CALIFORNIAN HYPOGÆOUS FUNGI.

BY H. W. HARKNESS.

PLATES XLII-XLV.

INTRODUCTION.

FOR several years the author has contemplated the preparation of a monograph upon the Hypogæi of California, and whenever it was possible, search was made in order to secure specimens for the purpose. Ill health has, however, compelled the suspension of work for periods of many months duration, and has also prevented excursions for collecting material at seasons which are unsuited to the invalid.

I need not remind those who have given attention to this line of investigation that such a collection could only be brought together by long and persistent effort. Unless by accident, the material is obtainable only by removing the surface of the ground, the common garden hoe being the implement best suited for the purpose.

As there are but seldom any surface indications to mark the spot where the tubers grow, it will readily be seen that their collection depends largely upon chance. Experience, however, teaches the collector to seek such locations as are best suited to the growth and development of the desired material; but, with all his knowledge, it is only by persistent effort that he may succeed. It has been too frequently the case that the writer has expended hours of arduous labor without securing a single specimen.

The district within the limits of which excursions have been made is bounded upon the north by the California State line, on the south by the Tehachapi range, by the seacoast on the west, and the valley of the Donner lake upon the east—an area exceeding 400 miles from north to south,

and some 300 miles from east to west, and within which are to be found the Coast Range mountains, with the dense forests of Sequoias, and the Sierra Nevada mountains rising to an elevation of 8,000 feet.

As will readily be seen, excursions for exploration to localities so remote must be, owing to unfavorable weather and other causes, too often barren of results. Many species may be found soon after the first autumnal rains, especially if the rain is followed by a period of sunshine and moderate heat. If these conditions continue during the entire rainy season much material may be collected during the winter. The most productive season, however, is that of early spring, as it seldom fails during these months that there are warm rains followed by sunny days. If, as it sometimes happens, there is an abundant precipitation of moisture, good material may be found even late into the spring. After the close of the rainy season but little is to be found, unless it be upon the banks of mountain rivulets, or in a few favored spots where there exists sufficient moisture combined with a suitable soil.

There being no visible indications to mark the spot where the fungi abide, to assure success in the search the characters of the trees and shrubs in the locality must be observed, as well as the nature of the soil. At times the fungi may be found beneath and amidst dense masses of decaying foliage of the Sequoias. When so found they will be in the immediate vicinity of the base of the tree. So far, however, as the writer's observations extend, the time during which the fungi are to be found among the Sequoias is of but short duration, as the mature plants are eagerly sought for by the rodents which are found in numbers in these forests. The most active of these foragers, and consequently the most destructive, are two species of wood-rats (*Neotoma*). Where these are to be found one must be upon the alert if he would secure mature specimens of the fungus, as the active little fellows are tireless in their search for this dainty. Squirrels and other rodents are but little less active and add to the difficulties of the collector.

A few tubers are to be found in the high Sierras at an elevation of 7,000 feet or more; these are generally located at or near the base of *Pinus contorta*, and occasionally beneath other species of Coniferæ. So far as my observations extend, this section can be relied upon for specimens only in the late spring, as the snow generally falls too early in the autumn to allow of their development.

At a lower elevation—3,000 or 4,000 feet—we find the oaks, under which, at the proper season, good material may be obtained. At these elevations the banks of the streams may yield material as late as July. In the foot-hills, at an elevation of from 1,400 to 1,500 feet, we find the best localities for the greatest number of species, which are here most prolific.

Upon well drained hillsides, in sandy soil, a variety of *Ceanothus* is found growing in dense clusters and averaging about seven feet in height. When protected from fire, we find beneath these shrubs a large accumulation of decaying foliage which serves to fertilize and protect the fungi found here.

Upon the plains the Eucalyptus tree has been cultivated to a large extent, and here a few varieties of fungi may be found. It may be broadly asserted that but seldom are species to be found in localities where grass or weeds are seen, as the roots of these plants seems to be inimical to the development of the tubers. Neither are they to be found in places where water accumulates or remains for a length of time upon the surface.

The earliest date at which we may hope to find tubers (truffles so-called) is about the first of January. At this time the cell-structure of the gleba is in a perfect state but is still destitute of asci or spores, which makes the identification of species impossible. So far as I have seen, the spore does not arrive at maturity until April; much, however, depends upon the weather. In any event, the tuber is of slower growth than many others of this class of fungi. The genus *Tuber* is widely distributed throughout California but is exceedingly scanty in numbers.

As to the economic value of the Hypogæi of California: so far, we have found none of the edible varieties of the Continent of Europe, although *Tuber Californica* is nearly identical with an edible species found in Italy. All of the Californian species are, however, edible, and no doubt would be greatly esteemed as a luxury were it not for the fact that they are so rare as to practically prohibit their use as food. The writer has but recently discovered reliable traces of a variety which, if found in quantity, is certain to take its place as a table luxury, although as yet he has not been able to obtain a single specimen.

Some years ago the citizens of Marysville discovered large quantities of an earth fungus which was growing in the vicinity of the city and which was freely eaten by those who were so fortunate as to be aware of its value. In that city they were known as the potato mushroom. A trustworthy gentleman states that they never appeared upon the surface of the ground, but that the search for them was a comparatively easy matter. The first noticeable sign of their presence was a circular space a foot or more in diameter, which was free or nearly so from vegetation. A more careful examination showed minute cracks or fissures upon the surface of the ground, and a moment's work with trowel or hoe sufficed to unearth a number of white, globose fungi, varying in size from an English walnut to that of a small orange. My informant states that they were gathered with the greatest facility. Another gentleman states that they were found by himself and friends in the vicinity of Sacramento, where they were highly esteemed as a delicacy. His description of the method pursued in their collection and of the surface indications marking their presence was identical with that of the observer above mentioned. Neither of the gentlemen could say positively in what month the fungus was found, but both agreed that it was late in the winter or early spring.

This will undoubtedly prove to be a *Terfezia*, a variety of which is found in northern Africa and also in great abundance in Arabia, being sold in the markets of Bagdad

as truffles. A *Terfezia* has recently been discovered in the valley of the Red river of Louisiana; this was recently distributed by Mr. Ellis in his "Centuries" (No. 1728) as *Terfezia leonis*. To what extent they are utilized as food in that locality we are not informed. Should the fungus again appear in the Sacramento valley in the same abundance as upon previous occasions, it will be sought for, as it is not only of value when fresh, but any excess of the product may be dried and would be an addition to any soup, and of value for many culinary purposes.

With these preliminary observations, which I trust may be of service in showing the methods pursued in the quest of material and its geographical distribution, I submit this monograph to the verdict of those who may be interested in this department of botany.

I should be lacking in courtesy did I fail to give due credit to my friend, Dr. Gustav Eisen, who has prepared the accompanying illustrations. The obligation is increased when I take into consideration the fact that his time was fully occupied in an entirely different line of biological investigation.

Hymenogaster *Vitt.*

Hymenogaster VITT., Monog. Tub., p. 20.

Peridium fleshy or thin, running down into an absorbing base. Cavities at first empty, radiating or irregular. Trama composed of elongated cells, but not of byssoid flocci, and therefore not easily separable. Spores various (Berk. Outlines Brit. Fung., p. 295.)

1. Hymenogaster versicolor, sp. nov.

Subglobose, 2 cm. in diam.; color white turning to pink; common integument thick, corrugated, flakey externally, pinkish beneath, closely adherent; gleba firm; cavities sinuous, minute; spores ovate, attached by a slender but somewhat elongated pedicel, 5 x 8 μ.

Type, No. 174, Harkness Coll.

Under small oaks, Bishops, Mill Valley, Marin County, Calif., April.

2. Hymenogaster Setchellii, sp. nov.

Minute, 1.5 cm. in diam.; color white turning to brown, subglobose, smooth; gleba buff, elastic; cells large, sinuous; sterigmata elongated; spores citriform, guttulate, brown, 7 x 9 μ.

Type, No. 165, Harkness Coll.

Under *Vaccinium*, beneath vegetable humus, Mt. Tamalpais, Marin County, Calif., April.

Named in honor of Professor William A. Setchell, of the University of California.

3. Hymenogaster utriculatus, sp. nov.

PLATE XLII, FIGS. 6*a*–6*f*.

Large, roundly gibbous, 2 cm. in diam.; color chocolate-brown; smooth, with slightly concave depressions upon the surface; gleba brown; cells gyrose or subrotund; septa fleshy, elastic, fibrose; spores ovoid, upon a cylindrical pedicel 3 μ in length, inclosed within a winged utricle, color citron-brown, 6 x 10 μ.

Type, No. 244, Harkness Coll.

Among Sequoias and oaks, Mill Valley, Marin County, Calif., July.

The spores of the *Hymenogaster* are frequently inclosed in a semitransparent utricle; such investment is, however, so far as the writer has observed, uniformly saccate or subrotund in outline.

4. Hymenogaster ruber, sp. nov.

Oblong, 2 cm. in diam., rugose; peridium pale red, thick, fleshy; gleba brown, septa white; cells minute; spores briefly obovate, rough, 6 x 8 μ.

Type, No. 248, Harkness Coll.

In the forest, Mill Valley, Marin County, Calif., July.

5. Hymenogaster globosus, sp. nov.

Minute, globose, 1 cm. in diam.; color dirty white; gleba fuscous or nearly black; cells irregular; spores ellipsoidal, 6 x 12 μ.

Type, No. 246, Harkness Coll.

In damp ground, beside a rivulet, Mill Valley, Marin County, Calif., July.

6. Hymenogaster candidus, sp. nov.

Oblong-cylindrical, 3 cm. in diam.; color white; gleba ochraceous; cells large; spores elliptical, guttulate, color brown, 10 x 5 μ.

Type, No. 49, Harkness Coll.

Under *Pseudotsuga Douglassii*, Towle, Placer County, Calif., May.

Differing from *H. Klotzii* in the form of the fungus and in the shape of the spores.

7. Hymenogaster luteus *Vitt.*

Hymenogaster luteus VITT., Monog. Tub., p. 22, Tab. III, fig, 9.

Peridium very thin, soft and silky, white, then brownish, bright yellow within; spores even, ovate or elliptic, oblong, yellow. (Berk. Outlines Brit. Fung., p. 295.)

No. 12, Harkness Coll.

Under decaying wood, Oakland, Calif., December.

8. Hymenogaster calosporus *Tul.*

Hymenogaster calosporus TUL., Fungi Hypo., p. 70, Tab. X, fig. 4.

Globosus sat irregularis, sæpius depressus aut costato-sulcatus (subtus præsertim), ex albido brunneus et sordidus; peridio tenui vix solubili, humido; lacunis inæqualibus absque directione, vacuis; septis linea media obscuriore notatis nec scissilibus; pulvinulo subnullo; sporis lanceolato-acuminatis, saturate brunneo-rubiginosis, levibus.

No. 48, Harkness Coll.

In the forest, Towle, Placer County, Calif., May.

9. Hymenogaster muticus *B. & Br.*

Hymenogaster muticus B. & Br., Ann. & Mag. Nat. Hist., 2d Ser., Vol. II, p. 267.

Globose, quite white when young, then tinged with brown and cracked, pale yellow-brown within; spores obovate, oblong, very obtuse. (Berk. Outlines Brit. Fung., p. 295.)

No. 64, Harkness Coll.

Under Sequoias, Taylor's Mills and Mt. Tamalpais, Marin County, Calif., March.

10. Hymenogaster lycoperdineus *Vitt.*

Hymenogaster lycoperdineus VITT., Monog. Tub., p. 22, Tab. II, fig. 5.

Globoso-difformis; peridio albo-fuligineo, sericeo-levi; carne molli elastica dilute fuliginea; cellulis majusculis irregularibus, e basi ad centrum seriatim directis; sporis fusiformibus, pallide fuligineis. (Tul. Fungi Hypo., p. 64.)

No. 72, Harkness Coll.

Under oaks, Camp Taylor, Marin County, Calif, July.

11. Hymenogaster arenarius *Tul.*

Hymenogaster arenarius TUL., Fungi Hypo., p. 73, Tab. X, fig. 2.

Globosus amorphus obovatus, albidus immutabilis; peridio levi vel inæquali tenuissimo glabro, sicco; cellulis irregularibus, exiguis, parietibus, ferrugineis sporis obrutis; septis albidis subsericeo-nitentibus, tandem aquose obscuris; sporis minutis citriformibus, in superficie inæqualibus, luteo-brunneis, guttulam vix concentricam foventibus.

No. 79, Harkness Coll.

In the forest, Mt. Tamalpais, Marin County, Calif., March.

