

# Proceedings of the Iowa Academy of Science

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Volume 9 | Annual Issue

Article 29

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1901

## Ustilaginae of Iowa

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### Recommended Citation

Hume, H. H. (1901) "Ustilaginae of Iowa," *Proceedings of the Iowa Academy of Science*, 9(1), 226-240.  
Available at: <https://scholarworks.uni.edu/pias/vol9/iss1/29>

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## USTILAGINÆ OF IOWA.

BY H. H. HUME.

*Ustilago*, Persoon Syn. Fung. 224. 1801.

Mycelium located in the tissues of the host, annual or perennial, spores produced from the mycelium at definite points on lines, stems or flowers, gelatinous at first, later pulverulent, in one species a hard, dark mass, smooth, echinulate or reticulated.

Spore masses in the inflorescence hard, irregular, variable in size, spores minutely spiny. *U. Austro-americana*.

Spore masses in the ovaries of *Avena sativa*, glumes destroyed, spores minutely spiny. *U. avenæ*.

Spore masses blackish, in the ovaries of *Bromus brevistaratus*, spores tuberculate with blunt projections.

*U. bromivora*.

Spore masses in the ovaries of *Setaria Italica*, glumes not affected; spores subglobose or irregular, contents granulated.

*U. Crameri*.

Spore masses in the inflorescence of *Hordeum vulgare*, glumes not totally destroyed, spores smooth. *U. Hordei*.

Spore masses in unexpanded inflorescence of *Stipa spartea*, spores small, 3-5u, smooth. *U. hypodytes*.

Spore masses in the ovaries of *Avena sativa*, glumes not destroyed, spores smooth. *U. levis*.

Spore masses between the nerves on the leaves, amphigenous spores smooth. *U. longissima*.

Spore masses in the inflorescence of *Hordeum vulgare*, glumes early destroyed, spores echinulate.

*U. nuda*.

Spore masses light brown, spores golden brown, echinulate, when mature escaping through the upturned walls of the capsule. *U. oxalidis*.

Spore masses in the ovaries of *Setaria glauca*; spores brown tinged with yellow; spores minutely and sparsely echinulate. U. panici-glauci.

Mycelium perennial; spore masses in the ovaries, brownish black spores smooth. U. perennans.

Spore masses in the ovaries, distended, swollen, spores minutely spiny. U. pustulata.

Spore masses in the unopened inflorescence of *Panicum sanguinale* and *P. glaucum*; spores 8-15 u; minutely echinulate. U. Rabenhorstiana.

Spore masses in the ovaries of *Eragrostis major*, spores densely echinulate. U. spermophora.

Spore masses in the unopened inflorescence of *Panicum capillare*, *P. proliferum* and *C. tribuloides*; blackish, spores minutely echinulate. U. syntherismæ.

Spore masses in the ovaries, of *Triticum vulgare*; spores echinulate. U. tritici.

Spore masses in the ovaries brownish violet, spores violet, widely and deeply reticulated. U. utriculosa.

Spore masses on leaves, flowers, stems, or roots; spores very variable in shape, echinulate. U. zeæ.

Spore masses completely destroying the panicle; spores 12-18u, densely and coarsely tuberculate. U. Arthurii.

*Ustilago Austro-americana*, Speg.

*Ustilago Austro-americana* Speg. Fungi argentini 4: 19.

Exsiccati.—Ell. and Ev. N. A. F., 2262.

Sey. and Ear. Ec. F. 372.

Spore masses in the inflorescence, brownish black, hard, irregular in size and shape; spores globose or slightly elliptical; light brown; 10-15x8-9u; epispore distinct, bearing minute spines.

Host.—*Polygonum incarnatum* Ell.

Specimens from Iowa.—Ex. Herb. J. C. Arthur (1737), Ames; C. E. Bessey; Herb. Hume (14) Ames, H. Harold Hume.

