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STUDIES OF THE PHYCOMYCETES OF IOWA

J. M. RAEDER
INTRODUCTION

Numerous papers and valuable collections of the Fungus Flora of the state have been contributed by earlier botanists. Due to the effort of such men as Halsted, Bessey, Arthur, Hitchcock, Holway and Pammel, a collection of over 200,000 specimens of the fungi of the state is assembled in the herbarium of Iowa State College and other prominent herbaria in America. These collections are listed and described in various papers which are scattered in numerous publications over a period of a half century.

It is obvious, then, that in order that such material be of value to students of mycology, it would seem desirable to collect it into some tangible form, by reexamining the specimens in the herbarium of Iowa State College, revising the nomenclature to conform to the more recent researches, and collecting and summarizing the literature bearing on the fungus flora of the state.

In the present paper the author has confined his efforts to one group, the Phycomycetes.

PHYCOMYCETES

Olpidiaceae

Olpidium saprolegniae Braun.

**Achlya* sp. (1). In terminal cells.

Synchytriaceae

Synchytrium anamalum Schroet.

Adox moschatellina (1). Holway; Decorah.

Synchytrium anemones (D. C.) Wor.

Anemone cylindrica. Ames; 1909.

Synchytrium decipiens Farl.

**Amphicarpa* sp. (1).

Amphicarpa monoica. Welch; Moingona, September 1900. Thomas; Ames, July, 1878. Anderson; Decatur Co., June, 1897. Melhus; Decorah, 1918.

Amphicarpa pitcheri. Anderson, Decatur County, July, 1905.

Apios tuberosa. Pammel; Ames, September, 1909.

Synchytrium Holwayi Farl.

**Monarda* sp. (12).

Saprolegnia ferax Gruith, Nees, Kutz.

*"On dead fish, cray-fish, etc., floating in water" (1).

Achlya prolifera Nees.

*"On decaying flies in water". (1).

Leptomitaceae

Leptomitus lacteus Ag.

*"On decaying animal and vegetable matter in water". (4).

Pythiaceae

Pythium de Baryanum Hesse.

Attacks seedling plants and is called by gardeners "Damping Off." (4).

Albuginaceae

Cystopus candidus (Per) Lev.

"The white rust of crucifers". (1).

Brassica arvensis. Melhus; Clarion, June, 1907. Pammel; Ames, August, 1911.

Brassica nigra (3). Bessey; Ames, July, 1880.

Capsella bursa-pastoris (3) (6). Phode; Randolph. King; Ames, 1912. Anderson; Decatur County, May, 1904. Hitchcock; Ames. Pammel and Stewart. "No oöspores have been found, lives through the winter within the tissues of the seedling host plants." (2). "Confined to Cruciferae. lives over the winter within the tissue of seedling plants which spring up in autumn particularly in case of above host, which may account for the lack of formation of oöspores" (10).

**Lepidium apetalum* (6).

**Lepidium Virginicum* (6). Anderson; Decatur County, May, 1904. Pammel; Ames, September, 1890.

Radicula armoracia. Anderson; Decatur County, May, 1904. Pammel; Ames, September, 1890.

Radicula palustris. Bennett; Tripoli, July, 1912. Anderson; Decatur County, September, 1904. Fawcett; September, 1914. King; Ames, June, 1914.

**Radicula sessiliflora* (3).

Raphanus sativus (3). Pammel; Waukon, July, 1908. Pammel; Decatur, July, 1908. Stewart; Ames, September, 1893. McPherson; Council Bluffs, 1895. Pammel; Ames, September, 1900, September, 1901. Oöspores abundant in inflorescence (6).

Sisymbrium canescens.

Sisymbrium officinale (10). Anderson; Decatur County, 1898. Hitchcock; Ames.

Cystopus bliiti (Bib) Dby.

**Acnida cannabina* (10).

Acnida tamariscina (3).

