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Fungicolous Fungi from Iowa

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In studying the parasitic fungi of Iowa many species of fungi associated with other fungi have been encountered, some of which have not been reported from the state previously. Hence, the following list has been compiled and the commoner species illustrated.

These fungi all show some degree of parasitism, most of them attacking the fruiting structures of the fungi they inhabit. *Syncephalis cornu* whose mycelium invades the mycelial strands of members of the Mucoraceae is possibly an exception. Two, *Darluca filum* and *Cicinnobolus cesati* are true secondary parasites and both show a remarkably wide host range on groups of fungi that are themselves obligate parasites, viz. the Uredinales and the Erysiphaceae.

Taxonomically, they are present throughout the entire gamut of the fungi from the Myxomycetes to the Basidiomycetes. Their distribution in the fungus classes follows:

Myxomycetes—Physarum polycephalum Schw.
Phycomycetes—Sporodinia grandis Link.
    Syncephalis cornu Van Tiegh. & Le Mon.
Ascomycetes—
    Sphaeriales Amphisphaeriaceeae—Amphisphaeria hypoxylon Ell. & Ev.
    Hypocreales Hypocreaceae—Hypocrea citrina (Pers.)
        Hypocrea latizonata Pk. Fr.
        Hypomyces hyalinus
        Hypomyces lactifluorum
        Hypomyces polyporinus
        Cordyceps ophioglossoides Tul.
Basidiomycetes Agaricaceae—Nyctalis asterophora Fr.
Fungi imperfecti
    Sphaerioidaceae—Cicinnobolus cesati De B.
        Darluca filum (Biv.) Cast.
    Moniliaceae—Trichothecium roseum Link
    Tuberculariaceae—
        Fusarium heterosporum Nees

The largest number fall in the Hypocreales of the Ascomycetes. The fact that these latter are bright colored and hence very conspicuous is certainly a contributing factor in the numerous reports of them as parasites.

Myxomycetes—Physarales

Physarum polycephalum Schw. (Figures 1 and 2)

Sporangia spherical or irregular, gyrose-confluent, helvelloid, umbilicate below; peridium thin, ashy, covered with evanescent yellow squamules, fragile;