The spores are bound together in hard, compact, irregular,

dark colored masses, usually surrounded by a reddish brown membranous covering.

*Ustilago Avenæ* (Pers.) Jens.

*Uredo segetum*. g. *Uredo*, Pers. Syn. Meth. Fung. 224. 1801.

*Uredo carbo*, g. *avenæ*, Wallroth. Fl. Crypt. Germ. 217. 1833.

*Ustilago carbo*. a vulgaris C. *avenacea*. Tul. Mem. Sur. Ust.

Ust. comp. aux. Ured. 80. 1847.

*Ustilago segetum* var. *avenæ*, Jens. Om. Korn. Brand. 61. 1888.

*Ustilago avenæ* Jens. L. Char. des Cer. 4. 1889.

Exsiccati Ell. & Ev. F. Col. 539.

Sey. & Ear. Ec. F. 81.

Spore masses filling and destroying the ovaries, brownish black; spores, subglobose, oval or elliptical smoky brown; 5-6 x 6-10 u; epispore minutely echinulate.

Host.—*Avena sativa*.

Specimen's from Iowa.—Herb. Iowa State College.

(1), (5), (6), (7), Ames, L. H. Pammel.

(2), (3), (4), F. C. Stewart; Crypt. Dist. Iowa State College A. M. A.

(11) Ames, G. W. Carver; Ex. Herb. J. C. Arthur (1696) Emmet Co.

R. I. Cratty, Ex. Herb. Hume (1) Ames, A. F. Sample.

*Ustilago avenæ* was for many years included with *tritici* and *hordei* under the name *segetum* until it was determined by Jensen that it would not develop either on barley or wheat. Upon the strength of this knowledge he separated it as *U. avenæ*. Kellerman and Swingle straightened out the synonymy and found the name should be *Ustilago avenæ* (Pers.) Jens.

This species is quite prevalent throughout the state but has doubtless been confounded with *U. levis*. Great damage is wrought annually to the oat crop and the seed grain should be much more generally treated than it now is. At threshing time in Iowa, the smut spores are often present in such quantities as to give rise to a stifling dust.

*Ustilago Bistortarum* (DC) Koern.

This species was listed by J. C. Arthur in his memorandum of Iowa Ustilagineæ, Bull. Iowa Agrl. Col., Dept. Bot. 172. 1884. No specimens could, however, be found and it entered here on the authority of Dr. Arthur.

Host.—*Polygonum incarnatum*.

Locality.—Ames.

*Ustilago bromivora* (Tul.) Fisch. de Waldh.

Host.—*Bromus marginatus*.

Specimens from Iowa.—Herb. Iowa State College (11) (12) Ames, F. A. Serrine.

The spores from the Iowa specimens are darker in color than those of N. A. F. 3052, and average smaller in size and are more regular in shape than those of Ec. F. 534. The markings of the epispore are the same in all cases.

*Ustilago caricis* (Pers.) Fuck. Symb. Myc. 39.

Listed by Arthur, Memorandum Iowa Ustilagineæ, Bul. Iowa Agrl. Col., Bot. Dept. 1884: 172.

*Ustilago Crameri* Koern.

Host.—*Setaria Italica*.

Specimens from Iowa.—Herb. C. R. Ball, Ames; L. H. Pammel and C. R. Ball.

The glumes are apparently little affected.

*Ustilago hordei* (Pers.) K. & S.

Host.—*Hordeum vulgare*.

Specimens from Iowa.—Herb. Iowa State College (23) Ames, G. W. Carver; Ex. Herb. J. C. Arthur (1676b) Ames, J. C. Arthur. Crypt. Dist., Iowa State College (7) Ames, G. W. Carver.

No specimens are at present found in the herbarium of the Iowa State College. The only material of the species from the state thus far was collected on the experimental plots on the college farm, June 11, 1900, by Mr. E. L. R. Walker and myself. In three plots it was quite common.

*Ustilago hypodytes* (Schlecht) Fr.