**Amaranthus* sp. (1).

**Amaranthus graecizans* (6). (10).

Amaranthus blitoides (10). Pammel; Ames, 1910. King; Ames, 1911.

Amaranthus hybridus (3) (10).

Amaranthus retroflexus (3), (10). Hitchcock; Ames. Pammel; Ames, 1910. King; Ames, 1910. Raymond; Ames, 1891. Bessey; Ames, September, 1882. Bessey; Ames, 1878. King; Ames, 1912. Pammel; Ames, September, 1902. Pammel; Ames, July, 1892.

Montelia tamariscina. "On leaves of common beet, no oöspores observed." (5).

Cystopus portulacae (D. C.) Lev.

"On purslane" (1).

Portulaca oleraceae (3). Bessey; Ames, 1890. Raymond; Ames, 1891. Hitchcock; Ames. "Abundant on this host from middle of June to first of September. Oöspores abundant," (6). Halsted (10) reports it in 1886 to be more prevalent than ever on the above host in spite of drought.

He accounts for this in that the host itself is a low growing succulent plant containing considerable moisture.

Cystopus ipomoeae-panduranae. (Lev). Farl.

Ipomoea batatas (4). Pammel; 1892. Pammel & Clarke; Hamburg.

Cystopus tragopogonis (Per). Schr.

**Ambrosia artemisiifolia*. "Abundant in June and early July." Halsted (10) reports the presence of the disease in 1888 on the above host, saying that this species of the fungus is the least common of the whole genus and was comparatively rare during the past two years.

**Ambrosia psilostachya* (3).

**Artemisia biennis*. Reported by Halsted on this host in 1885 (13).

**Parthenium integrifolium* (3).

Peronosporaceae

Phytophthora infestans (Mont.) D. By.

Solanum tuberosum (3). Stewart; Greenfield, 1903. Griffith; West Point, 1903. Halsted (2), (10) reporting this disease in 1886 says "it is the cause of potato rot. It has not been as prevalent as last year. The season has been dry and unfavorable to the development of the rot. Potatoes stored in cellars and pits where tubers rotted last winter are beginning to decay." Again in 1888 he reports that "there were no signs of the disease last season." "Past two seasons dry. Two years ago many complaints from all parts of the state. More than half of the potatoes in some sections rotted either before they were dug or in storage."

Phytophthora omnivora D. By.

Panax quinquefolium. Melhus.

Sclerospora graminicola (Sacc.) Schroet.

Setaria Italica (3). Pammel; Ames, August, 1889.

Setaria viridis (2), (3). Ames, August, 1889. Pammel; Ames, 1890, August, 1891. Combs; Ames, August, 1894. Pammel; Turin, September, 1894. Pammel; Jefferson, July, 1895. Pammel; Steamboat Rock, September, 1901. Pammel; Ames, 1911. Melhus; September, 1916. "Abundant during the latter part of May till middle of June, destroying large numbers of young plants of the above host. In whole patches it prevented the maturing of seeds." (4). "Not as common as in 1892. That year it took away whole patches of that miserable weed. After the fall rains in August the fungus increased somewhat." (8). "Common throughout the state in 1899." (9). Halsted (10) reported the presence of the disease in 1888. Less common that particular season.

Plasmopara viticola (B. and C.) B. and DT.

Vitis sp. Bakke; Ames, September, 1907.

Vitis labrusca (3). Bradford; Ames, 1911. Pammel; Boone, September, 1912.

Vitis vulpina (3). Bakke; Ames, September, 1907. "The frosty grape mildew has not been found on the cultivated grapes in this vicinity this season. In the spring the violent form of this fungus was discovered upon the leaves and canes of the common wildgrape (*Vitis vulpina*). Canes were dwarfed and covered with a white coat of conidial spores. Could not be propagated on the cultivated forms." (2). Halsted (10) in 1888 reports that two years previous to this date the canes of *Vitis vulpina* were dwarfed and covered with a thick coat of white, down to the earth's surface. None was found in 1887. Bessey (1) reports this disease in 1884 as follows. "Common from mid summer to autumn on leaves and young twigs." Destructive in 1902-03. (3). So abundant in 1892-93 as to threaten the cultivated grape (8).

