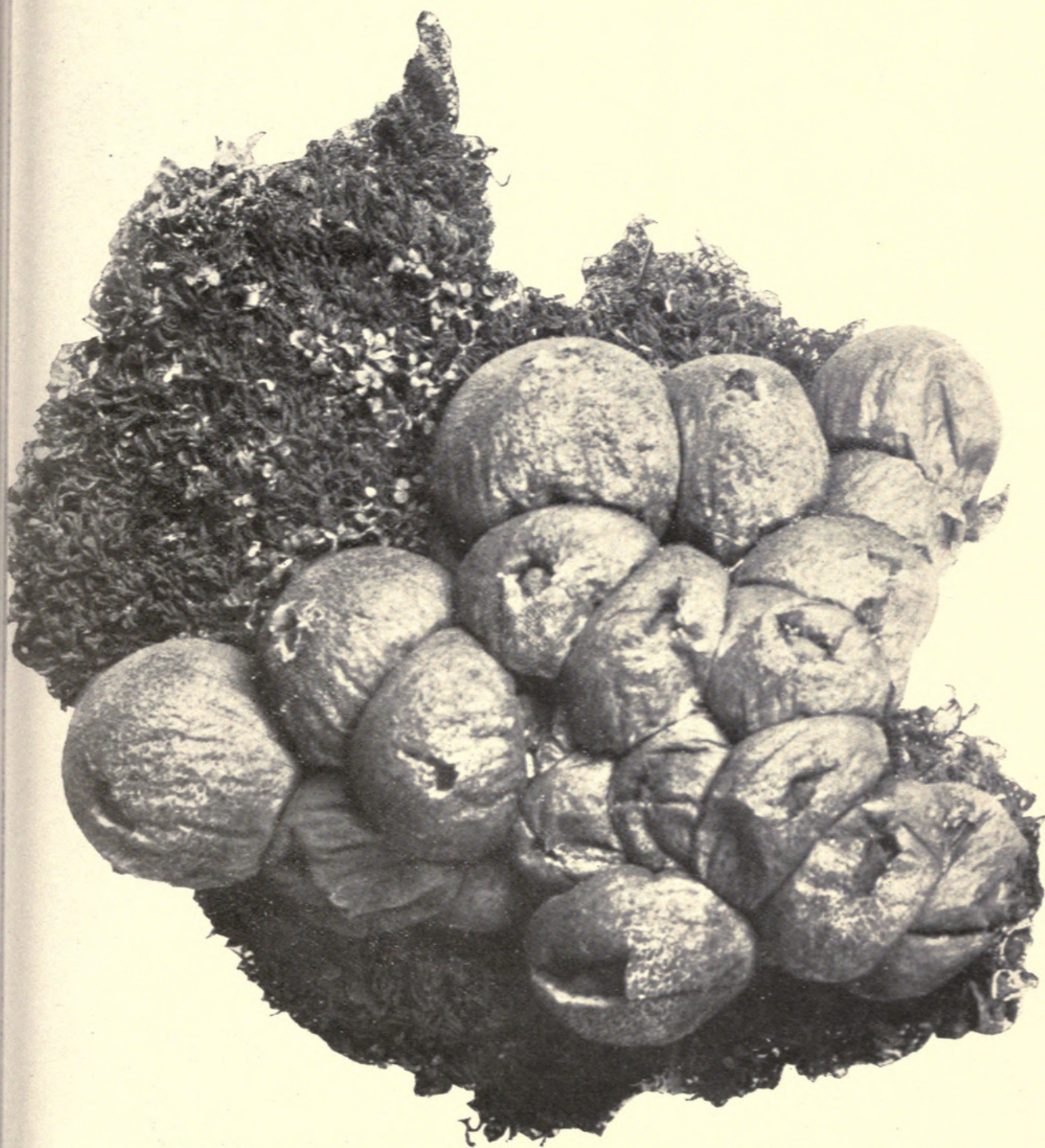


Fig. 1.