Host.—*Stipa spartea*, Trin.

*Ustilago longissima* (Sow) Tul.

Host.—*Glyceria* sp.

Specimens from Iowa.—Ex. Herb. J. C. Arthur (1637); Decorah, E. W. D. Holway.

*Ustilago nuda* (Jens) K. & S.

Host.—*Hordeum vulgare*.

Specimens from Iowa.—Herb. Iowa State College (22) Ames, G. W. Carver; Ex. Herb. J. C. Arthur (1676) Decorah, E. W. D. Holway.

Crypt. Dist. Iowa State College (1) Ames, G. W. Carver.

*Ustilago oxalidis* Ell. and Tracy. Jour. Myc. 6:77. 1890.

Exsiccati.—Ell. & Ev. N. A. F. 2424.

Spore masses in the ovaries, light brown; spores globose or subglobose, yellowish or golden brown; 10–16 $\mu$ : epispore thickly and sharply echinulate.

Host.—*Oxalis stricta*.

Specimens from Iowa.—Herb. Iowa State College (128) Ames, G. W. Carver.

This species has been searched for diligently by many collectors from the I. S. C. Botanical Department, but not until July 3, 1900, was it collected by Mr. G. W. Carver.

*Ustilago Panici-glauci* (Wallr.). Niessl.

Host.—*Setaria glauca*.

Specimens from Iowa.—Herb. Iowa State College (36) (37) (38) (39) Ames, L. H. Pammel; (40) Ames, C. B. Weaver; (35) Sioux City, L. H. Pammel; (47) Ames, L. H. Pammel; Ex. Herb. J. C. Arthur, (1722) Decorah, E. W. D. Holway; Charles City, J. C. Arthur; Herb. C. R. Ball, Ames, C. R. Ball; Herb. Hume (63) Boone, L. H. Pammel. Crypt. Dist. Iowa State College (2) Ames, G. W. Carver.

This *Ustilago* is very common in the state, usually appearing on the host in August and September, though the author has collected it as early as July 9th.

*Ustilago perennans* Rostr.

Host.—*Arrhenatherum avenaceum*.

Specimens from Iowa. Sey. & Ear. Ec. F. (83). Ames, F. A. Serrine, and L. H. Pammel; Herb. Iowa State College (65) Ames, L. H. Pammel; (68) Ames, E. R. Hodson; (69) Ames, J. C. Arthur; (70) Ames, L. H. Pammel; (71, 72)

Ames, G. W. Carver. Crypt. Dist. Iowa State College (19),  
Ames, G. W. Carver.

*Ustilago pustulata* Tracy and Earle.

Host.—*Panicum proliferum*.

Specimens from Iowa.—Herb. Iowa State College (53)  
Ames, L. H. Pammel and Jared G. Smith. Herb. C. R.  
Ball, Ames, L. H. Pammel. The Ames specimens show  
only the ovaries of the host affected. They are distended  
and roundish, the enveloping membrane being grayish in  
color.

*Ustilago Rabenhorstiana* Kuhn.

Host—*Panicum glabrum* and *Panicum sanguinale*.

*Ustilago spermophora* B. & C.

Host.—*Eragrostis major*.

Specimens from Iowa.—Herb. Iowa State College (73)  
Ames, L. H. Pammel; Ex. Herb. J. C. Arthur (1693);  
Decorah, E. W. D. Holway; Charles City, J. C. Arthur.

This species is doubtless common in the state, but it is  
generally overlooked as it produces no conspicuous distor-  
tion or discoloration of the affected parts of the host.

*Ustilago syntherismæ* (Schw.) Fisch. de Waldh.