12. Hymenogaster pallidus *B. & Br.*

Hymenogaster pallidus B. &. Br., Ann & Mag. Nat. Hist., 1st ser., Vol. XVIII, p. 74.

Smaller, rounded, depressed, nearly smooth, white, then dirty tan-color, rather soft, within white, then yellow, then pale brown; sterile base obsolete; spores lanceolate, acute, shortly pedicellate, rather rough. (Berk. Outlines Brit. Fung., p. 296.)

No. 81, Harkness Coll.

Under oaks, Camp Taylor, Marin County, Calif., March.

13. Hymenogaster caudatus, sp. nov.

Large, globose, 5 cm. in diam., color fuscous, rough, caudate; appendages springing from the base; gleba brown; veins olivaceous; spores ellipsoidal, 6 x 12 μ.

The caudal appendage is fleshy, from 1–2 cm. in length by 0.2 cm. in diam., and has a bluntly pointed terminus. The appendage is formed by an aggregation of many rootlets which are enclosed in a delicate membranaceous investment.

Type, No. 240, Harkness Coll.

Beneath Sequoias and oaks, Mill Valley, Marin County, Calif., April.

14. Hymenogaster olivaceus *Vitt.*

Hymenogaster olivaceus VITT., Monog. Tub., p. 24.

Globose, but angular; peridium whitish, then tinged with yellow, rufous when bruised; substance white, then of a dull buff, then rufous-olive, variegated with the white trama; spores pedicellate, mucronate, generally smooth. (Berk. Outlines Brit. Fung., p. 296.)

No. 167, Harkness Coll.

Collected during April, under *Sequoia sempervirens*, at Mill Valley, Marin Co., Calif., and under oaks, at Wire Bridge, Placer County, Calif.

15. Hymenogaster monticolus *Hk. Mss.*

Gautiera monticola HK., Bull. Cal. Acad. Sci., Vol. I, No. 1, 1884, p. 30.

Dark brown, irregularly lobed, 10 cm. in breadth, uniformly about 3 cm. in thickness, nearly plane above and below; stipe short and slender; stroma ferruginous brown, basidia apparently two-spored; sterigmata filiform; spores pale brown, elliptic or obovate, apiculate, longitudinally or somewhat obliquely striate, 10–12 by 7–8 μ. With the odor of decaying onions.

Type. No. 113 (3543), Harkness Coll.

Under *Sequoia gigantea*, Mariposa Big Tree Grove, Calif., July.

16. Hymenogaster Bulliardi *Vitt.*

Hymenogaster Bulliardi VITT., Monog. Tub., p. 23, Tab. III, fig. 5.

Globosus, ex albido aquilus; gleba firma densa, minutissime cellulosa, demum saturate ferruginea; loculis subobpletis; sporis levibus, late ovatis, breviter obtuseque acuminatis, basi rotundato-obtusis, guttulam crassam sæpius foventibus. (Tul. Fungi Hypo., p. 71.)

No. 233, Harkness Coll.

Mt. Tamalpais, Marin County, Calif., January.

17. Hymenogaster Behrii *De Toni.*

Hymenogaster Behrii DE TONI., Syll. Fung., Vol. VII, p. 174.
Splanchnomyces Behrii HK., Bull. Cal. Acad. Sci., Vol. I, No. 1, 1884, p. 30.

Cinnamon-brown, irregularly lobed, lacunose, 1–4 cm. in diam.; absorbing base inconspicuous; basidia 2-spored; sterigmata short, filiform; spores very unequal in size, yellowish brown, oval or elliptic, apiculate by the remains of the sterigmata, pitted all over with minute irregular depressions. 10–15 x 10 μ.

No. 104 (2911), Harkness Coll.

Growing in vegetable humus, Wildwood Glen, Sausalito, Marin County, Calif., December.

18. Hymenogaster rufus *Vitt.*

Hymenogaster rufus VITT., Monog. Tub., p. 23, Tab. III, fig. 17.

Subglobosus; peridio albo-rufescenti subsericeo; basi minuta; carne unicolore rubro-fusca; cellulis majusculis, irregularibus; sporis obovatis subsessilibus rufis. (Tul. Fungi Hypo., p. 64.)

No. 163, Harkness Coll.

Under shrubby oaks, Mill Valley, Marin County, Calif., April.

19. Hymenogaster tener *Berk.*

Hymenogaster tener BERK., Ann. & Mag. Nat. Hist., 1st Ser., Vol. XIII, p. 349.

Small, globose, soft, white, silky; substance pale pink, then greyish-umber; sterile base conspicuous, white; spores broadly elliptic, with a papillary apex, minutely warty. (Berk. Outlines Brit. Fung., p. 296.)

No. 11, Harkness Coll.

Under oaks, Oakland, Alameda County, Calif. Date not given.

Hydnangium *Wallr.*

Hydnangium WALLR., in DIETR. Fl. des Kœnigr. Preuss., VII, 465.

Peridium fleshy or membranaceous. Sterile base none. Trama vesicular. Cells at first empty, then filled with spores. Spores echinate. (Berk. Outlines Brit. Fung., p. 293.)

20. Hydnangium compactum, sp. nov.

Globose, 5 cm. in diam.; color white, smooth; gleba dense, pale orange; cells minute, oblong or ellipsoidal; spores globose, rough, not echinate, white, briefly stipitate, guttulate, 6 μ in diam.

Type, No. 191, Harkness Coll.

Under *Ceanothus*, Auburn, Placer County, Calif., May.

21. Hydnangium album, sp. nov.

Globose, color dirty white; peridium attenuate, membranaceous; gleba ochraceous; cells minute; spores spherical, white, briefly echinate, 12 μ in diam.

Type, No. 178, Harkness Coll.

In the forest, Calistoga, Napa County, Calif., April and May.

Resembling *H. candidum* Tul., with the exception that the spores are spherical and unusually large.

22. Hydnangium luteolum, sp. nov.

Oblong or subrotund, color white turning brown, base not visible; gleba yellowish; cells minute; spores globose, white, briefly stipitate, crowded, echinulate, guttulate, 12 μ in diam.

Type, No. 100, Harkness Coll.

Found in somewhat sandy soil beneath *Libocedrus decurrens* in the mountain region about Alta, Placer County, Calif., July.

Closely resembling *H. Carotæcolor* Tul., except in its inconspicuous base and the form of the spore.

Octaviania *Vitt.*

Octaviania VITT., Monog. Tub., p. 15.

Peridium continuous or cracked, cottony, running down into the sterile base. Trama byssoid, easily divisible. Fruit-bearing cavities or cells at first empty. Spores rough. (Berk. Outlines Brit. Fung., p. 292.)

23. Octaviania brunneola, sp. nov.

Globose, 5 cm. in diam., common integument smooth, absorbent base distinct, terminating in minute fibrillæ; cells various, subrotund or tortuous; basidia 4-spored; spores orbicular, brown, echinulate, 6–10 μ in diam.

Type, No. 82, Harkness Coll.

Mt. Tamalpais, Marin County, Calif., April.

24. Octaviania rosea *Hk.*

Octaviania rosea HK., Bull. Call. Acad. Sci., Vol. I, No. 1, 1884, p. 29.

Gregarious, peridium fibrillo-rugose, irregularly lobed, 1–3 cm. in diam., with distinct absorbing base, pale rose color, deepening within; basidia 1–2-spored; sterigmata filiform, capitate, as long as the diameter of the spore; spores globose, hyaline, pale; epispore covered with short, obtuse spines, 14–17 μ.

Type, No. 117, Harkness Coll.

Under shrubby oaks, at Golden Gate Park, San Francisco, Calif., January.

25. Octaviania mutabilis *Roum.*

Octaviania mutabilis ROUM., Revue Mycologique, Ann. VII, 1885, p. 23.

Subglobulosa, alba, tactu vinosa, dein nigrescens, basi fibrillis albis instructa; peridio separabili, tomento fugaci obtecto; gleba primum alba, dein, griseo-brunnea; cellulis irregulariter rotundatis, albidis, sæpe interruptis, centralibus majoribus; sporis globulosis, 12–15 μ in diam., echinulatis, brunneis.

No. 138, Harkness Coll.

Under *Arctostaphylos*, Auburn, Placer County, Calif., March; Calistoga, Napa County, Calif., March.

26. Octaviania socialis, sp. nov.

PLATE XLII, FIGS. 5*a*–5*d*.

Epigæous, large, 8 cm. in diam., surface deeply furrowed, furrows extending to its base; base distinct, with numerous branching threads; gleba rose-pink; cells irregular; spores globose, echinulate, having about ten pointed projections on the circumference, 12–14 μ in diam.

Type, No. 232, Harkness Coll.

In groups upon the surface of the ground beneath *Eucalyptus globulus*, Belmont, San Mateo County, Calif., January.

27. Octaviania citrina, sp. nov.

Globose, white; common integument flakey, imparting an earthy appearance; absorbent base spongy; fibrillæ wanting; gleba orange, cells irregular, basidia prominent, 4-spored; spores stipitate, brown, globose, echinulate, 10–12 μ in diam.

Type, No. 157, Harkness Coll.

Collected under *Arctostaphylos glaucus* at the following localities in California during April: Oat Hill Quicksilver Mine, Solano County; Camp Taylor, Marin County; and Calistoga, Napa County.

28. Octaviania occidentalis, sp. nov.

PLATE XLII, FIGS. 4*a*–4*d*.

Large, 2.5 cm. in diam.; color white turning brown, semiglobose; common integument flakey; absorbent base firm, terminating in branching fibrillæ; gleba white; cells oblong or subrotund, basidia 4-spored; spores briefly stipitate, white, globose, echinulate, having about twenty blunt projections on the circumference, 14 μ in diam.

Type, No. 137, Harkness Coll.

Wire Bridge, Placer County, Calif., March.

At irregular intervals, a flasked-shaped cystidium which springs from the parenchyma is to be found protruding from amid the true basidia for a distance of 18 μ and terminating in a conical point. These bodies are filled with what appears to be crystals and are destitute of sporophores.

29. Octaviania compacta *Tul.*

Octaviania compacta TUL., Fungi Hypo., p. 79.

Minor, polyrrhiza, nivea; peridio molliusculo insolubili tomentello-gossypino; cellulis rotundis oblongisve, minutissimis, mox obliteratis, oppletis; septis vix conspicuis; sporis innumeris minutissimis, sphæricis, scabriusculis, flavidis, tandem ochraceo-auratis.

No. 19, Harkness Coll.

Under oaks at Wire Bridge, Placer County, Calif., April. Collected by Chas. L. Phillips. Mill Valley, March.

Previously collected at Tamalpais, Marin County, Calif., and Blue Cañon, Placer County, Calif., under leaves, May-July.

30. Octaviania Stephensii *Tul.*

Octaviania Stephensii TUL., Fungi Hypo., p. 78.
Hydnangium Stephensii BERK., Ann. & Mag. Nat. Hist., 1st Ser., Vol. XIII, p. 352, also Vol. XVIII, p. 76.

Irregular, oblong, externally rufous, plicato-rugose at the base, cribrose, white within, milky, at length, when exposed to the air, rufous; spores globose, at length echinulate. (Berk. Outlines Brit. Fung., p. 292.)

No. 148, Harkness Coll.

Collected at the following localities in California during March: under oaks at Laundry Farm, Alameda County; at Mill Valley and Kents, Marin County; amongst Sequoias at Mt. Tamalpais.

Previously collected at Tamalpais, Marin County, Calif., and Alta, Placer County, Calif., May–July.

31. Octaviania monticola, sp. nov.

PLATE XLII, FIGS. *3a–3c.*

Large, 3 cm. in diam., irregular, globose, rough, flexible, buff; absorbent base prominent, fibres uniting, with earthy particles enclosed; gleba spongy, chestnut-brown; cells minute; basidia 4-spored, spores ovate, echinulate, 10 x 12 *μ*.

Type, No. 13, Harkness Coll.

Mountain regions in sandy soil, Auburn, Placer County, Calif., April.

Hysterangium *Vitt.*

Hysterangium VITT., Monog. Tub., p. 13.

Peridium entire, indehiscent, well marked, dissolving readily or splitting off naturally, either thin or somewhat thickish, firm, fibrous or membranaceous, provided with a mycelium; gleba perforated with cells which are at first hollow but are at length somewhat filled up, small, rounded or narrowly linear; partitions of the cells of very unequal thickness, tough, bearing basidia on both sides; basidia slender, generally 2-spored; spores ellipsoidal or lanceolate, with short sterigmata, very abundant, smooth and usually pale-colored and pellucid. Fungi of gregarious and hypogæous habits, of regular spherical shape; polyrrhizous, with the abundant white mycelium which is floccose in a peculiar fashion without being filamentous, either completely or partly covered, or at length attached to a nearly simple, rope-like mycelium and then naked, monorrhizous; with a distinct odor when mature. (Translated from the original.)