Explanation of Figure.

Old specimens in situ, near Cincinnati.

LYCOPERDON PIRIFORME.

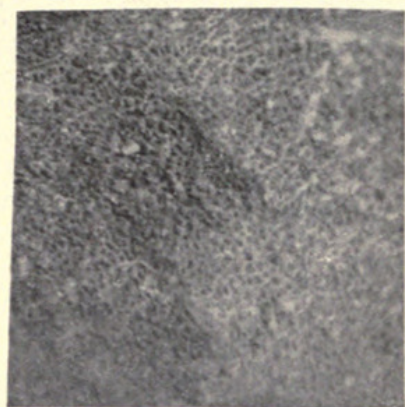


Fig. 2.

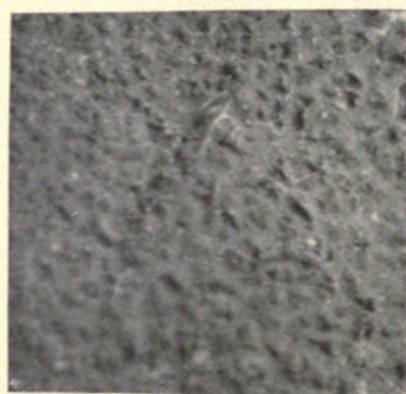


Fig. 3.



Fig. 4.

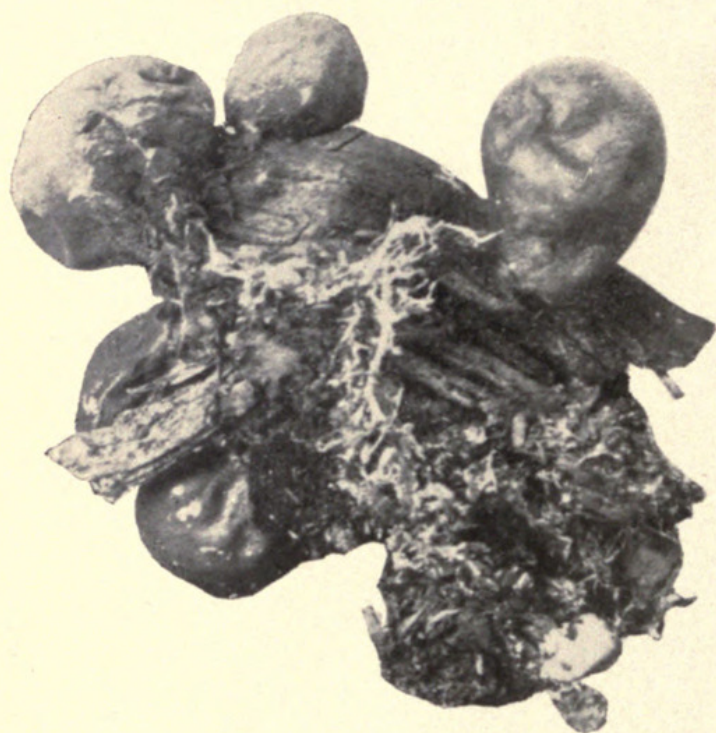


Fig. 5.



Fig. 6.



Fig. 7.



Fig. 8.

Explanation of Figures.

Figs. 2 and 3, Cortices enlarged. Fig. 4, From Otto Jaap, Germany. Fig. 6, From Mary L. Miles, Scotland. Fig. 8, From Wm. L. W. Eyre, England. Figs. 5 and 7, From C. G. Lloyd.

LYCOPERDON PIRIFORME.



Fig. 1.

Explanation of Figure.

Fig. 1, Plants collected near Upsala, Sweden, by C. G. Lloyd.

LYCOPERDON DESMAZIERES.*



Fig. 2.



Fig. 3.



Fig. 4.

Explanation of Figures.

Figs. 2 and 3, Plants From L. Rolland, France. Fig. 4, From Johanna Schultze-Wege, Germany.