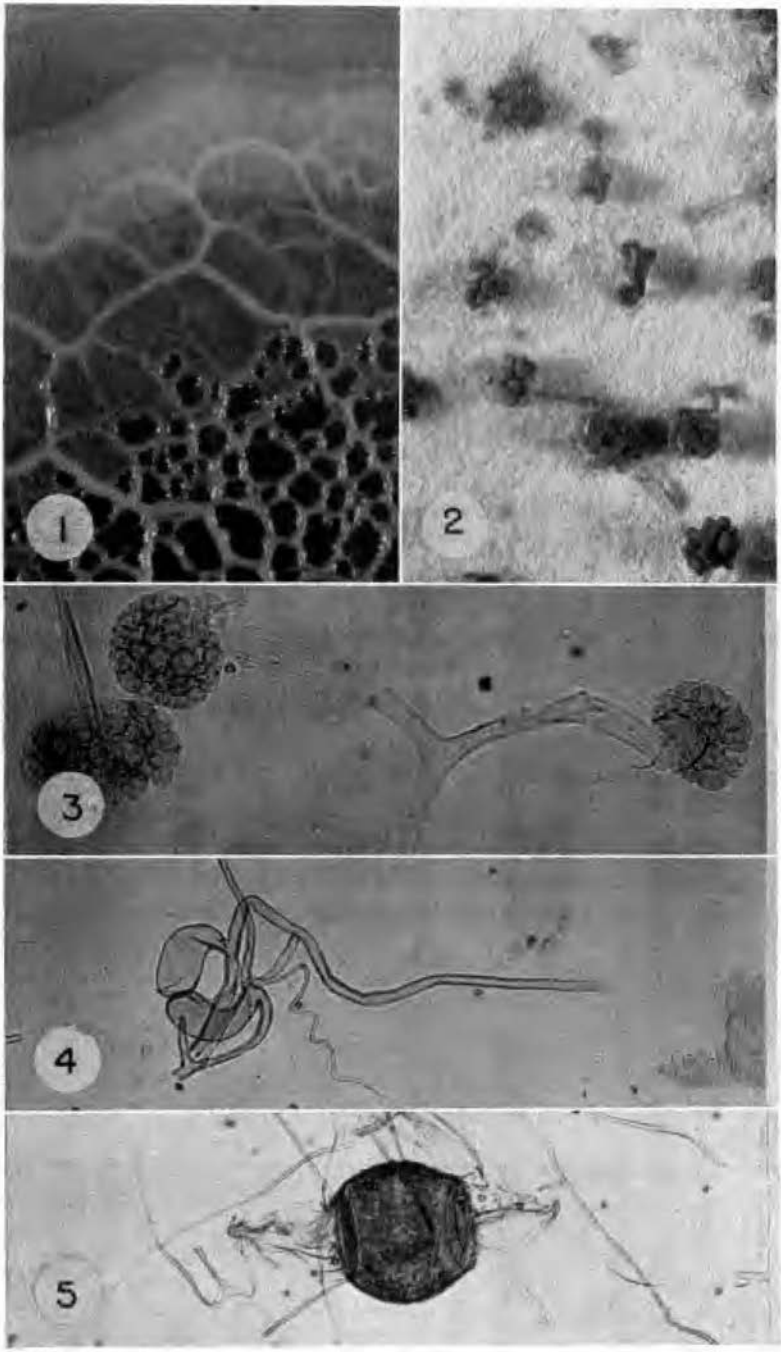

Figure 1. *Physarum polycephalum*, plasmodium.
Figure 2. *Physarum polycephalum*, sporangia.
Figure 3. *Sporodinia grandis*, sporangia.
Figure 4. *Sporodinia grandis*, suspensors
Figure 5. *Sporodinia grandis*, zygospore

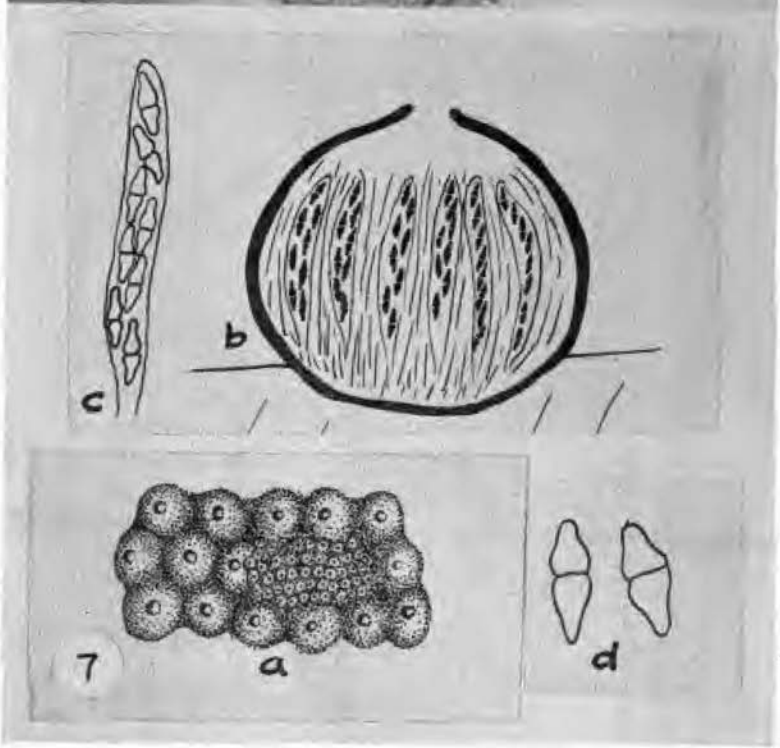

Figure 6. Gymnoascella aurata, sporangial head.
Figure 7. Amphisphaeria hypoxylon, a. habit, b. perithecium, c. ascus, d. ascospores.