32. Hysterangium cinereum, sp. nov.

PLATE XLII, FIGS. *2a–2b.*

Oblong-rotund, 5 cm. in diam., color brownish white, elastic, smooth; gleba ashy, cut surface showing abundant veins irregular in outline; spores elliptical, white, 6 x 14 *μ*.

Type, No. 31, Harkness Coll.

In vegetable humus under *Arctostaphylos*, Auburn, Placer County, Calif., February.

33. Hysterangium Phillipsii, sp. nov.

PLATE XLII, FIGS. *1a–1b.*

Large, 3–4 cm. in diam., color rose-pink, fibrillous; rootlets 12 cm. or more in length; gleba of a dark olive or greenish (verdatre) tint, profusely veined, coalescing at the base; cells minute, spores ellipsoidal, in groups of three or four, white, 2 x 5 *μ*.

Type, No. 234, Harkness Coll.

Under oaks, Wire Bridge, Placer County, Calif., January. Collected by Chas. L. Phillips.

34. Hysterangium occidentale sp. nov.

Large, 4 cm. in diam., color dirty white; peridium soluble, subrotund, somewhat flattened or discoid; gleba chocolate-colored; cells gyrose, large; spores ellipsoidal, white, 12 x 7 *μ*.

Type, No. 242, Harkness Coll.

Amongst Sequoias, Tamalpais, Marin County, Calif., May.

35. Hysterangium nephriticum *Berk.*

Hysterangium nephriticum BERK., Ann. & Mag. Nat. Hist., 1st Ser., Vol. XIII, 1844, p. 350; TUL., Fungi Hypo., p. 82.

Depressed, springing from a white, flat, branched, membranous mycelium; peridium firm, elastic, distinct, tomentose; substance pale blue or grey, here and there greenish; cavities radiating from the base; spores minute, oblong, pale clay-color. (Berk. Outlines Brit. Fung., p. 294.)

No. 143, Harkness Coll.

Under oaks, Auburn, Placer County, Calif., March; Mill Valley, Marin County, Calif., April; Calistoga, Napa County, Calif., May.

36. Hysterangium membranaceum *Vitt.*

Hysterangium membranaceum VITT., Monog. Tub., p. 14, Tab. IV, fig. 15.

Minus, rotundatum, radicatum; peridio tenui membranaceo albido subtomentoso; carne viridiuscula; cellulis difformibus et irregularissimis. (Tul. Fungi Hypo., p. 83.)

No. 176, Harkness Coll.

Mill Valley, Marin County, Calif., April; Auburn, Placer County, Calif., May.

37. Hysterangium stoloniferum *Tul.*

Hysterangium stoloniferum TUL., Fungi Hypo., p. 84, Tab. XI, fig. 8.

Sphæricum leve glabrum candidum, radice unica funiformi instructum; carne e cœruleo fusca, tenaci; septis crassis; sporis acervatim sordide fuscis.

No. 158, Harkness Coll.

Collected during April, under oaks, at the following localities in California: Calistoga, Napa County; Mt. Tamalpais and Camp Taylor, Marin County; Auburn, Placer County. Previously collected at Tamalpais, March–May.

38. Hysterangium Clathroides *Vitt.*

Hysterangium Clathroides VITT., Monog. Tub., p. 13, Tab. IV, fig. 2.

Globosum; peridio albido, mycelii gratia polyrrhizo, facile solubili; carne olivaceo-virente. (Tul. Fungi Hypo., p. 80.)

No. 156, Harkness Coll.

Collected in damp ground at the following localities in California during April: Calistoga, Napa County; Bishops and Tamalpais, Marin County; Wire Bridge, Placer County.

39. Hysterangium australe *Speg.*

Hysterangium australe SPEG., Fungi Argent. Pug. IV, n. 237.

Primo subglobosum dein ob terræ pressionem irregulariter compressum, varie gibbose expansum, magnitudine ludens 5–20 diam., basi manifesta nulla, fibrillis radicalibus perfecte destitutum, album, levissimum, glaberrimum, peridio tenui a pulpa non v. difficile secedente, gleba autem pallide fulvo-olivascente, tremelloideo-subceracea, tubulis numerosis, minutissimis undique irregulariter percursa; tubulis gracilibus 150–250 μ diam., varie elongatis, vacuis, parietibus sporiferis cinnamomeis; sporis elliptico-elongatis, sursum plus minusve attenuato-rotundatis, deorsum acute attenuato-cuneatis basique truncatis, episporio ubique majuscule undulato-subverruculoso, saturate olivaceo-fuligineis, protoplasmate grosse granuloso farctis v. 1-guttulatis 15–20= 8–10 μ; stipite longiusculo, gracili hyalino, monospermo fultis. (De Toni in Sacc. Sylloge Fung., Vol. VII, 1888, p. 157.)

No. 84, Harkness Coll.

Collected under oaks at the following localities in California during April: Tamalpais and Mill Valley, Marin County; Auburn, Placer County; Calistoga, Napa County.

40. Hysterangium fuscum, sp. nov.

Minute, dirty white, globose; mycelium flocculent at base; gleba elastic; veins white; hymenium brown; spores elliptical, 6 x 12 μ.

Type, No. 177, Harkness Coll.

Under *Arbutus Menziesii*, Mill Valley, Marin County, Calif., April.

Rhizopogon *Tul.*

Rhizopogon TUL., Fungi Hypo., p. 85, Tab. I, fig. 5, Tab. II, fig. 1, et Tab. XI, figs. 4–5.

Peridium continuous or cracked, adhering to creeping branched fibers which traverse its surface. Cavities distinct, at first empty. Spores smooth, oblong-elliptic. (Berk. Outlines Brit. Fung., p. 294.)

41. Rhizopogon aurantius, sp. nov.

Subglobose, 2 cm. in diam., color dirty white; peridium attenuate; gleba pale orange, the freshly cut surface showing a creamy exudation; cells large; cell-walls thin but firm; spores subglobose, with colorless oil globule, 8–10 μ in diam.

Type, No. 74, Harkness Coll.

Solitary in dense forests of Sequoias, deeply hidden by decaying vegetation, Mt. Tamalpais, Marin County, Calif., August.

Leucophleps, gen. nov.

Globose or roundly elongate, color white or citron, dense; gleba multilocular; cells crowded; veins pearly white; spores spherical or ovoid and borne upon elongated sterigmata.

42. Leucophleps magnata, gen. et sp. nov.

PLATE XLII, FIGS. 7*a*–7*c*.

Large, 3 cm. in diam., subglobose or elongate, white, smooth, solid; peridium wanting, white; the freshly cut surface sometimes showing a blue tint which soon vanishes; multilocular cells irregularly decreasing in magnitude

towards the surface and disappearing at the sterile base; veins pearly white; spores single, globose, smooth, enclosed in semi-opaque investments or utricles, with oil globules, supported upon somewhat tortuous sterigmata, 13 μ in diam.

Type, No. 154, Harkness Coll.

Under *Acer*, Calistoga, Napa County, Calif., April.

43. Leucophleps foveolata, sp. nov.

Subglobose, color white or faintly citron; peridium attenuate, minutely pitted; gleba white; veins white; cells rotund; spores white, smooth, guttulate, 7 x 12 μ.

Type, No. 209, Harkness Coll. A second specimen (No. 243) was collected in the same locality.

In moist earth beside a rivulet, Mill Valley, Marin County, Calif., July.

Differing from *L. magnata* in external characters and size of spore.

44. Leucophleps candida, sp. nov.

White, 2 cm. in diam., irregular, firm, surface completely studded with depressions of very variable circumference; peridium wanting; gleba of pearly whiteness; cells crowded and plentiful; spores globose, 8 μ in diam.

Type, No. 207, Harkness Coll.

Mill Valley, Marin County, Calif., June.

45. Leucophleps odorata, sp. nov.

PLATE XLIII, FIGS. 9*a*-9*b*.

Large, 3-4 cm. in diam., color orange, irregularly lobed or oblong, no fibrous attachment, slightly crepitating under pressure. Odor nauseating.

Type, No. 251, Harkness Coll.

Under oaks, Castle Crag, Shasta County, Calif., July.

The marked irregularity in form and color, together with the odor, serves to distinguish this from any other species, and although firm there is distinct crepitus to be observed upon pressure. The cells in the recently cut surface of the fresh plant present a glassy appearance.

46. Leucophleps citrina, sp. nov.

PLATE XLIII, FIGS. 8*a*-8*b*.

Subglobose, 2 cm. in diam., citron color, smooth; gleba firm, wavy; cells minute; spores roundly elliptical, guttulate, white, two to four spores form upon each basidium; basidia attenuate at the point of attachment, increasing in size towards the apex, oil globules interspersed for its entire length; spores 6x8 μ.

Type, No. 168, Harkness Coll.

Found amidst Manzanitas, Mt. Tamalpais, Marin County, Calif., April.

The fungus imparts a red tint to alcohol when immersed.

Melanogaster *Corda.*

Melanogaster CORDA in STURM's Deutschl. Fl., Abth. III, Heft 11, 1831, p. 1.

Peridium adhering to creeping branched fibres which traverse its surface, without any proper or distinct base. Cells at first filled with pulp. Spores smooth, mostly dark. (Berk. Outlines Brit. Fung., p. 293.)

47. Melanogaster Eisenii, sp. nov.

Globose, smooth, 1.5 cm. in diam., color brown; gleba fuscous; veins brown; cells rhomboidal; spores globose, 6-8 μ in diam.

Type, No. 116, Harkness Coll.

Cabo St. Lucas, Baja California, January. Collected by Dr. Gustav Eisen.

48. Melanogaster variegatus *Tul.*

Melanogaster variegatus TUL., Fungi Hypo., p. 92, Tab. II, fig. 4, et Tab. XII, fig. 6.

At first ochraceous, then reddish-ferruginous, minutely downy; walls of the cells dirty-white, yellowish, or orange; pulp black; spores minute. (Berk. Outlines Brit. Fung., p. 293.)

No. 145, Harkness Coll.

Amongst oaks, Wire Bridge, Placer County, Calif., March.

Previously collected at Sausalito, Marin County, Calif., February.

49. Melanogaster tuberiformis *Corda.*

Melanogaster tuberiformis CORDA., in STURM's Deutschl. Fl., Abth. III, Heft 11, 1831, p. 1, Tab. I.

Hypogæus rotundatus, fusco-cupreus, intus ater, radiculis fibrillosis atris tectus; sporis atris obovatis, deorsum attenuatis. (Tul. Fungi Hypo., p. 95.)

No. 5, Harkness Coll.

Amongst small oaks, Mill Valley, Marin County, Calif., April.

50. Melanogaster durissimus *Cooke.*

Melanogaster durissimus COOKE., Grevillea, Vol. VIII, p. 94.

Subglobosus, compressus, difformis aut sulcatus, lævis, durissimus, atro-fuscus, demum nigrescens. Peridio crasso, subnitido; carne mire lacunoso, ochraceo albo; lacunis majusculis, creberrimis, atris. Sporis oblongo-ellipticis, inæqualibus, brunneis .005–.008 x .003–.005 mm. Odore fortissimo.

No. 21*b*, Harkness Coll.

Collected amongst oaks at the following localities in California during April: Auburn and Wire Bridge, Placer County; Mt. Tamalpais and Sausalito, Marin County.

51. Melanogaster aureus *Tul.*

Melanogaster aureus TUL., Fungi Hypo., p. 97.
Octaviania aurea VITT., Monog. Tub., p. 20, Tab. III, fig. 14.

Oblongus uniformis, basi radicatus; peridio levi subalbido; carne primo dura aurea, venis albidis (cellularum parietibus) variegata, demum molli et nigrescente; cellulis subcavis.

No. 68, Harkness Coll.

Amongst oaks, Wire Bridge and Auburn, Placer County, Calif., February.

52. Melanogaster sarcomelas *Tul.*

Melanogaster sarcomelas TUL., Fungi Hypo., p. 96.
Octaviania sarcomelas VITT., Monog. Tub., p. 16, Tab. III, fig. 3.

Minor, difformis; peridio levi nigro; resticulis nullis; carne nigerrima unicolore; cellulis regularibus, substantia pultacea sporifera repletis; sporis ovalibus majusculis, levibus.

No. 128, Harkness Coll.

Collected at the following localities in California during April: amongst redwoods, Mill Valley, Marin County; under oaks, Wire Bridge, Placer County; in forest, Laundry Farm, Alameda County.