Vitis bicolor. Pammel; McGregor, Iowa, June, 1920.

Psedera quinquefolia. Pammel; Ames, Cedar Rapids.

Plasmopara Halstedii Farl. B. and T.

"On many composites" (1).

**Ambrosia artemisiifolia* (3) (6).

**Ambrosia trifida* (6).

**Bidens cernua* (6).

**Bidens chrysanthemoides* (6).

- **Bidens connata* (6). Pammel; Sheldahl, 1898.
 - **Bidens frondosa* (3) (6).
 - **Bidens laevis* (3).
 - **Erigeron* sp. According to Swingle (13) Holway reported this host at Decorah in July, 1884.
 - **Eupatorium purpureum* (3).
 - **Helianthus annuus* (6).
 - **Helianthus doronicoides* (3), (6).
 - **Helianthus grosse-serratus* (2), (3), (6).
 - **Helianthus Maximiliani* (3).
 - **Helianthus tuberosus* (6).
 - Rudbeckia laciniata* (6). Melhus; Ames; June, 1916.
 - **Rudbeckia triloba* (6).
 - **Silphium laciniatum* (6).
 - **Silphium perfoliatum* (6).
 - **Silphium* sp. Ames, July, 1909.
 - **Xanthium canadense* (6).
- On various members of the sunflower family. A new host reported in 1886. Destructive in 1902-03. "Not observed in 1894. Abundant on *Helianthus annuus*, *H. tuberosum* and other Compositae a few years ago." (8). In 1888 Halsted (10) reported that the hosts were numerous, the leading ones being species of *Helianthus*, *Silphium*, *Eupatorium*, *Bidens* and others of the Compositae. *Bidens connata* var. *comosa* was added to the list of hosts this year.
- Plasmopara pygmaea* (Ung.) Schroet.
 - "On wild anemones" (1).
 - Anemone canadensis*. Ames, 1909. Pammel; Ames, 1910. Ames, 1911.
 - **Anemone dichotoma* (4).
- Plasmopara Australis* (Speg.) Swingle.
- Echinocystis lobata* (4).
- Plasmopara geranii* (Pk.) Berl and De Toni.
- "On wild geranium" (1).
 - **Geranium Carolinianum*.
 - **Geranium maculatum* (4). Halsted (10) in 1888 reports it common on this host. Also states that Hitchcock found it this same year on *Geranium Carolinianum*, this making a new host for Iowa.
- Peronosplasmopara cubensis* (B. and C.) Cl.
- **Mormordica balsamina* (3). "Mildew of squash and cucumber, usually under glass" (4).
- Bremia lactucae* Regel.
- "On wild lettuce" (1).
 - "On lettuce" (4).
 - Lactuca ludoviciana* (4). Hitchcock; Ames.
 - Lactuca canadensis*. Pammel; Ames.
 - Lactuca* sp. Melhus. Bessey; Ames, September, 1882. "Abundant in 1893" (6).
 - **Lactuca leucophoea*. "Occasionally appeared on lower leaves of this host" (10).
 - Prenanthes albus*. Halsted (10) reports it on this host although he failed to find infection in 1888.
- Peronospora obducens* Schroet.
- "Wild touch-me-nots infested" (1).
 - **Impatiens pallida* (3).
 - **Impatiens biflora* (10).
- Peronospora parasitica* (Pers.) Tul.
- "On various crucifers" (1).
 - Brassica arvensis*. Hitchcock; Ames.
 - **Brassica campestris* (6).
 - **Brassica nigra* (3).

Capsella bursa-pastoris (4), (6), (7). Hitchcock; Ames.