Figure 8. *Cordyceps ophioglossoides* on tuber of Elaphomyces sp.
Figure 9. *Fusarium heterosporum* on sclerotium of Claviceps.

stipe from an expanded membranaceous base, long-subulate, yellow; spores minutely spinulose, violet, 9-11 microns. Plasmodium yellow.

On *Pleurotus ostreatus* Fr.

Phycomycetes—Mucorales

Sporodinia grandis Link (Figures 3, 4 and 5)

Turf at first white, later gray or brown; sporangiophores many centimeters long, prostrate, many times dichotomously divided at the tip, with several cross-walls, the ends spindle-shaped, swollen. At first colorless, later brown; sporangia, 80-150 microns, small in relation to the size of the sporangiophore and the spores, from gray to brown, when young often reddish; sporangial wall very delicate and easily lost, so that the large spores frequently appear as glass beads; columellae usually without special form being a mere extension of the sporangiophore, often covered by the spores; spores smooth, in old cultures brown, from spherical to oval and various in size (15-30 microns); zygophores erect, and many times dichotomously branched, with side branches longer than the sporangiophores, between the side branches many zygotes are initiated but according to the environment, sometimes many, sometimes very few, mature; zygotes readily visible to the unaided eye, up to 300 microns in diameter, barrel-shaped, dark brown with a slight roughening and almost without warts; suspensors smooth and brown; sometimes smaller zygospores are formed.

On Boletus sp. Ledges, Gilman, 1951.

On Pleurotus sp. Ames, Hill, 1907.

Syncephalis cornu van Tiegh. at le Mon. (Figure 6)

Sporophore about 180 microns high, strongly bent backwards and at the curved portion about 26 microns in diameter, tapering below and above to only 10 microns; Head usually 30 microns broad, smooth, colorless or pale yellow, with numerous spindle-shaped basal-cells, that carry the part-sporangia with 4-6 spores; spores elliptic or spindle-shaped 4-6 x 10-12 microns with a yellow, thick, smooth wall; zygotes spherical, 24-32 microns, yellow brown, surrounded by vesiculate branchlets of the sporophore; exospore with numerous extended warts.

On hyphae of *Mucor mucedo* L.

Ascomycetes—Sphaeriales

Amphisphaeria hypoxylon Ell. & Ev. (Figure 7)

Ellis, J. B. and B. M. Everhart, 1886. New species of fungi from various localities. Journ. Mycol. 2:41.

Perithecia densely gregarious, superficial, globose (¼ millim.), rough, black, subpruinose, membranaceo-carbonaceous, ostiole slightly prominent, asci clavate-cylindrical, 55-65 x 10-12 microns, with abundant paraphyses; ascospores 1-serrate, oblique, ovate elliptical, brown, uniseptate 8-9 x 5 microns.

On perithecia of *Hypoxylon serpens* (Pers.) Fr.

Iowa. ..... H. H. Macbride

Ascomycetes-Hypocreales

Hypocrea latizonata Pk.

Stroma consisting of a white to cream or pinkish subiculum which forms a band 2-6 mm. wide around the outside of the cups of *Cyathus;* perithecia immersed with brownish necks protruding; asci cylindric 60-75 x 4 microns; ascospores hyaline 3-3.5 mircons in diameter.

On Cyathus sp.