Elaphomyces *Nees.*

Elaphomyces NEES., in FRIES Syst. Myc., Vol. III, p. 21.

Common integument thick, hard. Asci globose or obovate. Sporidia consisting of several concentric utricles. Internal mass of fungus at length dusty. (Berk. Outlines Brit. Fung., p. 378.)

53. Elaphomyces variegatus *Vitt.*

Elaphomyces variegatus VITT., Monog. Tub., p. 68, Tab. IV, fig. 4.

Mycelium yellow (or yellowish grey), inconspicuous; cortex thick, hard, ochraceous-yellow or golden-yellow, rough, with thick pyramidal and obtuse, or narrow, pointed, and fragile warts, or only granulated; peridium reddish brown and variegated; asci 2–4-spored; sporidia opaque, blackish brown. (Cooke's Handbook, Vol. II, p. 749.)

No. 39, Harkness Coll.

Under *Pseudotsuga Douglassii*, Donner Lake, Nevada County, Calif., July.

54. Elaphomyces Morettii *Vitt.*

Elaphomyces Morettii VITT., Monog. Tub., p. 71, Tab. IV, fig. 17.

Crusta fusco-purpurea; cortice duro, fragili, nigro-brunneo obtuseque verrucoso; peridio albido-fusco; sporis fusco-nigrentibus. (Tul. Fungi Hypo., p. 112.)

No. 38, Harkness Coll.

Under oaks, Santa Cruz, Santa Cruz County, Calif., May.

Hydnocystis *Tul.*

Hydnocystis TUL., Fungi Hypo., p. 116, Tab. IV, Fig. 7; Tab. XIII, Fig. 2; Tab. XIV, Fig. 1.

Receptaculum utriforme, globosum aut varie sinuoso-anfractuosum, penitus clausum, vel rima basilari inaperta, brevi s. longiuscula et gyrosa, pilisque adpressis confertis fungum intrantibus occlusa et velata quasi dehiscens, interius latissime uniloculare et vacuum. Integumentum, receptaculi extima

corticula, indiscretum, minute papillosum, pilosum et coloratum. Hymenium quod fungi cavitatis paries est, albidum, ex fibris seu filamentis constans longissime linearibus, subdiscretis aut vix cohærentibus, parallele e receptaculo prodeuntibus, inæqualibus sterilibusque (paraphysibus), nec non et utriculis immistis paucioribus crassis longe cylindricis obtusis, in filum longum deorsum desinentibus, ascis scil. seu thecis octosporis. Sporæ uniseriatæ, sphæricæ aut ellipticæ, leves, pellucidæ, dilute coloratæ; nucleo oleoso, tandem homogeneo nec partito.

55. Hydnocystis compacta, sp. nov.

PLATE XLIII, FIGS. 11*a*-11*c*.

Minute, reddish brown, subrotund, cavernous without exterior opening, minutely and closely papillose; gleba compact, white; asci cylindrical, obtuse, 175 μ in length, 8-spored; spores globose, hyaline and unequally papillose, 25 μ in diam.

Type, No. 98, Harkness Coll.

Under *Libocedrus*, Alta, Placer County, Calif., May.

Genea *Vitt.*

Genea VITT., Monog. Tub., p. 27.

Common integument warty, with an aperture at the apex. Hymenium waved and sinuated, but not forming an intricate mass. Asci cylindrical. Sporidia globose [or subglobose.] (Berk. Outlines Brit. Fung., p. 378.)

56. Genea compacta, sp. nov.

PLATE XLIII, FIGS. 10*a*-10*c*.

Minute, 1 cm. in diam., irregularly stellate, color light brown, verrucose, distinct base with branching filaments; gleba white, irregularly cavernous; asci cylindrical, stipitate, 270 μ in length, 8-spored; spores ellipsoidal, verrucose, 25 x 18 μ. The fungus is exceedingly rare. The filaments composing the paraphyses are septate, extremely delicate, and of unusual length and wavy.

Type, No. 86, Harkness Coll.

Found in the forest, Mt. Tamalpais, Marin County, Calif., April.

The verrucosity consists in the surface of the spore being covered with small, round, knob-like projections, about sixteen being found in the circumference.

57. Genea arenaria, sp. nov.

Minute, color light brown, subglobose, lobed, verruculose, cavernous; gleba white, attenuate; asci linear, 8-spored; spores roundly ellipsoidal, 24 x 18 μ; paraphyses brief and not plentiful.

Type, No. 42, Harkness Coll.

In sandy ground. No locality or date.

58. Genea hispidula *Berk.*

Genea hispidula BERK., in Tul., Fungi Hypo., p. 121, Tab. XII, fig. 2, et Tab. XIII, fig. 3.

Small, brown, externally invested everywhere with rather rigid, adpressed, brown flocci; interior cavity very often simple, with the mouth almost hidden; radical fibres brown, adhering to the base; spores large, ellipsoid; warts thick and crowded. (Cooke's Handbook, Vol. II, p. 748.)

No. 115, Harkness Coll.

Beneath the surface of the ground under trees, San Rafael, Marin County, Calif., May. Under oaks, Wire Bridge, Placer County, Calif., April.

59. Genea verrucosa *Vitt.*

Genea verrucosa VITT., Monog. Tub., p. 28, Tab. II, Fig. 7.

Very irregular and polymorphous, gibbous, sulcate, or also somewhat many-lobed, black, verrucose ostiolate; ostiola sometimes very broad, radical filaments abbreviated; sporidia broadly elliptic, verrucose. (Cooke's Handbook, Vol. II, p. 748.)

No. 70, Harkness Coll.

Amongst decaying leaves under trees, Santa Cruz, Santa Cruz County, Calif., May.

60. Genea sphærica *Tul.*

Genea sphærica TUL., Fungi Hypo., p. 120, Tab. IV, Fig. 2; Tab. XII, Fig. 1, et Tab. XIII, Fig. 6.

Regularis et quasi perfecte sphærica, interdum depressa, atra glabra, verrucosa, comam ferrugineam siccam spissam longissimamque basi gerens, apice pervia, intus varie labyrintheo-cavernosa, rarius vacua et penitus utriformis.

No. 89, Harkness Coll.

Beneath the surface of the ground under oaks, Contra Costa County, Calif., May.

Balsamia *Vitt.*

Balsamia VITT., Monog. Tub., p. 30.

Common integument warty. Hymenium complicated with distinct lacunæ not leading to the surface. Sporidia cylindrical or oblongo-elliptic, even, pellucid. (Berk. Outlines Brit. Fung., p. 378.)

61. Balsamia magnata, sp. nov.

Subglobose, densely verrucose, 2.5 cm. in diam., color orange red; cavity gyrose; gleba white, firm; asci subovate, 8-spored, 50 x 38 μ; spores cylindrical, containing from one to three oil globules, 18 x 8 μ.

Type, No. 185, Harkness Coll.

In forests, Auburn, Placer County, Calif., May.

62. Balsamia nigrens, sp. nov.

Medium, semiglobose, irregular, black, verrucose, warts with polygonal base; openings stellar, sometimes extending through the mass; cavities large and somewhat regular; gleba white, firm, crossed by white wavy lines; asci semiglobose or ellipsoidal, briefly stipitate, 8-spored, 48 x 32 μ; spores oblong-elliptic, guttulate, 26 x 12 μ.

Type, No. 180, Harkness Coll.

Beneath *Ceanothus*, Auburn, Placer County, Calif., May.

63. Balsamia alba, sp. nov.

Large, color dirty white, subglobose, fissured, deeply verrucose; gleba firm; asci ellipsoidal, 8-spored; spores cylindrical, guttulate, 12 x 18 μ.

Type, No. 129, Harkness Coll.

Under oaks, Wire Bridge, Placer County, Calif., February.

This fungus is remarkable for the density of the gleba and the small number of its asci.

64. Balsamia filamentosa, sp. nov.

PLATE XLIII, FIGS. 13*a*-13*f*.

Large, oblong or irregularly globose, color ferruginous brown; densely verrucose; gleba filamentous; veins irregular; parenchyma pellucid; asci ellipsoidal, markedly stipitate, 42 x 24 μ; spores cylindrical, having two to three oil globules, 18 x 12 μ.

Type, No. 236, Harkness Coll.

Under *Heteromeles arbutifolia*, Auburn, Placer County, Calif., February.

The oil globules disappear from view when placed in a medium denser than that of water.

65. Balsamia vulgaris *Vitt.*

Balsamia vulgaris VITT., Monog. Tub., p. 30, Tab. I, Fig. 2.

Major, sæpissime sinuoso-exarata vel hinc et illinc excavata, minutissime papillosa, papillis interdum subnullis; lacunis latiusculis gyrosis; septis crassis in medio pellucidis; sporangiis paraphyses inter omnino nidulantibus brevioribusque vel breviter exsertis; sporis cylindricis angustis, guttulas oleosas tres subæquales includentibus. (Tul. Fungi Hypo., p. 123.)

No. 231, Harkness Coll.

Among decaying vegetation in shrubby thickets, Auburn, Placer County, Calif., December.

66. Balsamia platyspora *Berk.*

Balsamia platyspora BERK., Ann. & Mag. Nat. Hist., 1st Ser., Vol. XIII, 1844, p. 358.

Small, globose, rufous, minutely warted, substance pallid yellow, minutely cellulose; sporidia at first broadly oblong-elliptic, with a large globose nucleus, at length slightly elongated trinucleate. (Cooke's Handbook, Vol. II, p. 747.)

No. 222, Harkness Coll.

Amongst shrubs under vegetable mould, Auburn, Placer County, Calif., December.

67. Balsamia polysperma *Vitt.*

Balsamia polysperma VITT., Monog. Tub., p. 31.

Minor, anguloso-tuberulosa, papillis minutis congestis ferrugineis vestita; carne subalbida cellulosa; substantia intercellulari (septis) alba opaca; sporis numerosissimis. (Tul., Fungi Hypo., p. 125.)

No. 220*b*, Harkness Coll.

Under shrubs in sandy soil, Auburn, Placer County, Calif., December.

Hydnobolites *Tul.*

Hydnobolites TUL., Fungi Hypo., p. 126.

Integument replaced by white, evanescent down. Hymenium complicated with sinuous lacunæ, ending at the surface. Asci elliptic. Sporidia globose. (Berk. Outlines Brit. Fung., p. 377.)

68. Hydnobolites excavatum, sp. nov.

1 cm. in diam., color brown; peridium smooth; gleba brown, cavernous; asci subrotund, 8-spored, 65 x 54 μ; spores globose, 25 μ in diam.

Type, No. 189, Harkness Coll.

Under vegetable humus in sandy ground, Auburn, Placer County, Calif., May.

Hydnotrya *B & Br.*

Hydnotrya B. & BR., Ann. & Mag. Nat. Hist., 1st Ser., Vol. XVIII, 1846, p. 78.

Common integument minutely papillose, not distinct. Hymenium complicated with gyrose lacunæ, leading to the surface. Asci oblong. Sporidia globose, tuberculate. (Berk. Outlines Brit. Fung., p. 377.)

69. Hydnotrya cerebriformis, sp. nov.

PLATE XLIV, FIGS. 19*a*–19*f*.

Large, 3 cm. in diam., color salmon, subrotund, smooth, brain-like markings upon the surface; gleba white or faintly citron, canals gyrose; hymenium covered with clavate villi between and extending beyond the asci; asci cylindrical, briefly stipitate; spores globose, brown, foveolate, 25 μ in diam.

Type, No. 37, Harkness Coll.

Among fir trees, Donner Lake, Nevada County, Calif., July.

The slight pits upon the spore give it a rough appearance.

Pseudohydnotrya *Fischer.*

Pseudohydnotrya FISCHER, Tuberineæ in ENGLER & PRANTL'S Die Naturl. Pflanzenf., Teil I, Abth 1, p. 282.

Fungus irregularly rounded, perforated by hollow labyrinth-like passages and chambers which open out at several places on the surface of the fungus, and the walls of which are covered by hymenium. Surface of fungus covered with a pseudo-parenchymatic, hairy peridium, which often penetrates deeply into the interior chambers and then continues directly into the hymenium. Hymenium consists of paraphyses and of asci arranged like palisades. Paraphyses cylindrical, septate, at apex knob-like. Asci cylindrical or somewhat globular, 8-spored, spores ellipsoidal, smooth, without color, uniseriate or seldom biseriate. (Translated from the original.)

70. Pseudohydnotrya Harknessii *Fischer.*

Pseudohydnotrya Harknessii FISCHER, Tuberineæ in ENGLER & PRANTL'S Die Naturl. Pflanzenf., Teil I, Abth 1, p. 282.

