

THE USTILAGINALES OF INDIANA, II.<sup>1</sup>

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This paper is the first supplement to one bearing the same title published in the Proceedings of the Indiana Academy of Science for 1917, pp. 119-132. In the previous paper 47 species were recorded for the state on as many hosts. Each species was given a number. In the present paper additional hosts, together with some corrections or supplementary information, are given for species already listed. The same numbers are used. Ten species are also recorded for the state for the first time bringing the total to 57. Unless otherwise noted the collections were made by the writer. An index to species for the two papers is appended together with a complete host index.

Many of the species recorded should occur on other hosts and a considerable number of other species should be found within the state. The writer would appreciate it if interested persons would furnish duplicates of their collections for record in later supplements.

## NOTES ON SPECIES PREVIOUSLY RECORDED.

1. *CINTRACTIA CARICIS* (Pers.) Magn.

ON CYPERACEAE:

*Carex blanda* Dewey, wooded bank of Pigeon Creek near Maxwell Bridge, Warrick Co., June 10, 1918, C. C. Deam 25286.

6. *SCHIZONELLA MELANOGRAMMA* (DC.) Schröt.

ON CYPERACEAE:

*Carex convoluta* Mack., Happy Hollow, north of West Lafayette, Tippecanoe Co., May 15, 1910, Miss Uhde.

7. *SOROSPORIUM CONFUSUM* Jackson.

This was reported in the 1917 Proceedings as on *Aristida* sp. The host has been determined by Mrs. Agnes Chase as *Aristida gracilis* Ell.

8. *SOROSPORIUM SYNTHESISMAE* (Peck) Farl.

This species was reported by Clinton (N. Am. Flora 7:39, 1906) from Indiana on *Panicum capillare* L. At the time of the previous report no specimens had been seen. The writer has, however, made a collection on this host, one-half mile southeast of Shelby in Lake Co., Oct. 14, 1920.

In the previous report collections were also recorded on *Cenchrus carolinianus* Walt. Clinton (l.c.) uses the name *C. tribuloides* to include Indiana material. All collections from Indiana on *Cenchrus*, however, would more properly be referred to *C. pauciflorus* Benth. (c. f. Hitchcock, Bul. U. S. Dept. Agr. 772:249, 1920).

21. *USTILAGO SPERMOPHORA* B. & C.

This was reported in the 1917 Proceedings as on *Eragrostis major* Host.

<sup>1</sup>Contribution from the Botanical Department of the Purdue University Agricultural Experiment Station.

The host has recently been determined by Mrs. Agnes Chase as *E. cilianensis* (All.) Link.

22. *USTILAGO SPIRAEROGENA* Burrill.

ON POACEAE:

*Echinochloa WALTERI* (Pursh) Nash, one mile northwest of Thayer, Newton Co., Oct. 14, 1920.

This was collected in small amount on the same plants that bore *Tolyposporum bullatum* Schröt. (c. f. 49).

24. *USTILAGO STRIAEFORMIS* (West.) Niessl.

ON POACEAE:

*Elymus virginicus* L., one-half mile south of Wilders Station, Laporte Co., Oct. 5, 1920.

25. *USTILAGO UTRICULOSA* (Nees) Tul.

ON POLYGONACEAE:

*Persicaria hydro Piperoides* (Michx.) Small, one-half mile south of Bolivar, Wabash Co., Sept. 15, 1919, C. C. Deam 30028; one mile northwest of Thayer, Newton Co., Oct. 19, 1920.

*Persicaria lapathifolia* (L.) S. F. Gray, Bluffton, Wells Co., Aug., 1905, C. C. Deam (spec. in herb. U. S. Dept. Agr.).

*Persicaria Persicaria* (L.) Small, four miles northwest of Patoka, Gibson Co., Oct. 6, 1917, C. C. Deam 24185.

43. *UROCYSTIS AGROPYRI* (Preuss.) Schröt.

ON POACEAE:

*Elymus canadensis* L., south of West Lafayette, Tippecanoe Co., Aug. 9, 1918.

45. *UROCYSTIS CEPULAE* Frost.

ON ALLIACEAE:

*Allium cepa* L.

In the previous report it was stated that no specimens of this smut had been seen. It has since been found to be common and to cause a serious disease of onion sets in certain sections of Lake county. An ample collection was made near Hammond, July 27, 1920. It has also been observed commonly on onion sets on the market in Lafayette. The source of these, however, is unknown. A fine specimen collected at Crawfordsville, Montgomery Co., Aug. 10, 1907, by M. B. Thomas, is in the herbarium of the Missouri Botanical Garden, No. 13283.

46. *UROCYSTIS ORNITHOGALI* Koern.; Fisch. de Waldh. Aperçu Syst. Ust. 41. 1877.

Specimens of *Urocystis* on *Quamasia hyacinthina* (Raf.) Britton were referred in the 1917 list under this number to *U. Colchici* (Schlecht.) Rab. A more careful study has led to the conclusion that they are more properly referred to *U. Ornithogali*. This species has been commonly considered identical with *U. Colchici* but is treated separately by Schellenberg in his excellent monograph of the smuts of Switzerland (Beiträge Krypt. Schweiz 3<sup>2</sup>:139, 1911). After studying all the European material available the writer is inclined to agree with this view.