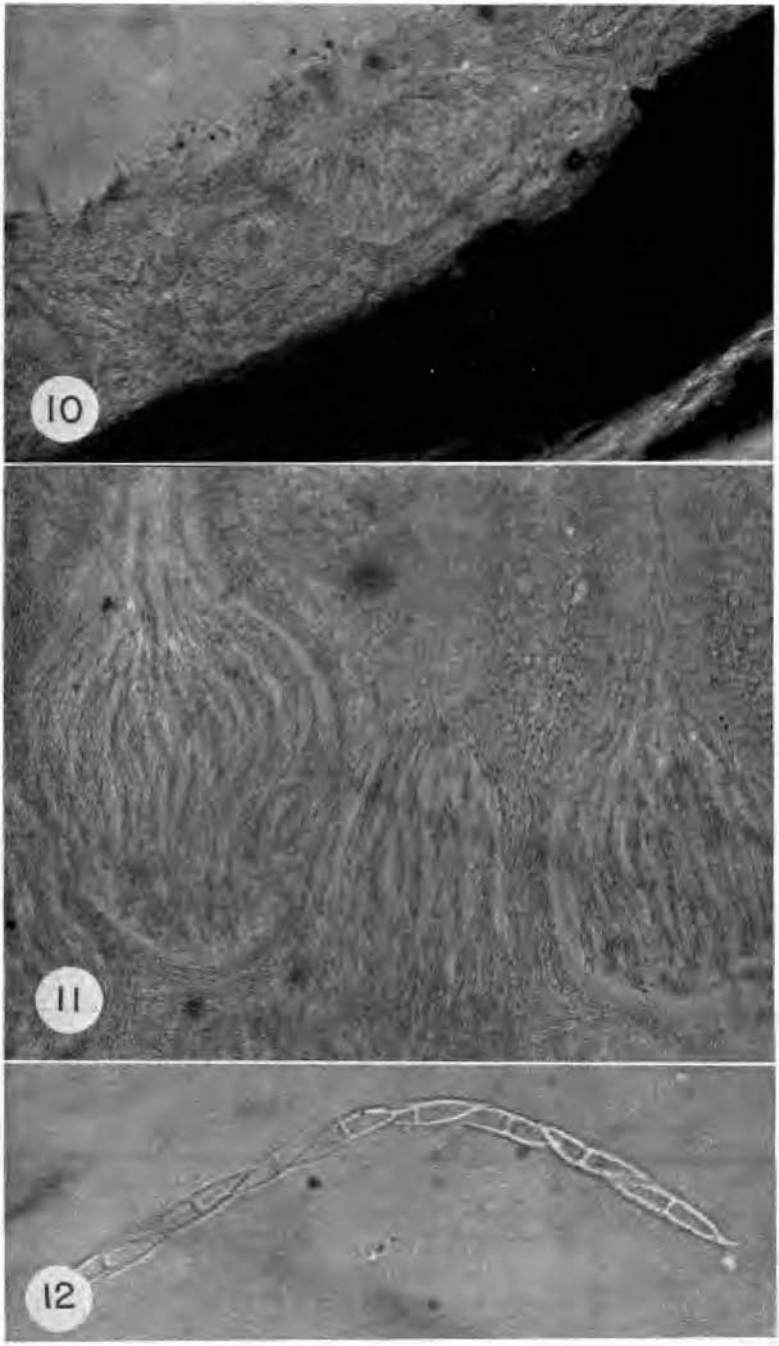

Figure 10. *Hypocrea citrina*, section of stroma showing perithecia.
Figure 11. *Hypomyces lactifluorum*, section of stroma showing perithecia.
Figure 12. *Hypomyces lactifluorum*, asccus and ascospores.

Fitzgerald, I. S. 1949. Hypocreales of Iowa. State Univ. Iowa Studies Natur. Hist. 19:14.

Hypocrea citrina (Pers.) Fr. (Figure 10)

Stroma effused, spreading irregularly often for several centimeters, occasionally interrupted, subfleshy, at first whitish, at length lemon-yellow with the margin cottony and lighter colored, within whitish, whole stroma becoming more or less faded with age, often subpallid; perithecia immersed, numerous, ovoid, yellowish; asci cylindrical, 62-75 microns long, becoming 16-spored by separation of each original spore into 2 subglobose cells with the lower slightly longer; individual spores 3-4 microns in diameter.