Asci 140–160 μ long, 20–28 μ broad, generally 8-spored. Spores 25–28 μ long, 14–18 μ broad. Paraphyses 7–14 μ thick at the swollen end. (Translated from the original.)

No. 1, Harkness Coll.

Under shrubs among vegetable humus. Mill Valley, Marin County, Calif., April.

71. Pseudohydnotrya carnea, sp. nov.

PLATE XLIII, FIGS. 16*a*–16*b*.

Minute, 1.5 cm. in diam., common integument, color pale brown, subglobose, irregular, slightly tomentose, chambered; gleba white; parenchyma convolute; asci cylindrical, 125 μ in length, 8-spored; spores ellipsoidal, white, guttulate, 22 x 15 μ; paraphyses hidden.

Type, No. 181, Harkness Coll.

Among shrubs, Auburn, Placer County, Calif.; May; under oaks, Mill Valley, Marin County, Calif., April.

This species is much infested by a parasitic *Sphæria*.

72. Pseudohydnotrya nigra, sp. nov.

Large, 2 cm. in diam., color dark brown, inclosed, peridium loosely adherent, tomentose; gleba white; parenchyma convolute; asci 120 x 8 μ; spores guttulate.

Type, No. 216, Harkness Coll.

Under shrubs in firm ground to which it adheres by its hairy investment. Auburn, Placer County, Calif., November to April.

Stephensia *Tul.*

Stephensia TUL., Fungi Hypo., p. 129.

Common integument fleshy, cottony. Base distinct. Hymenium intricate. Asci cylindrical. Sporidia globose, even, at length verrucose. (Berk. Outlines Brit. Fung., p. 377.)

73. Stephensia bombycina *Tul.*

PLATE XLIV, FIGS 18*a*–18*c*.

Stephensia bombycina TUL., Fungi Hypo., p. 130, Tab. XII, Fig. 4.
Genea bombycina VITT., Monog. Tub., p. 29, Tab. III, Fig. 13, et Tab. IV, Fig. 8; BERK., Ann. & Mag. Nat. Hist., 1st Ser., Vol. XIII, p. 357.

Subglobose, depressed; peridium rather soft, floccose, irregularly intruded into the cavity, destitute of rooting fibres; flesh gyrose-venose; sporidia pellucid, spherical. (Cooke's Handbook, Vol. II, p. 745.)

No. 173, Harkness Coll.

Found in forests, March. No locality.

This fungus varies slightly from the original description in the spores, which are generally biseriate and marked by irregularly foveolate depressions.

Pachyphlœus *Tul.*

Pachyphlœus TUL., Fungi Hypo., p. 130.

Common integument warty, opening by a terminal aperture. Base distinct. Asci clavate. Sporidia spherical. (Berk. Outlines Brit. Fung., p. 377.)

74. Pachyphlœus carneus, sp. nov.

PLATE XLV, FIGS. 33*a*–33*b*.

Subrotund, 1 cm. in diam., studded with slight warty elevations with stellate markings at their apex and an irregularly outlined base; gleba citron; veins obscure; asci elongate or ovoid and narrowed at terminus, briefly pedicellate, 8-spored; spores irregularly seriate, large, globose, verrucose, 14 μ in diam.

Type, No. 253, Harkness Coll.

Beneath Sequoias, Mill Valley, Marin County, Calif., July.

The spores are often seriate, at times, however, nearly biseriate. The fungus resembles *P. conglomeratus* B. & Br., but has a much larger spore.

75. Pachyphlœus ligericus *Tul.*

Pachyphlœus ligericus TUL., Fungi Hypo., p. 133, Tab. XIV, Fig. 5.

Exiguus verrucosus et nigricans; sporangiis ovato-globosis; sporarum verruculis crassis obtusisque.

No. 44, Harkness Coll.

Under pine trees in sandy soil, Towles, Placer County, Calif., May.

Myrmecocystis, gen. nov.

Fungus minute, irregular, lobed or gibbous, verrucose; gleba chambered by an irregularly stellate cavity not communicating with the exterior; asci subglobose or somewhat elongate, 8-spored; spores rough.

76. Myrmecocystis cerebriformis, gen. et sp. nov.

PLATE XLV, FIGS. 28*a*–28*e*.

Minute, 1 cm. in diam., color white or pale citron, lobed, verrucose, enclosed; gleba white, marked by an irregularly stellate-formed cavity without regular lines, the structure composed of large and uniform cells; asci subglobose or slightly elongated, 8-spored; spores globose, 24 μ in diam.

Type, No. 25, Harkness Coll.

In sandy places under oaks, Wire Bridge, Placer County, Calif., May.

77. Myrmecocystis candida, sp. nov.

PLATE XLV, FIGS. 29*a*–29*c*.

Minute, 0.5 cm. in diam., color white, irregular, lobed, verrucose; gleba irregularly chambered; asci subglobose, 8-spored; spores globose, rough.

Type, No. 18, Harkness Coll.

In rich sandy soil under oaks, Alameda County, Calif., June.

Differing from *M. cerebriformis* in magnitude and in the spore.

Geopora *Hk.*

Geopora HK., Bull. Cal. Acad. Sci., Vol. I, No. 3, 1885, p. 168.

Subterranean. Integument woolly, continuous with the trama. Hymenium convolute. Asci cylindrical. Sporidia hyaline, oblong, smooth.

78. Geopora Cooperi *Hk.*

Geopora Cooperi HK., Bull. Cal. Acad. Sci., Vol. I, No. 3, 1885, p. 168.

Irregularly globular, 2–4 cm. in diam., covered with dense brown wool which is continued inwards on the trama; absorbing base none; hymenium white, not closely packed; asci cylindrical, 8-spored, 220 x 26 μ; sporida hyaline, oblong, smooth, with a large shining, eccentric nucleus, 28 x 20 μ.

Type, No. 106 (3880), Harkness Coll.

Haywards, Alameda County, Calif., January. Coll. by Dr. J. G. Cooper.

79. Geopora magnata, sp. nov.

PLATE XLV, FIGS. 34*a*–34*d*.

Large, 6 cm. in diam., semiglobose, color brown, with brain-like convolutions marking its entire surface; septate hairs minute and in great abundance; gleba white and marked by labyrinthine cavities; asci cylindrical, 8-spored; spores white, destitute of oil globules, roundly ellipsoidal, 14 x 18 μ, much shorter than those of *G. Cooperi*.

Type, No. 255, Harkness Coll.

Amongst *Pinus insignis*, Golden Gate Park, San Francisco, Calif., January.

80. Geopora brunneola, sp. nov.

Irregularly globose, 3 cm. in diam., color brown, corrugated, tomentose, enclosed; gleba white; hymenium fleshy, densely crowded; asci cylindrical, 80 x 12 μ, 8-spored; spores obovate, hyaline, 12 x 18 μ. The asci are much shorter than in *G. Cooperi* and are densely crowded.

Type, No. 102, Harkness Coll.

In sandy ground, Golden Gate Park, San Francisco, Calif., April.

81. Geopora mesenterica, sp. nov.

PLATE XLIII, FIGS. 12*a*–12*c*.

Smooth, irregular, 5 cm. in diam., color dirty white; gleba ferruginous brown; parenchyma convolute; asci cylindrical, 102 x 12 μ; with elongated pedicel, 8-spored; spores white, ovoid, smooth, 10 x 12 μ.

Type, No. 37, Harkness Coll.

Under *Ceanothus* in decaying vegetable humus, Auburn and Wire Bridge, Placer County, Calif., May.

Tuber *Micheli.*

Tuber MICHELI, Nov. Pl. Gen., p. 221.

Asci short, saccate, disposed in sinuous veins. Sporidia elliptic, reticulate, often echinulate. Peridium warty or tubercled, rarely smooth, without any definite base. (Berk. Outlines Brit. Fung., p. 376.)

82. Tuber (Eutuber) citrinum, sp. nov.

PLATE XLV, FIGS. 30*a*–30*c*.

Subglobose, 2 cm. in diam., irregular, warty, fissured, color citron, turning to pale brown; gleba white; asci globose, enclosed in wavy filaments; spores two to three, seldom four; spores ellipsoidal, reticulate-alveolate, dark brown, 30 x 42 μ; about eighteen alveoli on the circumference of the spore.

Type, No. 123, Harkness Coll.

In forest, Tamalpais, Marin County, Calif., May.

Resembling *T. rapæodorum* Tul. excepting in form and the structure of the gleba.

83. Tuber (Eutuber) monticolum, sp. nov.

Minute, globose, 1.5 cm. in diam., smooth, color dirty white, fissured, with a slightly defined sterile base; gleba white, firm; asci globose, briefly stipitate, 2–4-spored; spores ellipsoidal, dark, reticulate-alveolate, 36 x 25 μ.

Type, No. 27, Harkness Coll.

Among firs in dense woods in Sierra Nevada mountains at Towle, Placer County, Calif., July.

84. Tuber (Eutuber) magnatum *Pico.*

Tuber (Eutuber) magnatum PICO, Melethemata, p. 79.

Ochraceo-pallens v. dilute virescens, subleve aut minutissime papillosum, difforme, globoso-angulosum et varie lobatum, basi obconica instructum; venis aeriferis tenuissimis, reticulatis; asci 1-3-sporis; sporis fuscis elliptico-rotundatis et alveolato-reticulatis, retis alveolis amplis. (Tul., Fungi Hypo., p. 150.)

No. 62, Harkness Coll.

In oak forest, San Rafael, Marin County, Calif., March; under oaks, Wire Bridge, Placer County, Calif., March.

85. Tuber (Eutuber) Borchii *Vitt.*

Tuber (Eutuber) Borchii VITT., Monog. Tub., p. 44, Tab. I, Fig. 3.

Globosum, vulgo regulare, puberulum, albidum, maculis candidis notatum posteaque rufescentibus conspurcatum, intus ex albido fuligineo-violaceum et etiam fusco-nigricans, venis albidis rariusque lineis obscurioribus marmoratum; sporangiis elliptico-rotundatis, sæpius 1-3-sporis; sporis crassis ovatis reticulato-alveolatis spisseque luteo-brunneis. (Tul., Fungi Hypo., p. 145.)

No. 54, Harkness Coll.

Amongst decaying leaves of oak, Mt. Tamalpais, Marin County, Calif., June.

86. Tuber (Eutuber) australe *Speg.*

Tuber (Eutuber) australe SPEG., Ann. de Sociedad Cientifica Argentina, Vol. XXIV, 1887, p. 122.

Globosum v. globoso-trigonum, superne integrum, inferne sæpius trilobatum, magnitudine valde ludens (4-30 mill. diam.), lævissimum, sordide album; cutis tenuis a carne inseparabilis; caro compactiuscula, alba, dein grisea, venis parcis crassiusculis, albidis, immutabilibus ramoso-anastomosantibus percursa; asci in pulpa dense dispersi, globosi v. globoso-elliptici, primo 2-3 spori, dein sæpius 1-spermi v. 2-spermi altero abortivo (70-90 μ x 60-80 μ): sporæ globoso-ellipticæ, pallide fulgineo-olivaceæ, areola hyalina, lata, reticulato-alveolata cinctæ (35-40 μ x 28-30 μ sine areola; 45-50 μ x 35-38 μ cum areola).

No. 203, Harkness Coll.

Amongst oaks in vegetable humus upon a well drained hillside, Auburn, Placer County, Calif., June.

87. Tuber (Eutuber) gibbosum, sp. nov.

Irregularly gibbose, 2 cm. in diam., color cinnamon-brown; gleba ochraceous; septa white, tortuous, obscure; asci subrotund, 3-4-spored; spores dark brown, ellipsoidal, echinate, markedly reticulate-alveolate, large, 24 x 36 μ.

Type, No. 162, Harkness Coll.

Under oaks, Mill Valley, Marin County, Calif., April.

88. Tuber (Eutuber) excavatum *Vitt.*

Tuber (Eutuber) excavatum VITT., Monog. Tub., p. 49, Tab. I, Fig. 7.

Subglobose, about an inch in diameter; peridium discrete, ochraceous, minutely verrucose, firm; flesh horny, cinerous-red, liver-colored, or tawny; veins pallid-ochraceous; the substance falls away in the center, so as to leave a cavity, which has an opening at the base of the tuber; asci numerous, ellipsoid, 2-4-spored; sporidia ellipsoid, yellowish, or pallid-tawny; epispore largely foveolo-plicate. (Cooke's Handbook, Vol. II, p. 740.)

No. 159, Harkness Coll.