**Draba Caroliniana* (6), (12).

Lepidium apetalum (6), (7), (12). Ames, 1911. Pammel; Ames, May, 1918.

Lepidium Virginicum (2), (10). Hitchcock; Ames.

Lepidium sp. Stewart and Pammel. Anderson; Decatur County, June, 1904.

**Radicula palustris* (2), (4), (10).

**Raphanus sativus* (6).

Sisymbrium canescens (4).

Sisymbrium officinale (6).

"*Brassica nigra* and *Radicula palustris* were added to the list of hosts for Iowa in 1888. Another oösporic host, *Lepidium Virginicum*, also was added the same season. Oöspores were first found that year, June 28 (2). "Abundant on leaves and stems of *Lepidium apetalum* and *L. Virginicum*, killing the hosts." (6). "Abundant in April and May on leaves of *Lepidium apetalum*, completely infesting the whole plant, giving them a yellow appearance and stunted growth. It also occurred on *Capsella bursa-pastoris* but less abundantly" (7). "Is one of our most common species upon various cruciferous hosts. In ordinary seasons *Lepidium Virginicum* is much infested and has its branches strangely distorted. This year the pepper-grass has been quite free from attacks excepting the seedlings which for a few weeks were badly infested in the spring. This species lives over the winter in these seedlings and when spring comes the mildewed plants communicate the trouble to other plants by means of the multitude of conidial spores. The vigor of its attack upon the young pepper-grass makes this mildew one of the useful weed-destroyers. It deals in the same way with the shepherd's purse. Of all its hosts it has been most abundant upon *Radicula palustris*. In some species examined the conidiospores were not more than one-fourth the normal size. Other parts of the same patch, however, showed all gradations and it may be observed that a leaf parasite may be dwarfed as well as its host." (10).

Peronospora effusa (Grev.) Rabh.

**Chenopodium* sp. (1).

Chenopodium album (10). Dwigans; Ames, October, 1899. Hitchcock; Ames. Halsted found it on this host at Spirit Lake in 1885. Mature oöspores were found on the leaves (5).

Plantago major. Pammel; Ames, June, 1909.

Peronospora sordida B. and Br.

Scrophularia nodosa (4). Bessey; Ames, October, 1882. "Has been a good illustration of the influence of moisture on mildew. The host *Scrophularia nodosa* is a common plant on the banks of streams, especially when the slope is steep and without sod. The peronospora was frequently looked for, but it appeared in its usual abundance in only one place and this was at the bend in a stream, where the host grew close to the water" (10).

Peronospora viciae (Berk.) D.By.

Vicia Americana. Hitchcock; Ames. "Abundant in the latter part of May and early June on this host."

Peronospora trifoliorum D.By.

**Astragalus canadensis* (4).

Medicago sativa. Schultz; Postville, June, 1914.

Vicia Americana (1), (4). "Abundant early in summer. Unable to propagate well in 3 per cent sugar solution". (2). "Has heretofore been a common species upon *Astragalus canadensis* and especially on *Vicia Americana*. Upon the latter it was so abundant two years ago as to almost destroy the host in whole patches. This year it was obtained only after a long search in the moistest places in which the vetch will grow." (10).

Peronospora potentillae D. By.

Agrimonia gryposepala. Melhus; Ames, June, 1916.

Potentilla monspeliensis (4), (8). Hitchcock; Ames. Anderson; Decatur County, May, 1904. "On *Potentilla* sp. in autumn" (1). "Not found in 1895; local in 1894" (6). "Found only in one place, in shade of leaves of *Potentilla monspeliensis*" (8).

Peronospora euphorbiae Fckl.

**Euphorbia maculata* (4).

**Euphorbia preslii*.

Euphorbia serpyllifolia (2). Hitchcock; Jewell Junction. "Is a species which quickly diminishes in time of drought. Not uncommon in *Euphorbia maculata* in wet seasons. Scarce past two years. A new host, *E. serpyllifolia* was added last year by Mr. Hitchcock. (10).