LYCOPERDON DESMAZIERES.*

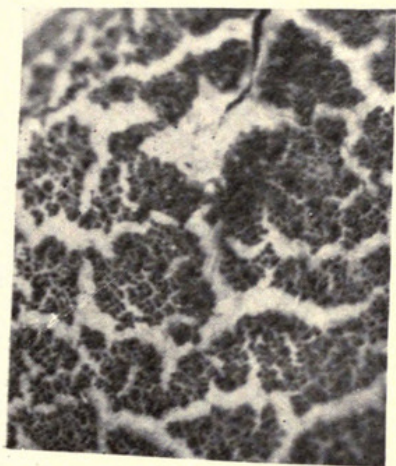


Fig. 1.



Fig. 2.

Explanation of Figures.

Fig. 1, Cortex enlarged. Fig. 2, Plant from L. Romell, Sweden.

LYCOPERDON SEROTINUM.

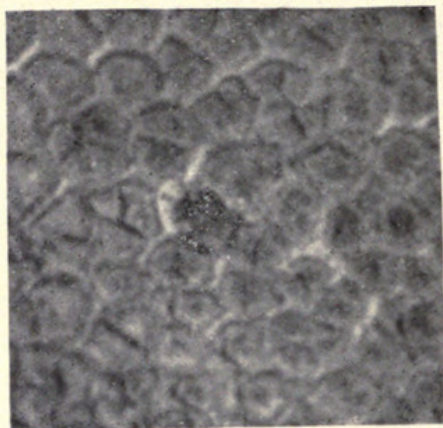


Fig. 3'



Fig. 4.



Fig. 5.

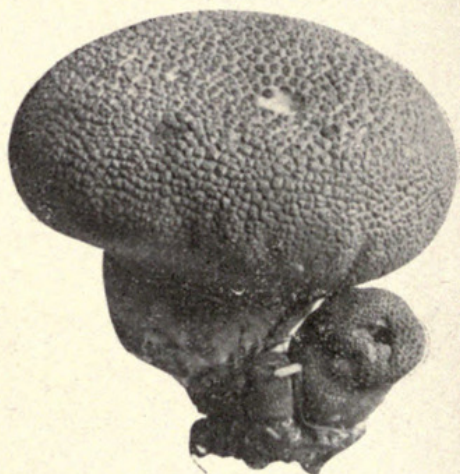


Fig. 6.

Explanation of Figures.

Fig. 3, Cortex enlarged. Fig. 4, Plants from R. B. Mackintosh, Massachusetts. Fig. 5, From H. B. Dorner, Indiana. Fig. 6, From Rev. J. M. Bates, Nebraska.

LYCOPERDON TESSELLATUM.*

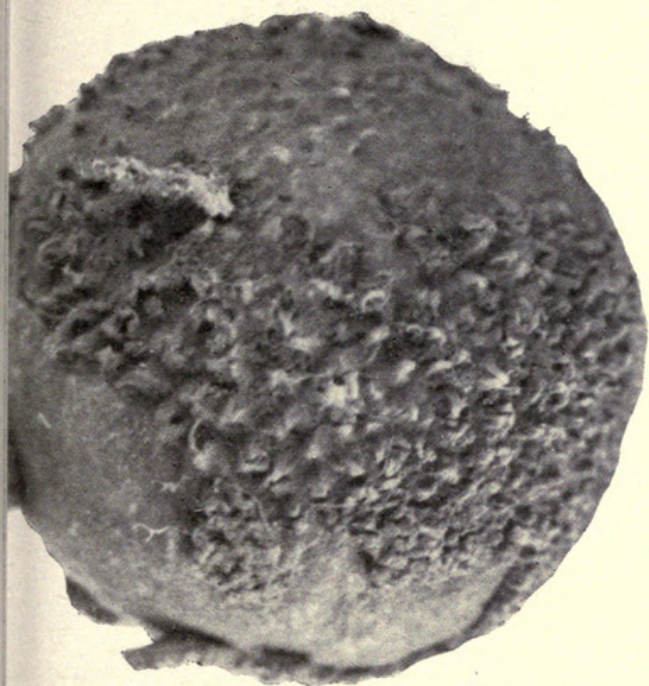


Fig. 1.