Beneath oaks in clayey soil, Laundry Farm, Alameda County, Calif., April.

The spore is somewhat larger (42 μ in diam.) than in the dried specimen, and like it coarsely reticulate.

89. Tuber (Sphærotuber) puberulum *B. & Br.*

Tuber (Sphærotuber) puberulum B. & BR., Ann. & Mag. Nat. Hist., 1st Ser., Vol. XVIII, p. 81.

Gregarious, irregularly sublobate, clothed with short, erect down, which gives it to the naked eye a peculiar pearly appearance; the white spots are very visible, even in dried specimens; peridium very thin and delicate, so that the pinky-brown color of the flesh is apparent through it, often cracked; veins white from a radiating base, in some individuals very few; sporidia nearly spherical, reticulato-echinulate; odor of the radish. (Cooke's Handbook, Vol. II, p. 741.)

No. 36, Harkness Coll.

Growing amongst decaying pine bark in the forest, Donner, summit of the Sierra Nevada mountains, 7,000 feet, July; under *Libocedrus*, Towles, Placer County, Calif.

90. Tuber (Sphærotuber) Californicum, sp. nov.

PLATE XLV, FIGS. 31*a*–31*b*.

Subglobose, 1.5 cm. in diam., ochraceous, smooth; gleba firm, brown; veins conspicuous, not plentiful; asci subglobose, not stipitate, 3–4-spored; spores globose, large, brown when mature, reticulate-alveolate, 42 μ in diam., about ten alveoli on the circumference.

Type, No. 150, Harkness Coll.

Under oaks beneath vegetable humus upon a hillside, Laundry Farm, Alameda County, Calif., March.

This species is especially notable for the magnitude of its spore.

91. Tuber (Oogaster) Caroli *Bonnet*.

Tuber (Oogaster) Caroli BONNET, Rev. Mycol., Ann. VII, 1885, p. 8.

Globosum, brunneo-ferrugineum, verrucis plerumque 5-goniis asperatum, basi squamiformi, eximia instructum; gleba firma, sicca, pallide luteola, dein luteola, venis albis, numerosis, latissimis, e fungi basi exorientibus, gyrosis marmorata, lineis obscuris destituta; ascis globosis v. piriformibus, longe lateque stipitatis, 1–4-sporis; sporidiis ellipsoideis, dense et acute aculeatis, magnis, 20–22=14–15, luteo-brunneis. (Paoletti in Saccardo's Sylloge Fung., Vol. VIII, 1889, p. 894.)

No. 149, Harkness Coll.

In clayey soil beneath oaks, Laundry Farm, Alameda County, March; Howards, Marin County, Calif., May.

92. Tuber (Sphærogaster) candidum, sp. nov.

PLATE XLV, FIGS. 32*a*–32*b*.

Subrotund, 2 cm. in diam., smooth, color whity brown; gleba light brown; veins attenuate, white; asci subglobose; 3–4-spored; spores globose or ovoid, echinate, brown when mature, 24 μ in diam.

Type, No. 195, Harkness Coll.

Under dense clusters of *Ceanothus*, Auburn, Placer County, Calif., May.

Differing from *T. echinatum* Sacc. in the form of the spore.

93. Tuber (Sphærogaster) Eisenii, sp. nov.

Irregularly oblong, 3 cm. in diam., common integument smooth; gleba pale or whitish; veins large; asci ovate, stipitate, 1–2-spored, seldom more than one; spores globose, dark brown, echinate, 18 μ in diam.

Type, No. 196, Harkness Coll.

In sandy places beneath vegetable humus, Auburn, Placer County, Calif., May.

Named in honor of Dr. Gustav Eisen of the California Academy of Sciences.

94. Tuber (Sphærogaster) olivaceum, sp. nov.

Semiglobose, 2 cm. in diam., color ferruginous brown, smooth; gleba olivaceous; veins minute; asci ellipsoidal, markedly pedicellate, 2–4-spored; spores globose, echinate, dark brown, 24 μ in diam.

Type, No. 197, Harkness Coll.

Beneath vegetable humus, Auburn, Placer County, Calif., May.

Piersonia, gen. nov.

Integument scabrous or warty; gleba showing a multiplicity of brownish dots, orbicular or gyrose; asci nesting together; spores 3–4, alveolate.

Named in honor of William M. Pierson, a member of the California Academy of Sciences.

95. Piersonia alveolata, gen. et sp. nov.

PLATE XLIV, FIGS. 20*a*–20*e*.

Diameter 1 cm., integument scabrous, color white, turning to sulphur; gleba firm, citrine, cut surface showing a large number of orange-colored dots; asci clavate, 60 x 80 μ, pedicel elongated (70 μ), 3–4-spored; spores alveolate, citrine, 24 μ in diam.

Type, No. 183, Harkness Coll.

Beneath *Ceanothus*, Auburn, Placer County, Calif., May.

96. Piersonia scabrosa, sp. nov.

PLATE XLIV, FIGS. 21*a*–21*e*.

Semiglobose, irregular, 2 cm. in diam., color chestnut-brown, surface rough; gleba buff; asci obtusely saccate, pedicellate, 4-spored; spores globose, white, alveolate, 20 μ in diam.

Type, No. 201, Harkness Coll.

In the forest, Auburn, Placer County, Calif., June.

Differing from the preceding in color and in dimensions of the spore.

Delastria *Tul.*

Delastria TUL., Ann. Sci. Nat., Bot., 2d Ser., Tome XIX, p. 379.

Ascomata basi obtusa protuberante instructa, cortice tenuissimo, fibrilloso-byssoideo, passim rimoso aut evanido vestita. Gleba carnosa, humida, mollis, venis candidis anastomosantibus variegata et iisdem in glebulas rotundatas, quasi septis spuriis, divisa. Asci oblongo-reniformes, ampli, 2-4-spori. Sporidia sphærica, reticulato-alveolata, nucleo oleoso donata. (Sacc. Sylloge Fung., Vol. VIII, 1889, p. 904.)

97. Delastria rosea *Tul.*

PLATE XLV, FIGS. 27*a*-27*b*.

Delastria rosea TUL., Ann. Sci. Nat., Bot., 2d Ser., Tome XIX, p. 379.

Globosa v. obovata, depressa, vulgo gibberoso-mamillosa, interdumque sulcata et rimosa, fragilis, cortice adpresse byssaceo-tomentoso, subsericeo v. velutino, niveo dein fuscato involuta; gleba ex albido mox amœne rosea, dein rufa, venis candidis, immutabilibus, cum cortice continuis, areolata; ascis inordinatim sparsis, ovoideo-oblongis, sæpius incurvis seu reniformibus, nec in modum pedicelli deorsum angustatis, 2-3-rarius 4-sporis; sporidiis, sphæricis, reticulato-alveolatis, subaculeatis, maturis luteolis, 30-40 μ in diam. (Paoletti in Sacc. Sylloge Fung., Vol. VIII, 1889, p. 905.)

No. 182, Harkness Coll.

Under shrubs amongst vegetable humus, Auburn, Placer County, Calif., May.

This is the only species found of this genus. The characteristic rose-pink tint shown upon the cut surface of the gleba is still to be seen even after months of immersion in alcohol. About fourteen alveoli appear on the circumference.

Choiromyces *Vitt.*

Choiromyces VITT., Monog. Tub., p. 50.

Common integument, even. Base definite. Asci clavate. Sporidia spherical. (Berk. Outlines Brit. Fung., p. 377.)

98. Choiromyces gangliformis *Vitt.*

Choiromyces gangliformis VITT., Monog. Tub., p. 51, Tab. II, Fig. 2.

Globosus, levis, fuscus; gleba albida, exiccatione vix mutata, grumoso-compacta, venis numerosissimis, interruptis, decolorantibus, mirabiliter anastomosantibus et areolas hinc illinc albas filisque minimis concoloribusque varie junctas, gangliformes, inter se relinquentibus; sporidiis sphæricis, verrucis conicis elongatis asperatis. (Paoletti in Sacc. Sylloge Fung., Vol. VIII, 1889, p. 901.)

No. 151, Harkness Coll.

Under *Arctostaphylos*, Calistoga, Napa County, Calif., April.

Terfezia *Tul.*

Terfezia TUL., Fungi Hypo., p. 172, Tab. VI, Fig. 4; Tab. VII, Fig. 5; Tab. XV, Figs. 3-5; et Tab. XXI, Fig. 15.

Integumentum crassum v. tenue, carnosum, clausum continuum v. hinc et illinc parce rimosum, leve, nonnunquam fibrillosum, in cuticulæ sorte qua tegitur primo albidum deinque plus minus et inæqualiter fucatum. Moles interior carnosa solida, scil. lacunis destituta, initio pallida et quasi similaris, matura uvida, molliuscula, in massulas s. glebulas rotundatas, rarius diversiformes, carnoso-humidas v. pulposas, fertiles et varie coloratas divisa, parenchymate sterili interposito laxiori ærifero pallido maculas que irregulares (areolas) s. venarum species in fungo secto fingente. Sporangia late elliptica v. globosa, utriculis genitivis imposita et in glebulis veluti inordinate creberrima nidulantia, octospora. Sporæ sphæricæ initio conglobatæ et leves, maturæ liberæ echinatæ (aliquando insuper reticulatæ) diluteque coloratæ; nucleo tandem oleoso.

99. Terfezia spinosa, sp. nov.

PLATE XLV, FIGS. 24*a*-24*b*.

Terfezia leonis LANGLOIS in Ellis' Centuries, No. 1782.

Globose, white or citron, smooth; gleba variegated; asci subrotund or briefly elongate, 6-8-spored; spores globose, seldom ellipsoidal, 15-20 μ in diam.

Type, No. 108*a*, Harkness Coll.

Red River Valley, Louisiana.

The spores are furnished with large projections (only about twenty being found upon the peripheria of each), which are slightly curved, somewhat blunt at the point, and confluent at the base.

As will be observed, there is a marked dissimilarity between this species and *T. leonis*, a specimen of which

from the herbarium of Vittadini is in possession of the writer. A spore from this specimen is represented in fig. 25, and agrees in outline with that figured by Tul. in Fungi Hypo., Plate XV, fig, 3.

100. Terfezia Zeynebiæ, sp. nov.

PLATE XLV, FIG. 26.

Large, globose, 4 cm. in diam., color white, turning brown; gleba citrine when dried; asci subspherical, 8-spored, 36 x 40 μ (briefly pedicellate); spores with spine-like projections, 15 to 18 μ in diam.

Type, No. 212, Harkness Coll.

The valley of the Tigris, Arabia. This fungus was sent to me some years ago by the American Consul at Bagdad.

Named in honor of Zeyneb of the Arabian Nights.

T. Zeynebiæ is found in clusters in the alluvial soil of the valley and is readily discovered owing to the fact that slight fissures are to be seen in the overlying earth. The fungus is greatly esteemed as an article of food and is sold in large quantities in the markets of Bagdad.

The spine-like projections are short and blunt, generally some little distance apart, about 16 projections appearing on the circumference.

Chatin in La Truffe, page 78, describes two species from Mesopotamia, *T. Hafizi* and *T. Metaxasi*. The first, *T. Hafizi*, is figured by the author (Plate XV, fig. 1) as being rugose and destitute of spines. Paoletti in Saccardo's Sylloge Fungorum, Vol. XI, p. 445, refers to the same as possessing a reticulate spore, 18 x 20 μ.

T. Metaxasi, shown in plate XIII, fig. 2, Ibid., has a much larger spore with a very large increase in the number of its spines.

Terfeziopsis, gen. nov.

Ascomata smooth, globose or pyriform; gleba veinless, firm; asci globose or ellipsoidal, 2-4-spored; spores globose or ovoid, echinate; spines recurved or hooked.

This fungus is nearly allied to *Terfezia*, but is separated from *Terfezia* because of the form of its spore.

101. Terfeziopsis lignaria, gen. et sp. nov.

PLATE XLIV, FIGS. 23*a*-23*c*.

Subglobose, irregular, 1.5 cm. in diam., brown, smooth; gleba white; asci globose or ellipsoidal, 35 x 45 μ, briefly stipitate, 4-spored, spores globose or ovoid, echinate, 15 μ in diam.

Type, No. 206, Harkness Coll.

Among oaks in sandy pasture, Auburn, Placer County, Calif., June.

The spore is armed with delicate spines. In each instance the spine being hooked or recurved near the terminus, as is shown in fig. 23*c*. The same figure represents an ascus with spore *in situ*.

Endogone *Link*.

Endogone LINK, Diss. I, p. 33; FRIES, Syst. Myc., Vol. II, p. 295.