Peronospora Arthuri Farl.

Oenothera biennis. Anderson; Decatur County, July, 1905. Melhus; Iowa City, July, 1916.

Peronospora polygoni Thuem.

Polygonum aviculare (4), (10). King; Ames, June, 1912.

Polygonum scandens (4). "Is far from common on this host. Mr. Hitchcock in May, 1887, found a few specimens of it on *P. aviculare*, thus making a new host for Iowa." (10).

Peronospora lophanthi Farl.

Agastache scrophulariaefolia (2), (10). Hitchcock; Ames. "Found for first time in this host in 1888." (10).

Peronospora alta Fckl.

Plantago major (4), (10). Pammel; Ames, June, 1909. June, 1910, June, 1917. "In 1885 very common. Has been almost entirely absent from *Plantago major* for past year." (10).

Plantago Rugelii. Pammel; Ames, October, 1909. King; Ames, 1912.

Peronospora hydrophylli Waite.

Hydrophyllum Virginicum. Pammel; Ames, June, 1914. McGregor, May, 1918. "Reported by Hitchcock on this host at Iowa City in 1888" (13).

Peronospora sparsa Berk.

Rosa sp. Sioux City, October, 1914.

Peronospora alsinearum Caspary.

Cerastium nutans (4).

Peronospora urtica (Lib.) D. By.

**Laportea canadensis* (4).

Peronospora calotheca D. By.

**Galium aparine*. Holway found oöspores in the leaves and stems of this host at Decorah, June, 1884. (13).

**Galium boreale* (4). "Frequently met with on species of *Galium*. Not found this season until October 14, when it was collected in abundance upon seedling bed straws. This seems like a clear instance of fresh-growing plants being favorable for the development of *Peronosporas*." (10).

Peronospora leptosperma D. By.

"On wild sage" (1).

**Artemisia biennis* (4), (10).

**Artemisia ludoviciana*. Common in these last two hosts in 1895.

Peronospora ficariae Tul.

**Ranunculus repens* (4).

Peronospora violae D. By.

Viola sp. Knox; Pringhar, August, 1911.

Peronospora gonolobi Lagerh.

Gonolobus laevis. Anderson; Decatur County, July, 1902.

Mucoraceae*Pilobolus crystallinus* (Wigger) Tods.

"On horse dung very common in midsummer and autumn." (1).

Rhizopus nigricans Ehr.*Solanum tuberosum*. Ames. "The common black mold of bread." (1).

"The common decay of apples" (4). "On germinating corn" (9).

Mucor mucedo Linn.

"Common on decaying vegetable matter" (4).

Mucor racemosus Fres.

"On decaying plums and fermenting liquor."

Sporodinia grandis Link.

"On decaying toad-stools and pore fungi" (1).

Entomophthoraceae*Empusa muscae* Cohn.*Musca domestica*. Morrison; Ames, November, 1900. "On common flies in autumn." (4).*Entomophthora calopteni* Bessey.

"This fungus is parasitic upon grasshoppers in autumn." (1). "On Rocky Mountain locust." (4).

Entomophthora radicans. Bref.

"On cabbage butterfly." (4).

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Phytophthora infestans (Mont.)
 D.By.
Rhizopus nigricans Ehr.
Viola Americana
Peronospora vicia (Berk.) D.
 By.
Peronospora trifoliorum D.By.
Viola sp.
Peronospora violae D.By.
Vitis labrusca
Plasmopara viticola (B. and C.)
 B. and dT.
Vitis bicolor
Plasmopara viticola (B. and C.)
 B. and dT.
Vitis vulpina
Plasmopara viticola (B. and C.)
 B. and dT.
Xanthium canadense
Plasmopara Halstedii (Farl.) B.
 and dT.

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