Fig. 2.



Fig. 3.

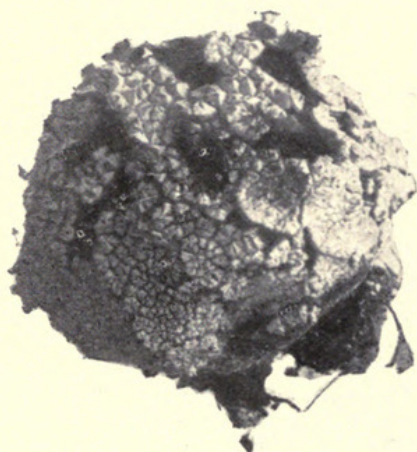


Fig. 4.

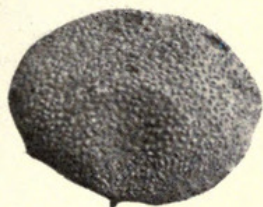


Fig. 5.

Explanation of Figures.

Figs. 1 and 2, Small plants enlarged. Fig. 3, Cortex before breaking. Fig. 4, Cortex breaking. Fig. 5, Plants from O. Mattiolo, Italy.

LYCOPERDON CRUCIATUM.



Fig. 6.



Fig. 7.



Fig. 8.



Fig. 9.



Fig. 10.

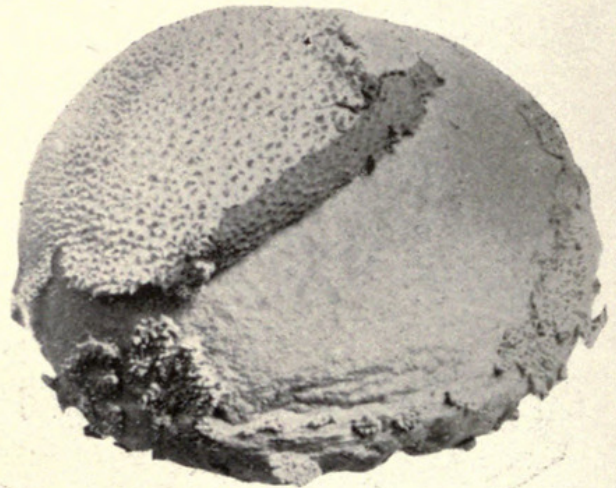


Fig. 11.

Explanation of Figures.

Fig. 6, Plant from France in Museum at Paris. Fig. 7, Plant from Germany in Museum at Berlin. Figs. 8, 9, 10 and 11, from Cincinnati.

LYCOPERDON CRUCIATUM.

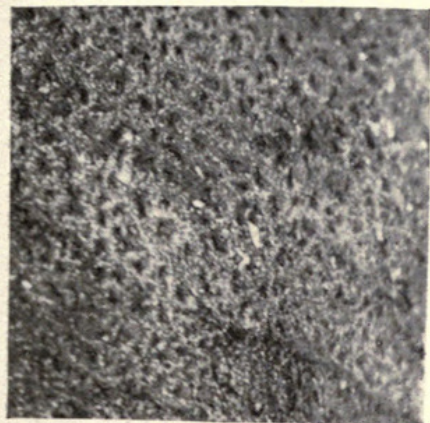


Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.

Explanation of Figures.

Fig. 1, Cortex enlarged. Figs. 2, 3 and 4, see over.

LYCOPERDON POLYMORPHUM.



Fig. 5.



Fig. 6.



Fig. 7.



Fig. 8.



Fig. 9.



Fig. 10.



Fig. 11.

Explanation of Figures.

Fig. 7, Type from Vittadini in Museum at Paris. Figs. 2, 3, 4, 5, 6, 8, 9, 10 and 11, Plants all from Rev. C. Torrend, Portugal, and all same collection.