On *Exidia glandulosa* Fr. Iowa. Mc New, 1935.

Hypomyces polyporinus Pk.

Subiculum effused, covering the hymenium of the host, entirely obliterating the pores, whitish or pale yellowish; perithecia numerous, thickly scattered or closely crowded, partially immersed in the subiculum, amber; asci cylindrical, 8-spored; ascospores 1-seriate with ends overlapping, fusiform, mostly a little curved, smooth, 1-septate, 15-20 x 4-4.5 microns.

On *Polyporus versicolor* L.

Fitzgerald (*ibid.*)

Hypomyces hyalinus (Schw.) Tul.

Subiculum effused, almost entirely covering the host which is often undeveloped, white, pallid or with a tinge of pink or brownish; perithecia thickly scattered, immersed or partially immersed in the subiculum or with the necks slightly protruding, darker than the subiculum, brownish or reddish brown; asci cylindrical, 8-spored; spores 1-seriate with the ends overlapping, usually with a minute apiculus above, or occasionally obtuse, gradually tapering below, often slightly constricted and septate near the base, at first smooth, becoming strongly verrucose, septation less distinct in mature spores on account of the wart-like markings on the surface, constriction usually evident, 15-20 x 5-7 microns, hyaline or faintly yellowish.

On Agaricaceae.

Fitzgerald (*ibid.*)

Hypomyces lactifluorum (Schw.) Tul. (Figures 11 and 12)

Subiculum thin, effused, covering the hymenium and stem of host and entirely obliterating the gills, bright orange, color changing to bright purple as the host decays; perithecia thickly scattered, immersed or with the necks slightly protruding, a little darker than the subiculum; asci very long, cylindrical, 8-spored; ascospores 1-seriate with ends overlapping, fusiform with an apiculus at each end, for the most part slightly curved or unequal-sided, 1-septate, with the septum in the center, hyaline and slightly roughened at maturity, 35-40 x 7-8 microns, oozing from the perithecia and forming a white powder over the surface of the stroma.

On Lactarius spp. Ames: Gilman 1938.

Cordyceps ophioglossoides (Fr.) Link (Figure 8)

Stroma consisting of an olivaceous, sterile stem which sends numerous root-like branches into the substratum and a clavate laterally compressed head, red-brown at first, becoming dark-brown to black and roughened by the protruding ostioles; perithecia thickly scattered, immersed or somewhat superficial; asci long, cylindrical, 8-10 microns in diameter; ascospores filiform, nearly as long as the ascus, many-septate, breaking into part spores 3-5 x 1.5 microns.