According to this treatment, the smut on Liliaceous hosts belonging to the tribe Scilleae, including besides the American *Quamasia*, species of *Muscaria*, *Ornithogalum* and *Scilla* in Europe, would be assigned to *U. Ornithogali*, while *U. Colchici* would include the European form on *Colchicum autumnale*. The writer is not able to express an opinion as to whether the form on Convallariaceae in Europe and America is properly assigned to either of the above species, as sufficient material has not been available for study. Clinton (Bost. Soc. Nat. Hist. Proc. 31:452. 1904; N. Am. Flora 7:57. 1906) has assigned specimens on *Salamonia* and *Vagnera*, collected in Iowa and Montana, somewhat doubtfully to *U. Colchici*.

*U. Ornithogali* differs from *U. Colchici* chiefly in the widely different character of the sorus, the size of the spores, and the character and wall color of the surrounding layer of sterile cells. In the former the sori are elliptical, commonly half as broad as long, the spore balls consist usually of one, rarely two spores, which are 18-22  $\mu$  in diameter, and the sterile cells form a firmly united unbroken spore covering, the walls of which are cinnamon-brown. In the latter the sori are linear, often ten or more times as long as broad; the spore balls consist of one to two, rarely three spores, which are 14-20 $\mu$  in diameter; the sterile cells with light cinnamon-brown walls form a loose often interrupted layer over the spores.

#### SPECIES NEW TO INDIANA.

##### USTILAGINACEAE.

48. *THECAPHORA IRESINE* (Elliott) Jackson, Mycologia 12:154. 1920.

*Tolyposporium Iresine* J. A. Elliott, Mycologia 11:88. 1919.

Sori localized in the inflorescence, involving the ovaries and perianth of one or a group of flowers, often involving the rachis and rarely occurring on the stem or leaves, forming irregular compound galls 0.3-3.5 cm. long, enclosed by a firm, grayish-green membrane, which ruptures irregularly exposing the reddish-brown spore mass; spore balls solid, subsphaeroid, 40-70 $\mu$  or ellipsoid, 50-70 by 60-90 $\mu$ , light chestnut-brown, composed of many, 15-70, spores; spores variable in shape, irregularly polyhedral, prismatic or oblong, 12-20 by 25-32 $\mu$ ; inner wall thin, 1-1.5 $\mu$ , colorless or pale cinnamon-brown, smooth, exposed wall 2-4 $\mu$  thick, darker in color with prominent verrucose-rugose markings.

##### ON AMARANTHACEAE:

*Iresine paniculata* (L.) Kuntze. In a dried up wooded slough, about one-half mile south of Half Moon pond, ten miles southwest of Mount Vernon, Posey Co., Sept. 21, 1918, C. C. Deam 26651 (type); Sept. 26, 1920, C. C. Deam 33041.

This remarkable smut was sent to the writer among other parasitic fungi in the fall of 1918 by Mr. Deam. It was at once recognized as a species of *Thecaphora* and an examination of the literature revealed that only one species of this genus was known in North America on Amaranthaceae, namely, *Thecaphora Thorneri* Griffiths (Bull. Torrey Club 31:88. 1904). The specimen on *Iresine* while agreeing in general with the description of that species seemed to differ in important characters. A definite decision with reference to the relation of the two forms was therefore reserved until

the type of *T. Thornberi* could be examined. Through the courtesy of Dr. Griffiths, two collections of his species, one of which was the type, were furnished for study.

The Iresine smut was found to be very closely related to *T. Thornberi* but to differ in several important respects. The sori, while involving the ovaries, are not usually confined to them, as described for *T. Thornberi*, but are indefinite, involving the ovaries and apparently the perianth of single flowers or groups of flowers and also occasionally the rachis. The spore balls are much smaller in the species under discussion, measuring 40-75 $\mu$  in globose balls, reaching 90 $\mu$  in occasional ellipsoid balls, while in *T. Thornberi* the globose balls are 80-115 $\mu$  in diameter, reaching 145 $\mu$  in the ellipsoid ones. The spores are also somewhat larger and the markings more prominent than in *T. Thornberi*.

In the meantime the species was described as *Tolyposporium Iresine* by Dr. J. A. Elliott (l.c.), of Fayetteville, Arkansas, from the same material, obtaining it through Prof. B. W. Wells to whom Mr. Deam had sent specimens under the impression that the galls might be caused by insects. The species obviously belongs in Thecaphora rather than in Tolyposporium and the transfer was made by the writer in a recent paper (l.c.).

The second collection made by Mr. Deam in 1920 at the type locality is ample and shows a great variation in the point at which the host is attacked and the degree of development (c. f. Fig. 1).

49. *TOLYPOSPORIUM BULLATUM* Schröt. Krypt. Fl. Schles. 3:276. 1887.