Hypogæous. Flocci collected into a globose, spongy mass. Vesicles globose, solitary, or collected in little fascicles at the ends of the branches. (Berk. Outlines Brit. Fung., p. 409.)

102. Endogone macrocarpa *Tul.*

Endogone macrocarpa TUL., Fungi Hypo., p. 182, Plate XX, Fig. 1.
Glomus macrocarpus TUL., Giorn. Bot. Ital., Ann. I, Vol. II, part 1, p. 63.
Endogone pisiformis BERK., Ann. & Mag. Nat. Hist., 1st Ser., Tome XVIII, 1846, p. 81.

Subamorpha, sordide grisea lutea auratave; peridio tenuissimo vel obsoleto; sporangiis crassissimis.

No. 99, Harkness Coll.

Under *Libocedrus decurrens*, Towles, Placer County, Sierra Nevada mountains, Calif., at an elevation of nearly 5,000 feet, July.

103. Endogone microcarpa *Tul.*

Endogone microcarpa TUL., Fungi. Hypo., p. 182, Plate XX, fig. 2.
Glomus microcarpus TUL., Giorn. Bot. Ital., Ann. I, Vol. II, part 1, p. 63.

Globosa, regularis, candida, intus vero luteola; sporangiis exiguis.

No. 237, Harkness Coll.

In forest, Mill Valley, Marin County, Calif., February.

104. Endogone lanata, sp. nov.

Subglobose, 0.7 cm. in diam., color white; gleba flocculent, white; concepticles numerous, wooly; asci brown, globose, 100 μ in diam.

Type, No. 45, Harkness Coll.

In forests in the Sierra Nevada mountains, Placer County, Calif., July.

The so-called ascus is crowded like others with more or less organized protoplasmic material.

105. Endogone malleola, sp. nov.

PLATE XLIV, FIGS. *22a–22b*.

Minute, 0.3 cm. in diam., convex surface inferiorly concave, fibers of mycelium extending from the concave surface; gleba white, flocculent; asci 48–70 μ in diam., spherical, attached to an elongated pedicel (6 x 180 μ); spore-like bodies numerous, globose, homogeneous, white, 7 μ in diam.

Type, No. 103, Harkness Coll.

Upon the surface of the ground in dense shade of *Sequoia sempervirens*, Mt. Tamalpais, Marin County, Calif., December.

The pedicel is much more minute than is that in *macrocarpa*.

106. Sphæria (Hypocrea) Setchellii, sp. nov.

PLATE XLIII, FIGS. *17a–17c*.

Parasitic, perithecia papillose discoid, minute, membranaceous; ostiolum hidden; spores heterogeneous, fifty or more in each of the perithecia, elliptical, black when mature, non-guttulate, 12 x 14 μ.

Type, No. 181*b*, Harkness Coll.

Parasitic within the parenchyma of *Pseudohydnotria carnea*.

There is a marked dissimilarity between this species and that of *S. Zobelii* Tul., not only in the general outline of the perithecia and its ostiolum but in the size of the spore.

Named in honor of Professor William A. Setchell of the University of California.

107. Sphæria (Hypocrea) Zobelii *Tul.*

Sphæria (Hypocrea) Zobelii TUL., Fungi Hypo., p. 186, Tab. XIII, fig. 1.
Microthecium Zobelii CORDA, Icon. Fung., T. V., pp. 30 et 74, Tab. VIII, fig. 53.

Fungorum hypogæorum gregatim parasitica, sphærica, brevissime mucronata ore subintegro; perithecio membranaceo tenuissimo; sporangiis oblongis 3–8-sporis; sporis ellipticis et utrinque truncatis, levibus, atris. (Tul. Fungi Hypo.)

No. 255*b*, Harkness Coll.

Found with and upon the parenchyma of *Geopora magnata*.

In this specimen we find that the perithecia is globose or slightly oblong vertically, with a well developed ostiolum.

This parasite was discovered by Corda in *Choiromyces* and referred to a new genus, *Microthecium*. In his review of the work of Corda, Tulasne declines to accept his generic name and places it in the *Sphæriaceæ*, calling it *S. Zobelii*.

Sporophaga, gen. nov.

Parasitic and deeply seated within the ascus and spores of host-plant; a hypogæous fungus.

108. Sporophaga cyanea, gen. et sp. nov.

PLATE XLIII, FIGS. *15a–15g*.

Ustilago cyanea CES.

Hypogæous, produced within the spore of *Balsamia vulgaris* in groups of from three to six within each spore; the spores of the host-plant, together with the inclosing ascus, soon separate, when the spores of the parasite are seen to be grouped together; spores ovate, dark, 4 x 6 μ.

Type, No. 231, Harkness Coll.

The parasite does not appear until the spores of the host-plant are fully matured. After the disappearance of the spore and ascus the parasitic spores remain in groups of from twenty to forty, being kept in contact by the entanglement of the hyphæ; in due time, however, they separate and are dispersed.

Possibly the oil globules to be seen in the spores of a freshly cut *Balsamia* may for the moment be mistaken for the parasitic spores. It can readily be shown that there exists no connection between the two, as one has but to place the material in a fluid denser than water, and the oil globules will soon disappear from sight.

The affinities of *Sporophaga cyanea* are decidedly obscure and will probably remain so until the earlier stages of the development of its spore are noted. In the interval it may be placed either amongst the *Uredinæ* or the *Ustilagineæ*.

The freshly cut surface of the host-plant shows a decidedly blue tint, due to the presence of the parasite.

Host-plant found at Auburn, Placer County, Calif., April.

INDEX TO GENERA AND SPECIES OF CALIFORNIAN HYPOGÆOUS FUNGI.

New genera and species in full face, synonyms in *italics*.

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The colored illustrations have been mostly prepared after fresh material, a few after alcoholic preparations. The microscopic drawings have been made from glycerine preparations with the aid of a Zeiss Apochromat, Obj. 2 mm., Aperture 1.40, Compensating Oculars 8 and 12. Projection on working table.

EXPLANATION OF PLATE XLII.

Fig. 1. *Hysterangium Phillipsii*, sp. nov.
(a) Vertical section with fibrillose rootlets. (b) Section of gleba.

Fig. 2. *Hysterangium cinereum*, sp. nov.
(a) Fully developed fungus. (b) Transverse section.

Fig. 3. *Octaviania monticola*, sp. nov.
(a) External view. (b) Transverse section of same. (c) Section of gleba enlarged.

Fig. 4. *Octaviania occidentalis*, sp. nov.
(a) Section of gleba enlarged; Zeiss AA, Oc. 2. (b) Section showing hymenium and pseudobasidia; Zeiss AA, Oc. 6. (c) Pseudobasidia enlarged, showing spores round or ovoid. (d) Free spore.

Fig. 5. *Octaviania socialis*, sp. nov.
(a) Perfect plant. (b) Vertical section. (c) Enlarged spores *in situ*. (d) Basidia, sterigma, and spores.

Fig. 6. *Hymenogaster utriculatus*, sp. nov.
(a) Entire plant. (b) Section of gleba showing cells and hymenium. (c) Enlarged section of hymenium. (d, e) Two spores with utricle. (f) Isolated spore.

Fig. 7. *Leucophleps magnata*, gen. et sp. nov.
(a) Section of hymenium with basidia and spores. (b) Vertical section showing cell-structure. (c) Optical section of spore with spore investment.


1a


1b


2a

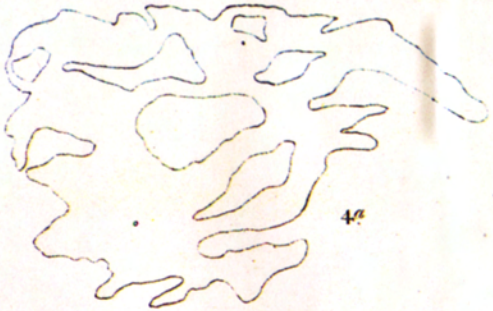

2b


3a

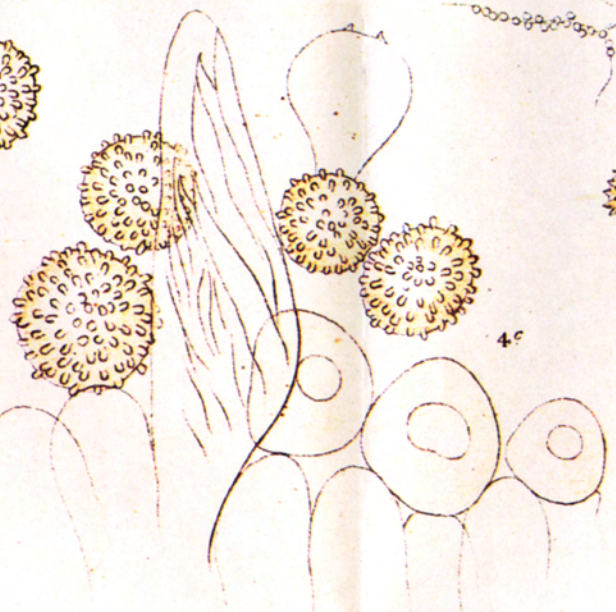

3b


3b


3c

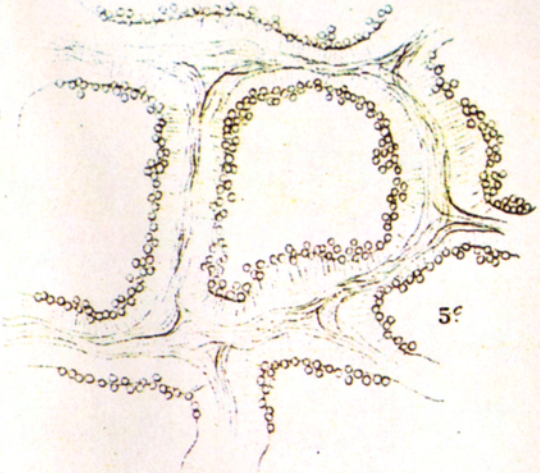

4a

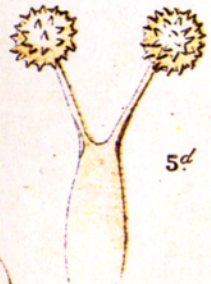

4d


4c


3c

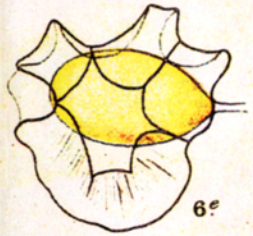

4b


5c

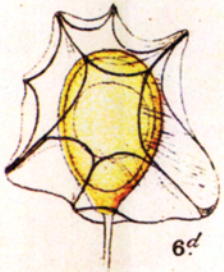

5d


6a


6c


6e


6f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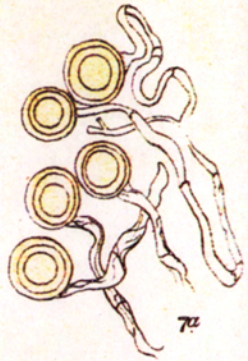
7a


6b


7b


7c

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EXPLANATION OF PLATE XLIII.

Fig. 8. *Leucophleps citrina*, sp. nov.
(a) Section of hymenium with basidia and spores. (b) Basidia isolated, 10 to 12 times the length of the spore (bb); (bbb) oil-globules shown within the basidia.

Fig. 9. *Leucophleps odorata*, sp. nov.
(a) Mature plant. (b) Vertical section showing cell-structure.

Fig. 10. *Genea compacta*, sp. nov.
(a) Section of gleba with asci and paraphyses. (b) Ascus with spores. (c) Isolated spore.

Fig. 11. *Hydnocystis compacta*, sp. nov.
(a) Ascus with spores. (b) Isolated spore. (c) Optical section of spore.

Fig. 12. *Geopora mesenterica*, sp. nov.
(a) Ascus with spores. (b, c) Isolated spores.

Fig. 13. *Balsamia filamentosa*, sp. nov.
(a) Fungus fully developed. (b) Longitudinal section. (c, d) Asci with spores. (e, f) Isolated spores with oil-globules.

Fig. 14. *Balsamia*, sp. ?
Immature fungus showing development of spores.

Fig. 15. *Sporophaga cyanea*, gen. et sp. nov.
(a) Optical section of spore of *Balsamia vulgaris* in the early stage of its development. (b) Section of the same showing the membranous investments of the spore. (c) *Balsamia* spore in a more advanced stage of development. (d) Ascus with spores of the host-plant; some of the spores already ruptured and the parasite set free within the ascus. (e) Group of parasites within a spore of the host. (f) Two parasites with hyphæ within a spore of the host. (g) Isolated parasite showing a double investment of the same, together with its septate hyphæ, the hyphæ having a branched terminus.