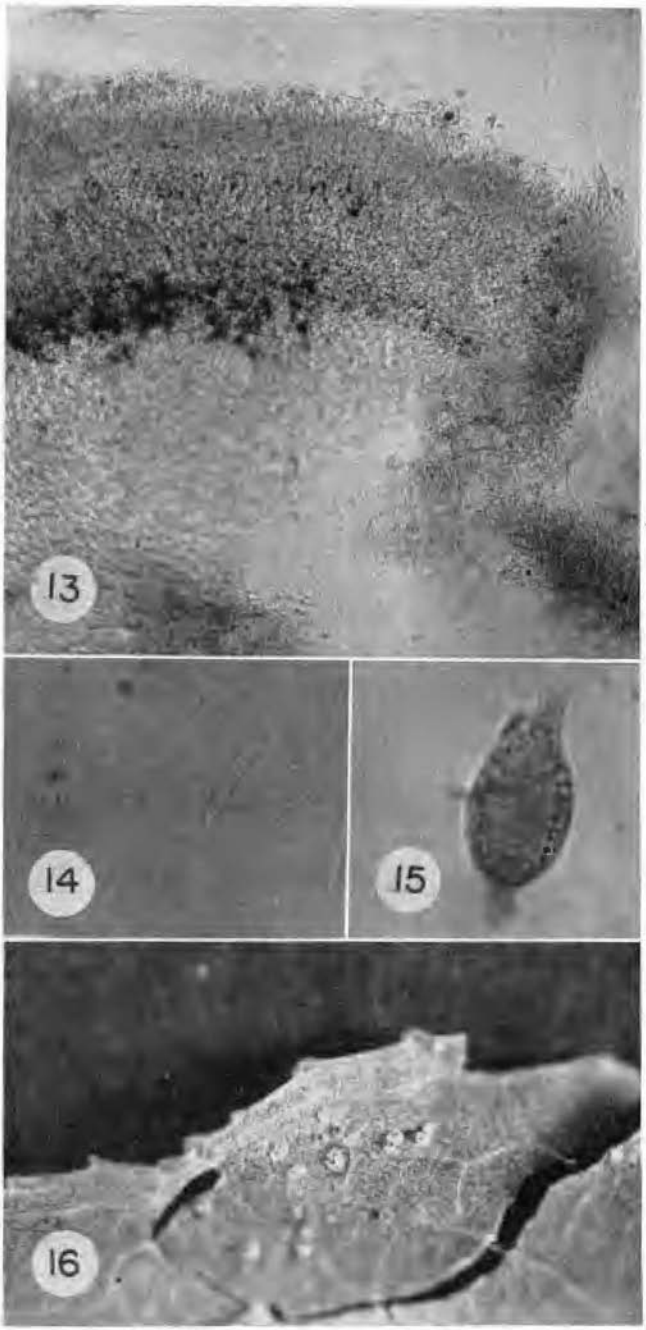

Figure 13. *Fusarium heterosporum*, section of sporodochium.
Figure 14. *Fusarium heterosporum*, macroconidia.
Figure 15. *Cicinnobolus cesati*, pycnidium.
Figure 16. *Darluca filum*, pycnidia on uredinia of Melampsora.

On Elaphomyces. Ames: Chao, 1940.

Martin, G. W. 1928. Notes on Iowa Fungi—1927. Iowa Acad. Proc. 35:131-133.

Basidiomycetes—Agaricales

Nyctalis asterophora Fr.

Pileus 1-2 cm. broad, at first subglobose then hemispherical, whitish, floccose, at length dingy brownish and pulverulent, flesh pallid, moist, rather thick; gills adnate, distant, rather narrow and thick, obtuse, sometimes forked, whitish or dingy, frequently not developed, stem 2-3 cm. long, 3-8 mm. thick, relatively stout, stuffed then hollow, pruinose or silky, whitish or brownish, often curved; spores often lacking by reason of the undeveloped hymenium, elliptical, smooth, 6 x 4 microns, white; chlamydospores on surface of pileus, etc., abundant, brownish, spiny, 12-18 microns, globose, odor and taste farinaceous.

On Russula sp.

Ames: Cation, 1928

Fungi Imperfecti—Sphaerioidaceae

Cicinnobolus cesati De Bary (Figure 16)

Pycnidia within the mycelium of members of the Erysiphaceae; hyphae erect or prostrate, short, septate, hyaline or light gray; pycnidia pointedly clavate or pear-shaped, small, 25-35 x 9-15 microns; pycnidiospores terete or ovoid, straight or slightly curved with rounded ends, hyaline 2.5-3 x 1 microns, 1-2 guttulate, extruded in long cirri.

On *Erysiphe cichoracearum* DC. on *Ambrosia trifida integrifolia* (Muhl.) T & G

On *Erysiphe cichoracearum* DC. on *Aster* sp.

On *Erysiphe cichoracearum* DC. on *Aster cordifolius* L.

On *Erysiphe cichoracearum* DC. on *Aster multiflorus* Ait. Decatur Co.: Anderson 1905

On *Erysiphe cichoracearum* DC. on *Aster salicifolius* Lam.

On *Erysiphe cichoracearum* DC. on *Cirsium altissimum* (L.) Spreng.