ON POACEAE:

*Echinochloa Crus-galli* (L.) Beauv., one mile northwest of Thayer, near Kankakee river, Newton Co., Oct. 14, 1920; one-half mile south of Wilders Station, Laporte Co., Oct. 5, 1920.

*Echinochloa Walteri* (Pursh) Nash, one mile northwest of Thayer, near Kankakee river, Newton Co., Oct. 14, 1920.

The sori of this species occur in occasional ovaries of the grass and are ovate, 3-5 mm. in length, and covered by a thin, smooth, greenish membrane. The sori rupture irregularly disclosing the granular mass of black spore balls. It is not as common as *Ustilago sphaerogena* Burrill (c. f. No. 22 of 1917 list), but may occur with it in the same inflorescence. The two species are easily distinguished in the field. In *U. sphaerogena* the sori are usually larger, 3-9 mm. in length and are covered by a tough, hispid, grayish-green membrane, which on rupturing discloses an agglutinated or dusty olive-brown spore mass.

50. *USTILAGO HIERONYMI* Schröt. in P. Henn. Hedwigia 35:213. 1896.

ON POACEAE:

*Bouteloua curtipendula* (Michx.) Torr., Bayles Mill, Wea Creek, Tippecanoe Co., Sept. 15, 1920, with E. B. Mains.

This is a common smut west of the Mississippi river, but has not before been collected, to our knowledge, so far east.

51. *USTILAGO RESIDUA* Clinton, Jour. Myc. 8:133. 1902.

ON POACEAE:

*Danthonia spicata* (L.) Beauv. In a woods two miles south of Corydon Junction, Harrison Co., May 26, 1919, C. C. Deam 27681.

This species usually affects the whole inflorescence. It has a wide distribution but has not often been reported. It is recorded on this host otherwise only from New Hampshire. It is especially common on the Pacific coast.

## TILETIACEAE.

52. DOASSANSIA RANUCULINA Davis, Bot. Gaz. 19:416. 1894.

ON RANUNCULACEAE:

*Ranunculus delphinifolius* Torr., one-half mile southeast of Shelby, Lake Co., Oct. 14, 1920.

This is a rare form known otherwise only from Wisconsin. The spores are largely germinated.

53. DOASSANSIA SAGITTARIAE (Westend) Fisch. Ber. Deuts. Bot. Ges. 2:405. 1884. *Uredo Sagittariae* Westend. Herb. Crypt. Belge 1177. 1857.

ON ALISMACEAE:

*Sagittaria latifolia* Willd., City water works lake, Bloomington, Monroe Co., Aug. 26, 1908. J. M. VanHook, 2383.

*Sagittaria heterophylla* Pursh (?), pond four miles east of Bloomington, Monroe Co., July 25, 1919. J. M. Van Hook, 3796.

This species was recorded by Prof. VanHook in the Proceedings for 1910, p. 206. It was overlooked in the previous list. I am indebted to Prof. Van Hook for the opportunity to examine specimens.

54. ENTYLOMA LINEATUM (Cooke) Davis, Trans. Wis. Acad. Sci. 9:162. 1893. *Ustilago lineata* Cooke; DeToni, in Sacc. Syll. Fung. 7:456. 1888.

ON POACEAE:

*Zizania aquatica* L., one mile southeast of Shelby, Lake Co., Oct. 14, 1920.

55. ENTYLOMA MENISPERMI Farl. & Trel. Bot. Gaz. 8:275. 1883.

ON MENISPERMACEAE:

*Menispermum canadense* L., two miles north of West Lafayette Tippecanoe Co., Aug. 9, 1918; one-half mile south of Wilders Station, Laporte Co., Oct. 5, 1920.

56. ENTYLOMA NYMPHAEAE (D. D. Cunn.) Setch. Bot. Gaz. 19:189. 1894.

*Rhamphospora nymphaeae* D. D. Cunn. Sci. Mem. Med. Off. Army India 3:32. 1888.

ON NYMPHAEACEAE:

*Castalia* sp., one mile northwest of Thayer, Newton Co., Oct. 14, 1920.

57. ENTYLOMA RANUNCULI (Bon.) Schröt. Beitr. Biol. Pfl. 2:370. 1877.

*Fusidium Ranunculi* Bon. Handb. Myc. 43. 1851.

ON RANUNCULACEAE:

*Ranunculus delphinifolius* Torr., one-half mile southeast of Shelby, Lake Co., Oct. 14, 1920.

This collection was made in a dried up slough on the terrestrial form of the host. It consists for the most part of the conidial form which occurs equally as abundant on the upper surface of the leaf as on the lower, a condition not found on other host species. This is doubtless correlated with the fact that the stomata are abundant on the upper surface of the leaves in the terrestrial form. The smut has not been reported on this host before.

## INDEX TO SPECIES.

Synonyms are omitted. The numbers are those preceding the species name. Black-faced type indicates reference to both lists. Ordinary type to and including 47 refers to previous list, after 47 to the present list.

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Fig. 1. *Thecaphora Iresine*. Showing variation in method of attacking host.