Hosts.—*Panicum capillare*, *P. proliferum*, and *Cenchrus  
tribuloides*

Specimens from Iowa.—Herb. Iowa State College (13)  
Wilton Junction, L. H. Pammel; (17) (18) Ames, C. E.  
Bessey; (76) Ames, F. C. Stewart; (77) Ames, P. H. Rolfs;  
(78) Ames, L. H. Pammel; (79) Ames, P. H. Rolfs; (80)  
F. C. Stewart; (87) Ames, L. H. Pammel; (88) Ames,  
P. H. Rolfs; Herb. C. R. Ball, Ames, C. R. Ball, Crypt.  
Dist. Iowa State College (14), Ames, H. H. Hume. Herb.  
Hume (65) Des Moines, L. H. Pammel; (66) Boone, L. H.  
Pammel.

The forms of *Panicum capillare* and *panicum proliferum*  
are identical, while between these two and the one on  
*Cenchrus tribuloides* there is no appreciable morphological  
distinction. The different hosts are often found asso-  
ciated, and when in proximity the one is affected if the

other is. Still there may be biological differences, or the two may be distinct, though the writer does not think so.

*Ustilago Tritici*, (Persoon) Jensen.

Host.—*Triticum vulgare*.

Specimens from Iowa.—Herb. Iowa State College (91) Ames, F. C. Stewart; (92) Ames, C. B. Weaver; (144) Council Bluffs, L. H. Pammel. Crypt. Dist. Iowa State College (6), Ames, G. W. Carver. Herb. C. R. Ball, Ames, F. C. Stewart.

*Ustilago utriculosa* (Nees) Fries (Nees) Tul.

Host.—*Polygonum lapathifolium*, var. *incarnatum*. Wats., *P. Pennsylvanicum*, L., *P. hydropiper*.

Specimens from Iowa.—Herb. Iowa State College (93) Greenfield, F. C. Stewart. (95 and 96) Ames, C. E. Bessey.

Ex. Herb. J. C. Arthur 3 (1737) Charles City, J. C. Arthur; Decorah, E. W. D. Holway.

Herb. C. R. Ball, Ames, C. R. Ball.

Herb. Hume, (18 & 8) Ames, H. Harold Hume.

Crypt. Dist. Iowa State College (30) Ames, A. F. Sample.

Every flower in the head is usually destroyed and much swollen. One specimen in Professor Arthur's herbarium, on *P. hydropiper*, collected at Charles City, showed spores lighter in color and with somewhat smaller reticulations than usual.

It is altogether probable that the species now known as *Sphacelotheca Hydroperis* (Schum.) DeBary was at one time confused with this species. The figure given by Nees, both in *Das. Syst. der Pilze* and *Schw.* does not resemble the cut given by Corda, nor does it look like *utriculosa* as we know it. Corda's illustration is good for this species but not of those given by Nees, (1817 and 1834) are quite like *Sphacelotheca hydroperis* (Schum.) DeBary.

*Ustilago Zeæ* (Beckm.) Ung.

Host.—*Zea Mays*. *Euchlena luxurians*.

Specimens from Iowa.—Herb. Iowa State College (25) Ames, F. C. Stewart; (28) (29) (30) (31) (32) L. H. Pammel; (33) G. P. Miller; (34) C. E. Bessey, Emmet Co.; Ex. Herb. Hume (13) Ames, H. Harold Hume; (67) Boone, L. H.



Pammel; Herb. C. R. Ball, Ames, F. C. Stewart; Crypt. Dist. Iowa State College (16) Ames, A. F. Sample; (15) Ames, A. F. Sample.

The spores are at first enclosed in a whitish gelatinous membrane. This is eventually ruptured and the spores escape. It is found in Iowa wherever corn is grown and annually occasions losses amounting to thousands of dollars.

At first I thought that the fungus on *Euchlena* might be different but on careful examination concluded that so far as morphological differences were concerned, that it was *Ustilago zea*. The synonymy as given above has been adopted directly from Magnus, though most of it has been personally verified.

*Ustilago Arthurii* N. Sp.

Host.—*Panicularia americana*, (Torr.) MacM.

Specimens from Iowa.—Types in Ex. Herb. J. C. Arthur were collected at Spirit Lake, Iowa, July 5, 1899, by Dr. J. C. Arthur.