On *Erysiphe cichoracearum* DC. on *Helianthus tuberosus* L. Ames: Rolfs 1891

On *Erysiphe cichoracearum* DC. on *Hydrophyllum virginianum* L.

On *Erysiphe cichoracearum* DC. on *Lappula virginiana* (L.) Greene

On *Erysiphe chicoracearum* DC. on *Pilea pumila* (L.) Gray

On *Erysiphe cichoracearum* DC. on *Solldago canadensis* L.

On *Erysiphe cichoracearum* DC. on *Verbena stricta* Vent.

On *Erysiphe cichoracearum* DC. on *Verbena urticifolia* L.

On *Erysiphe cichoracearum* DC. on Zinnia sp. (cult.) Shenandoah: Archer 1926

On *Erysiphe polygoni* DC. on *Physalis heterophylla* Nees.

On *Erysiphe polygoni* DC. on *Lycium halimifolium* Mill. Ames: Gilman 1931

On Oidium sp. on *Lactuca canadensis* L.

On Oidium sp. on *Lactuca sagittifolius* Ell.

On Oidium sp. on *Monarda mollis* L.

On Oidium sp. on Rosa sp.

On Oidium sp. on *Rudbeckia laciniata* L.

On *Podosphaera oxyacanthae* (DC.) De By on *Prunus americana* Marsh.

On *Microsphaera alni* on Evonymus sp. Ames: Gilman 1951

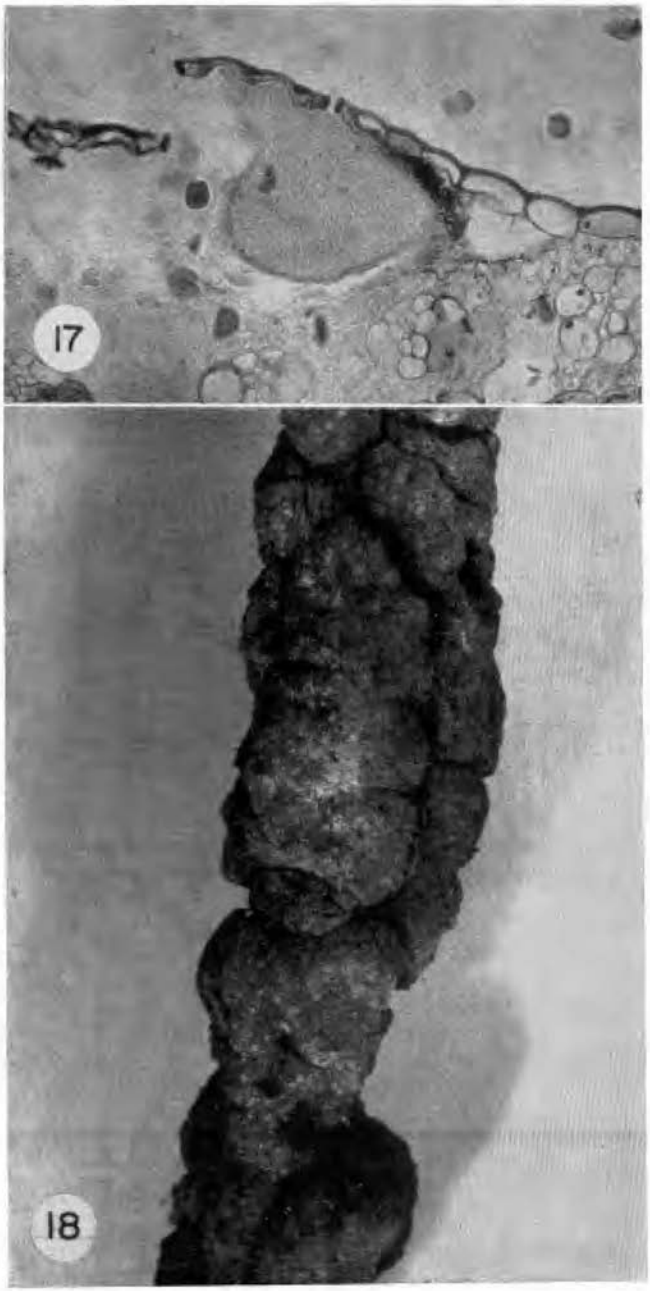

Figure 17. *Darluca filum*, section through pycnidium.
Figure 18. *Trichothecium roseum* on stroma of Dibotryon morbosum.

