

THE PERONOSPORALES OF INDIANA.

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The species of this order of fungi are all parasitic upon the higher plants and are of two types known respectively as the White Rusts and the Downy Mildews. The White Rusts (*Albugo*) are easily recognized by their milk-white, glistening sori which are produced on the leaves and stems, and even on the flowers and fruits of various weeds and a few useful plants. The Downy Mildews produce white mould-like patches upon the under surface of the leaves of various plants. To this group belongs the Downy Mildew of the grape (*Rhynotheca viticola* (B. & C.) G. W. Wilson) which is one of our most destructive fungous diseases.

Our knowledge of the Indiana species of the order is in a great degree due to the work of the late Dr. L. M. Underwood, whose "List of Cryptogams at Present Known to Inhabit the State of Indiana"* contains a list of fourteen species of three genera on twenty-seven hosts which were completely determined, besides six additional entries of hosts by generic name only. As a result of a study of the material in the herbaria of Dr. J. C. Arthur and of the author, a paper entitled "The Phycomycetes of Indiana" was prepared and presented to this Academy two years ago. This paper contained four additional species of this order, one of them being admitted on the authority of Dr. W. A. Kellerman. Since this time *Peronospora floerkeae* Kellerman has been recorded as a member of our flora.†

Within the last year the opportunity presented itself of restudying the material in the herbarium of Dr. Underwood and of verifying the determinations both of fungi and hosts. This resulted in the detection of a new host and in the reduction of three of the six partially determined ones to others already listed. Subsequent field work has supplemented the list both of fungi and hosts until now twenty-two species of six genera on forty-seven hosts are known from the state. The number of genera as compared with previous published records is doubled, the number of species has been increased a third, and the list of hosts almost doubled.

*Proc. Ind. Acad. Sci. 1893: 31-33. 1894.

†Wilson, *Torreyia*, 6:192. 1907.

In conclusion I wish to most heartily thank those botanists who have so kindly co-operated with me in this work.

FAMILY 1. ALBUGINACEAE.

1. ALBUGO BLITI (Biv.) Kuntze.

- On *Acnida tamariscina* (Nutt). Wood, Hamilton, 8:1907‡.
- On *Amaranthus graecizans* L., Tippecanoe, 10:1907.
- On *Amaranthus hybridus* L. (including *A. sp.* of Underwood), Johnson, Putnam, Tippecanoe 1893:31:—Madison, 8:1907.
- On *Amaranthus retroflexus* L., Johnson, 1893:31:—Hamilton, 7:1907; Madison, 8:1907; Tippecanoe, 10:1905.
- On *Amaranthus spinosus* L., Montgomery, 1893:31:—Hamilton, 7:1907.

2 ALBUGO CANDIDA (Pers.) Roussel.

- On *Brassica arvensis* (L.) B. S. P., Putnam, 8:1907.
- On *Brassica nigra* (L.) Koch. Johnson, Tippecanoe, 1893:32:—Hamilton, Putnam, 7:1907.
- On *Bursa bursa-pastoris* (L.) Britton. (*Capsella Bursa-pastoris* Moench). Montgomery, Putnam, 1893:32:—Hamilton, 7:1907; Tippecanoe, 5:1906.
- On *Cardamine bulbosa* (Torr.), Britton, Montgomery, 1893:32§.
- On *Dentaria* sp., Montgomery, 1893:32.
- On *Iodanthus pinnatifidus* (Michx.), Steud. (*Thelypodium pinnatifidum* Wats.), Tippecanoe, 6:1907. (Arthur) Herbarium Arthur.
- On *Lepidium virginicum* L., Putnam, 7:1907.
- On *Raphanus sativus* L., Johnson, Putnam, 1893:32; Hamilton, 7:1907.
- On *Roripa armoracca* (L.) A. S. Hitchcock (*Nasturtium armoracia* Fries). Putnam, 7:1897, 7:1907; Tippecanoe, 8:1894. (W. Stewart.) Herbarium Arthur.
- On *Roripa palustris* (L.) Bessey (*Nasturtium palustre* DC.), Hamilton, 8:1907.
- On *Sinapis alba* L., Johnson, 1893:32.

‡Date of collection. Other references are to year and page of these proceedings, *i. e.*, 1893:31.

§ The material in the Underwood herbarium is labeled as above, but listed as *C. bulbosa purpurea*.

- On *Sisymbrium officinalis* (L.) Scop., Brown, Putnam, 1893:32:—Hamilton, 7:1907.
- On *Sophia pinnata* (Walt.), Britton (*Sisymbrium canescens* Nutt.) Putnam, 1893:32:—Tippecanoe, 5:1905.
- On *Sophia millefolium* Rydberg, Putnam, 1893:32 (as *Sisymbrium canescens* p. p.).
3. ALBUGO IPOMOEAE-PANDURANAE (Schw.) Swing.
 On *Ipomoeae hederacea* Jacq. (*I. nil.*), Putnam, Tippecanoe, 1893:32:—Hamilton, 8:1907.
 On *Ipomoea pandurata* (L.) Meyer, Johnson, 1893:32:—Tippecanoe, 6:1898. (*Arthur.*) Herbarium Arthur.
4. ALBUGO PORTULACAE (DC.) Kuntze.
 On *Portulaca oleracea* L., Johnson, Montgomery, Putnam, Tippecanoe, 1893:32:—Hamilton, 8:1907; Madison, 8:1907.
5. ALBUGO TRAGOPOGONIS (DC.) S. F. Gray.
 On *Ambrosia artemisiifolia* L., Putnam, 7:1907.