Dr. Arthur's note made presumably at the time of collection was, "Affected plants have the heads totally destroyed."

*Cintractia Cornu*. Ann. Sci. Nat. Bot. 6:15. 277-279., 1883.

*Cintractia sorghi* (Sorok.) De Toni.

Host.—*Andropogon Sorghum*.

Specimens from Iowa.—Herb. Iowa State College (74) Ames, H. Harold Hume and Otto Evers.

All the ovaries of the affected plants were filled with spores and a sharp, central columella was present. The flowers were too old to make out the spore masses in the stamens.

*Cintractia Junci* (Schw.) Trel.

Host.—*Juncus tenuis*.

Specimens from Iowa.—Herb. Iowa State College (131) & (132) Ames, C. E. Bessey; (133) Ames, Hitchcock.

*Cintractia sphærogena* (Burrill.)

Host.—*Panicum crus-galli*.

Specimens from Iowa.—Herb. Iowa State College (130 Clinton, L. H. Pammel.

The spore masses are quite hard and so compact as to be easily sectioned. A cross section reveals the presence of a portion of the plant tissues among which may be seen, upon microscopical examination, the remains of the mycelium. From this the spores are arranged basipetally. Consequently it appears that this species belongs more properly to the genus *Cintractia*. In 1896 Dr. P. Mangus described *Cintractia Seymouriana* occurring on *Panicum crus-galli* but his fungus affected only the culms and leaves, and for this reason it appears to be different. So far as known the species under consideration affects only the ovaries. Hence this fungus occurring in the ovaries of *P. crus-galli* has been provisionally transferred to the genus *Cintractia*, as *Cintractia sphærogena* (Burrill.)

*Cintractia Reiliana* (Kuehn.) Clinton.

Host.—*Sorghum* sp. probably *vulgare*.

Specimens from Iowa.—Herb. Iowa State College (55,) Monticello, E. E. Reed.

The fibro-vascular bundles of the affected portion remain intact, serving as a sort of network in which the spores are held. The specimen from which the above description was drawn was collected in 1894 and is so far as known the only one ever taken in the state. It is probably more common than the number of specimens would indicate.

*Tilletia* Tul. Ann. Sci. Nat. Bot. 7:112. 1847.

*Tilletia foetens* Trelease.

Host.—*Triticum vulgare* L.

Specimens from Iowa.—Herb. Iowa State College (123) Ames, (124) (125) Ames, L. H. Pammel; Ex. Herb. J. C. Arthur (1776) Central Iowa, I. P. Roberts and A. N. Prentiss; Decorah, E. W. D. Holway. Herb. C. R. Ball, Ames, F. C. Stewart.

Though no description of this species was published by Berkeley and Curtiss until 1874, still specimen No. 100 in Rav. Fung. Carol. 1860 bears the name, *Ustilago foetens* B. & C.

*Tilletia rotundata* (Arth.) Masee.Host.—*Panicum virgatum* L.

Specimens from Iowa.—Herb. Iowa State College, New Albin, L. H. Pammel. Herb. J. C. Arthur (type). Herb. Hume—(84) New Albin, L. H. Pammel.

Affected ovaries scarcely differ from unaffected, there is no swelling or other external mark which would indicate that they are affected.

*Tilletia striciformis* (West.) Fisch. de Waldh.Host.—*Poa pratensis* L.; *Phlem pratense* L.; *Agrostis alba*.

Specimens from Iowa.—Herb. Iowa State College (120) (101) (102), Ames, L. H. Pammel; (121) (122), Ames, F. C. Stewart. Herb. Hume (50) Ames, G. W. Carver. Crypt. Dist. Iowa State College (3) (4) (5) Ames, G. W. Carver.

*Tilletia subfusca* N. Sp.Host.—*Sporobolus neglectus* Nash.