Darluca filum (Bev.) Cast. (Figures 16 and 17)

Pycnidia gregarious, inhabiting Uredinales, small, spherical to elongate, ostiolate at tip, black; conidia long-spindle-shaped, straight 15-18 x 3-4 microns, with one septum, not or slightly constricted, hyaline with short, evanescent, slimy appendages at both ends.

On *Melampsora bigelowii* Thuem. on *Salis interior* Raw.
On *Melampsora humboltiana* Speg. on *Salix nigra* Marsh. Ames: Carver 1892; Decatur Co: Anderson 1904
On *Melampsora medusae* Thuem. on *Populus deltoides* Marsh
On *Melampsora bigelowii* Thuem. on Salix sp. Ames: Tiffany 1951
On *Puccinia asparagi* DC on *Asparagus officinalis* L. Ames: Pammel 1902 New Hampton: Archer 1927
On *Puccinia graminis* Pers. on *Agropyron smithii* L.
On *Puccinia graminis* Pers. on *Dactylis glomerata* L. Ames: Taylor 1947
On *Puccinia graminis* Pers. on *Hordeum jubatum* L. Decatur Co: Anderson 1904
On *Puccinia graminis* Pers. on *Phleum pratense* L.
On *Puccinia graminis* Pers. on *Poa pratensis* L. Decatur Co: Anderson 1903
On *Puccinia sorghi* Schw. on *Zea mays* L. Ames: Picklum 1951; Ames: Vestal 1951
On *Uromyces silphii* (Burr.) Arth. on *Juncus interior* Weig.

Moniliaceae

Trichothecium roseum Link (Figure 18)

Turf forming a powdery case, widespread, mold-like or arachnoid, white, finally pink, formed of creeping, branched, septate, white hpyhae; conidiophores erect, little or non-septate, usually unbranched and scarcely swollen at the tip; conidia acrogenous, single, one after another, but remaining attached and forming a head by apical growth, pear-shaped, two-celled, the apical cell being larger, hyaline, then pink, 12-18 x 8-10 microns.

On stromata of *Dibotryon morbosa;* Ames: Gilman 1952.

Fungi Imperfecti—Tuberculariaceae

Fusarium heterosporum Nees. (Figures 9, 13 and 14)

Sporodochia gelatinous, evanescent, orange to brick-red; conidia typically spindle-sickle-shape, some thick-set and compact, others elongate, curved, tapering at both ends, pedicillate, apex of compact conidia tapering into a flask-neck with bent tip, apex of elongate conidia usually pointed and curved; the elongate forms approach the "Roseum Type"; stroma lax, floccose with richly developed aerial mycelium, white, citron to sulphur yellow and incarnate, the lower thicker plectenchymatic part amber-brown; conidia scattered, in false heads, in sporodochia or pionnotes, on more or less richly branched conidiophores, 3-, seldom 4-5 and -0-2, exceptionally 6-10 septate.

0-septate 11 x 3 microns
1-septate 14 x 3 microns
3-septate 27 x 3.2, mostly 18-37 x 2.4-4.3 (15-49 x 2-5.1) microns
5-septate 35 x 3.8, mostly 33-42 x 3.4-4.8 (27-51 x 1.8-5.5) microns
7-septate 42 x 4.3 microns
9-septate 47 x 5 microns
10-septate up to 62 x 5.5 microns

Chlamydospores intercalary usually in chains, seldom in conidia. On sclerotia of *Claviceps purpurea* Tul. Ames: Picklum 1951.

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