FAMILY 2. PERONOSPORACEAE.

6. BASIDIOPHORA ENTOSPROA Roze and Cornu.
 On *Aster novae-anglae* L., Tippecanoe, 5:1907.
7. SCLEROSPORA GRAMINICOLA (Sacc.) Schröter.
 On *Setaria* sp., Steuben. (*Kellerman.*) Herbarium Ohio State University.
8. RHYSOTHECA AUSTRALIS (Speg.) G. W. Wilson.
 On *Sicyos angulatus* L., Johnson, 1893:32:—Tippecanoe, 9:1905.
9. RHYSOTHECA GERANII (Peck) G. W. Wilson.
 On *Geranium carolinianum* L., Putnam, Vigo, 1893:32.
10. RHYSOTHECA HALSTEDII (Farlow) G. W. Wilson.
 On *Bidens connata* Mühl., Johnson, 1893:32.
 On *Bidens frondosa* L., Johnson, 1893:32:—Hamilton, Madison, 8:1907; Putnam, 7:1907.
 On *Erigeron annuus* L., Hamilton, 8:1907.
 On *Helianthus annuus* L., Montgomery, 1893:32.
11. RHYSOTHECA OBDOCENS (Schröter) G. W. Wilson.
 On *Impatiens aurea* Mühl. (*I. pallida* Nutt.), Tippecanoe, 1893:32.
 On *Impatiens biflora* Walt. (*I. fulva* Nutt., *I. sp.* of Underwood), Putnam, 1893:32:—Marion, 5:1906.

12. *RHYSOTHECA VITICOLA* (B. & C.) G. W. Wilson.
 On *Vitis aestivalis* Michx., Tippecanoe, 6:1894 (*Arthur*), Herbarium Arthur; Lake, 7:1894 (*Arthur*). Herbarium Arthur.
 On *Vitis cordifolia* Michx., Johnson, 1893:32:—Hamilton, Putnam, 7:1907; Tippecanoe, 9:1905.
 On *Vitis labrusca* L. (including *Vitis sp. cult.* of Underwood), Crawford, Johnson. Montgomery, Putnam, 1893:32:—Hamilton, 7:1907; Madison, 8:1907.
13. *BREMIA LACTUCAE* Regel.
 On *Lactuca canadensis* L., Hamilton, Putnam, 7:1907.
 On *Lactuca sativa* L., In Greenhouses, Tippecanoe, 3:1903. (*Arthur*). Herbarium Arthur.
14. *PERONOSPORA ALTA* Fuckel.
 On *Plantago major* L., Johnson, Putnam, 1893:32:—Hamilton, 8:1907.
15. *PERONOSPORA CORYDALIS* de Bary.
 On *Bicucula canadensis* (Goldie) Millsp. (*Dicentra canadensis* DC.), Putnam, 1893:32:—Tippecanoe, 5:1906.
 On *Bicucula cucularia* (L.) Millsp. (*Dicentra cuclaria* DC.), Montgomery, 1893:32.
16. *PERONOSPORA EFFUSA* (Grev.) Rabenh.
 On *Chenopodium album* L. (including *Chenopodium sp.* of Underwood), Johnson, Putnam, 1893:32:—Hamilton, 8:1902; Tippecanoe, 6:1894 (*Olive*).
17. *PERONOSPORA EUPHORBIAE* Fuckel.
 On *Euphorbia humistrata* Engelm., Tippecanoe, 6:1902 (*Arthur*). Herbarium Arthur.
 On *Euphorbia maculata* L., Hamilton, 8:1907; Putnam, 7:1907.
18. *PERONOSPORA FICARIAE* Tul.
 On *Ranunculus recurvatus* Poir (including *Ranunculus sp.* of Underwood), Montgomery, Putnam, 1893:32.
19. *PERONOSPORA FLOERKEAE* Kellerman.
 On *Floerkea proserpinacoides* Willd., Hamilton, 5:1906.
20. *PERONOSPORA PARASITICA* (Pers.) Fries.
 On *Brassica nigra* (L.) Koch., Putnam, 8:1907.
 On *Raphanus sativus* L., Hamilton, 7:1907.
 On *Sophia pinnata* (Walt.) Britton (*Sisymbrium canescens* Nutt.) Tippecanoe, 5:1905.

21. PERONOSPORA POLYGONI Thümen. (*P. runcidis* Ant. p. p.)
On *Polygonum scandens* L. Johnson, 1893:33:—Hamilton, 7:1907;
Putnam, 8:1907.
22. PERONOSPORA POTENTILLAE de Bary.
On *Potentilla mousepalcensis* L. (*P. norvegica* L.), Hamilton,
7:1907; Putnam, 8:1907.
- Upper Iowa University,
Fayette, Iowa.