LYCOPERDON POLYMORPHUM.



Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.

Explanation of Figures.

Figs. 1, 2 and 3, From Hollis Webster, Massachusetts. Fig. 4, From L. R. Waldron, Michigan.

LYCOPERDON CEPAEFORME.



Fig. 5.



Fig. 6.



Fig. 7.



Fig. 8.

Explanation of Figures.

Figs. 5, 6, 7 and 8, From Rev. C. Torrend, Portugal.

LYCOPERDON HUNGARICUM.

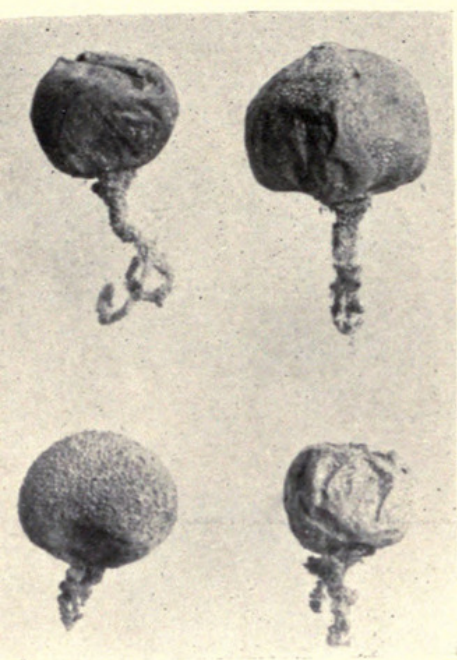


Fig. 9.

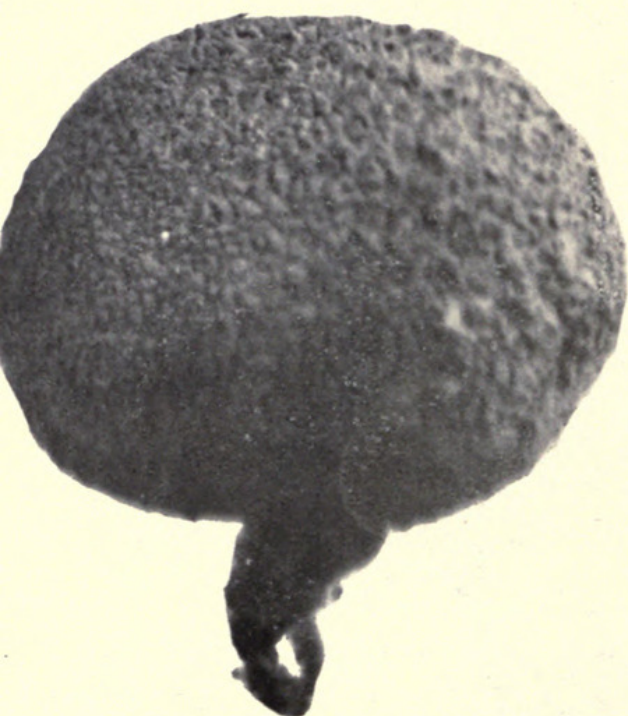


Fig. 10.