Fig. 16. *Pseudohydnotrya carnea*, sp. nov.
(a) Entire fungus, hairs faintly shown. (b) Transverse section.

Fig. 17. *Sphæria Setchellii*, sp. nov.
(a) Fragment of host-plant showing an ascus with spores and paraphyses; cell-wall of the perithecia enclosing parasitic spores. (b) Perithecia in different stages of development, one still destitute of spores; the asci of the host-plant faintly shown. (c) Isolated spore greatly magnified. Spores colored black for convenience, in life as in 17*c*.

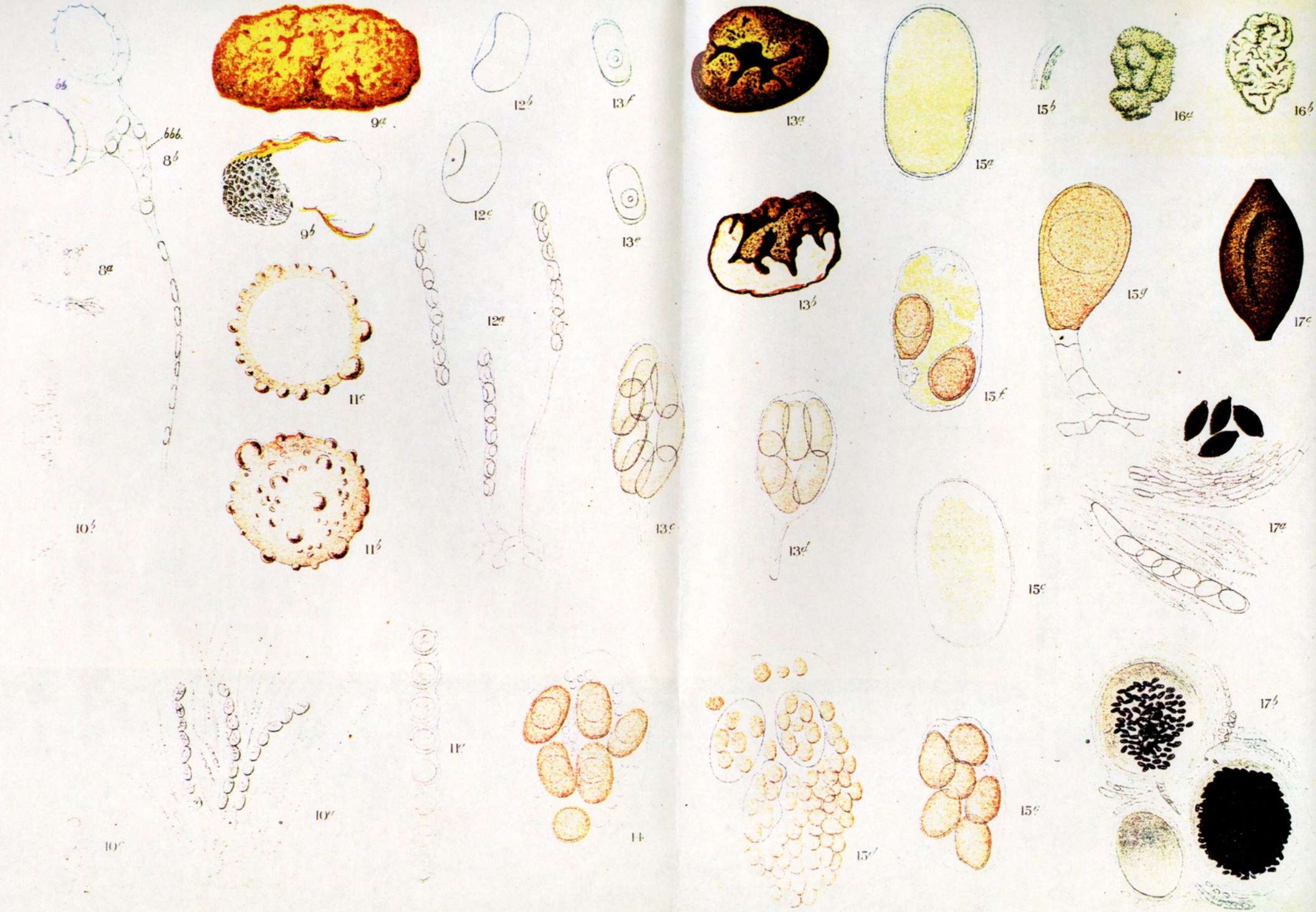

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FIG. 8. CHLOROCHYTRIUM CITRINA, SP. NOV. FIG. 9. CHLOROCHYTRIUM COMPACTUM, SP. NOV. FIG. 10. GENEA COMPACTA, SP. NOV. FIG. 11. HYDROCYSTIS COMPACTA, SP. NOV.

EXPLANATION OF PLATE XLIV.

Fig. 18. *Stephensia bombycina* TUL.
(a) Fragment of gleba with asci. (b) Isolated spore showing its rugosities. (c) Optical section showing the periphery.

Fig. 19. *Hydnotrya cerebriformis*, sp. nov.
(a) Vertical section of fungus. (b) Enlarged vein-tracing. (c) Asci with paraphyses. (d) Isolated spore showing roughened surface. (e) Optical section of spore. (f) Section of the surface of spore magnified.

Fig. 20. *Piersonia alveolata*, gen. et sp. nov.
(a) Section of gleba showing veins, cell, and asci. (b) Asci (magnified) with spores. (c) Isolated spore. (d) Optical section of spore. (e) Section of spore showing alveolate surface.

Fig. 21. *Piersonia scabrosa*, sp. nov.
(a) Section of plant. (b) Enlarged section of cut surface. (c) Ascus with spores. (d) Optical section of spore. (e) Section of spore surface.

Fig. 22. *Endogone malleola*, sp. nov.
(a) Transverse section of fungus, full size of the mature plant. (b) Conceptacle with contents and fragment of pedicel.

Fig. 23. *Terfeziopsis lignaria*, gen. et sp. nov.
(a) Ascus with spores (spores round or slightly ovoid). (b) Optical section of spore (about 70 to 75 spines in its circumference). (c) Hooked spines on surface of spore.

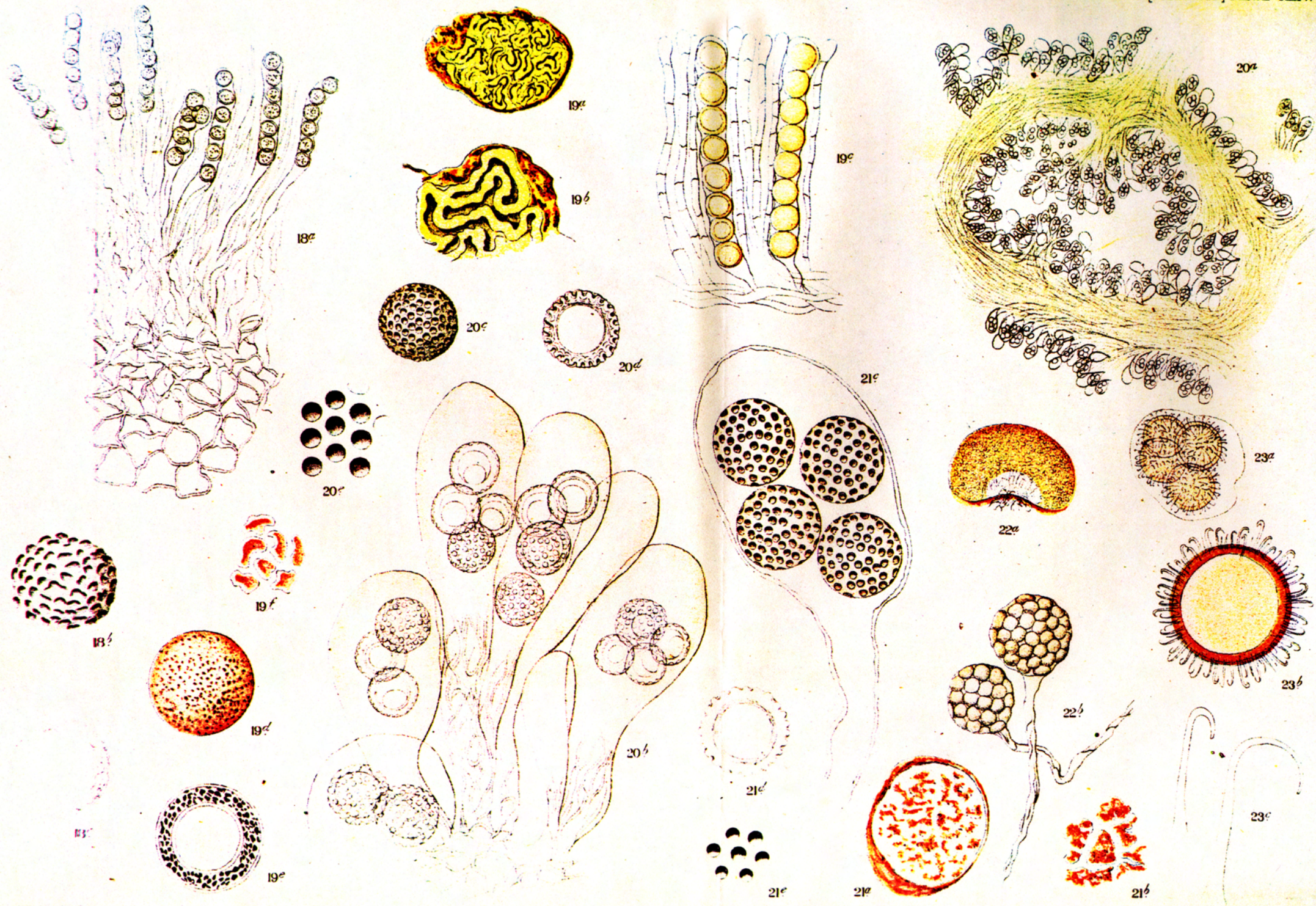

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FIG. 18. STEPHENSIA BOMBYCINA *Tuz.* FIG. 19. HYPONOTRYA CEREBRIFORMIS, SP. NOV. FIG. 20. PIERSONIA ALVEOLATA, GEN. ET SP. NOV. FIG. 21. PIERSONIA SCABROSA, SP. NOV.

EXPLANATION OF PLATE XLV.

Fig. 24. *Terfezia spinosa*, sp. nov.
(a) Isolated spore. (b) Spine on surface of spore.

Fig. 25. *Terfezia leonis* Tul.
Isolated spore.

Fig. 26. *Terfezia Zeynebiæ*, sp. nov.
Isolated spore.

Fig. 27. *Delastria rosea* Tul.
(a) Section of gleba with ascus and spores. (b) Isolated spore.

Fig. 28. *Myrmecocystis cerebriformis*, gen. et sp. nov.
(a) Fully developed fungus. (b) Vertical section. (c) Detail of surface of fungus. (d) Ascus with spores. (e) Detail of surface of spore.

Fig. 29. *Myrmecocystis candida*, sp. nov.
(a) Section of gleba. (b) Asci with spores. (c) Isolated spore showing a rough surface. (d) Optical section of spore. (e) Detail of sculptured surface of spore. Asci in *c* and *d* improperly outlined, should appear as in *b*.

Fig. 30. *Tuber (Eutuber) citrinum*, sp. nov.
(a) Section of gleba with ascus and spores. (b, c) Isolated spores.

Fig. 31. *Tuber (Sphærotuber) Californicum*, sp. nov.
(a) Section of gleba with asci and spores. (b) Isolated spore.

Fig. 32. *Tuber (Sphærogaster) candidum*, sp. nov.
(a) Ascus with spores. (b) Isolated spore.

Fig. 33. *Pachyphlœus carneus*, sp. nov.
(a) Ascus with irregularly serrate spores. (b) Isolated spore.

Fig 34. *Geopora magnata*, sp. nov.
(a) Fully developed fungus. (b) Section of fungus. (c) Enlarged section of gleba. (d) Enlarged section of hymenium.

FIG. 24. TERFEZIA SPINOSA, SP. NOV. FIG. 25. TERFEZIA LEONIS *TUL.* FIG. 26. TERFEZIA ZEYNERIÆ, SP. NOV. FIG. 27. DELASTRIA ROSEA *TUL.*

FIG. 28. MYRMECOCYSTIS CEREBRIFORMIS, GEN. ET SP. NOV. FIG. 29. MYRMECOCYSTIS CANDIDA, SP. NOV. FIG. 30. TUBER CITRINUM, SP. NOV. FIG. 31. TUBER CALIFORNICUM, SP. NOV.