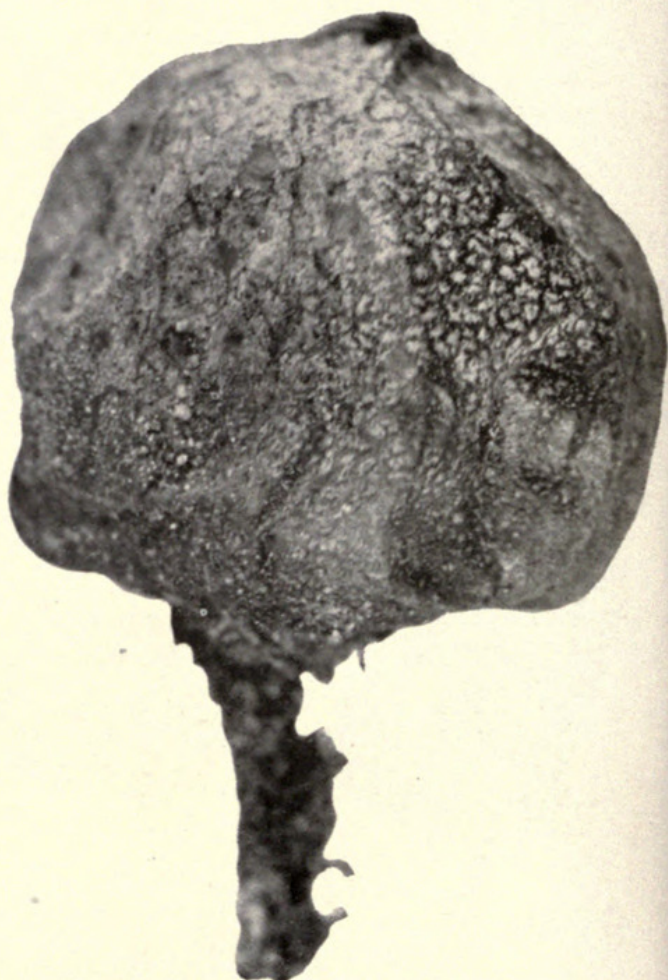


Fig. 11.

Explanation of Figures.

Fig. 9, Plants from M. Bezzi, Italy. Fig. 10, Young plant enlarged 5 times.
Fig. 11, Old plant, enlarged 5 times.

LYCOPERDON PUSILLUM.

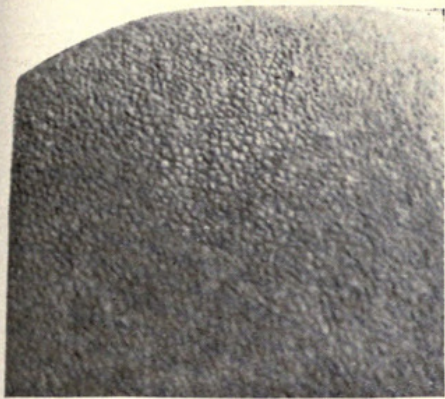


Fig. 1.

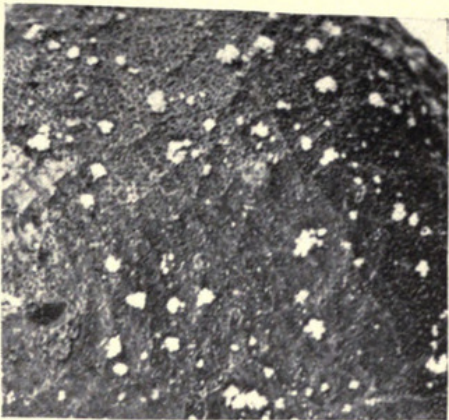


Fig. 2.



Fig. 3.



Fig. 4.



Fig. 5.



Fig. 6.



Fig. 7.



Fig. 8.

Explanation of Figures.

Fig. 1, Cortex enlarged. Fig. 2, Cortex with lime deposit, enlarged. Fig. 3, From L. Rolland, France. Fig. 4, From Dr. Hollos, Hungary. Figs. 5, 6, 7 and 8, From J. Lind, Denmark.

LYCOPERDON SPADICEUM.



Fig. 9.



Fig. 10.



Fig. 11



Fig. 12.



Fig. 13.



Fig. 14.

Explanation of Figures.

Figs. 9 and 10, Plants from Madame Rousseau, Belgium. Fig. 11, From Dr. Hollos, Hungary. Fig. 12, From L. Rolland, France. Fig. 13, From A. Weidmann, Austria. Fig. 14, From N. Patouillard, France.

LYCOPERDON SPADICEUM.



Lloyd, C. G. 1905. "Mycological Notes, No. 19." *Mycological writings of C. G. Lloyd* 2, 205–220.

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