Specimen from Iowa.—Type in the Ex. Herb. J. C. Arthur, collected at Spirit Lake by Dr. J. C. Arthur.

This species is altogether different from the two species described by Ellis (1) on *Sporobolus*, namely *T. asperifolia* and *T. montana*. Specimen No. 1895 Ell. & Ev. N. A. F. collected at Boise City, Mont. by Gustave Smith, was made by Masee, the type of a new species, *Tilletia mixta*. My species somewhat resembles Masee's, but differs from it in having smaller and lighter colored spores. Most of those examined and measured in Dr. Arthur's specimens were 14u and none were above 16u. The spores nearly always appear to be smooth and on a few only were small scattered spines found.

On these differences it has been provisionally described as a new species.<sup>1</sup>

*Neovossia* Körn, Oestr. Bot. Zeitschr. 29:217. 1879.(1) *Journal of Mycology* 3:55. An. 1887.

*Neovossia Iowensis* Hume and Hodson.

Spore masses filling the ovaries, black; spores globose, subglobose or ovate, brownish black, opaque; 16x20–24x28 $\mu$ ; enclosed in a hyaline capsule; appendage hyaline, slender, two or three times the length of the spore; episporium apparently pitted.

A careful comparison with the specimen in De Thuenen's *Mycotheca Universalis* leads to the belief that the Iowa specimens are specifically distinct. The spores differ from those of *Neovossia molinia* (Thum.) Körn being darker in color, broader, and blunter, and proportionally shorter at the end opposite the appendage. The markings of the episporium are somewhat coarser.

Several attempts were made to germinate the spores in order to throw some light upon the vexed question of the true status of the genus *Neovossia*, but thus far unfortunately all trials have resulted in failure. However, based entirely upon the morphological distinctions it is the author's belief that the genus has sufficient reasons for its existence.

Host.—*Phragmites communis* Trin.

Specimens from Iowa.—Material collected at Colo, Iowa, by E. R. Hodson, Sept. 23, 1899.

*Entyloma* DeBary, Bot. Zeit. 1874: 101.

*Entyloma compositarum* Farl.

Host.—*Lepachys pinnata* Torr. & Gray., and *Ambrosia artemisiæfolia*, L.

Specimens from Iowa.—Herb. Iowa State College (143) Ames, A. S. Hitchcock; (136) Jewell Jc., G. W. Carver.

Ex. Herb. J. C. Arthur (1813) Decorah, E. W. D. Holway; Ex. Herb. Hume Ames, Iowa, H. Harold Hume; Ames, G. W. Carver.

*Entyloma crastophilum*, Sacc.

Host.—*Phleum pratense*, L.

Specimens from Iowa.—Herb. Iowa State College (136) Decorah, E. W. D. Holway.

I have carefully compared No. 1301, Krüger's Fungi Saxonici, on *Holcus lanatus* and the two are apparently identical.

*Entyloma Linariæ*, Schroet.

Host.—*Veronica peregrina*, L.

Specimens from Iowa.—Herb. Iowa State College (144) Ames, A. S. Hitchcock.

*Entyloma Menispermii*, Farl & Trel.

Host.—*Menispermum Canadense*, L.

Specimens from Iowa.—Herb. Iowa State College (134) Ames, L. H. Pammel; (131) Ames, P. H. Rolfs and L. H. Pammel, (132) Ames, G. W. Carver; (133) Ames, Zmunt. Ex. Herb. J. C. Arthur (1814) Decorah, E. W. D. Holway.

*Entyloma microsporium*, (Ung.) DeBary.

Host.—*Ranunculus septentrionalis*, Poir.

Specimens from Iowa.—Ex. Herb. J. C. Arthur (1810) Decorah, E. W. D. Holway.

*Entyloma physalidis* (Kalch & Cke) Farl.

Host.—*Physalis Virginiana*, *P. lanceolata*, *P. Philadelphia*, *P. heterophylla*.

Specimens from Iowa.—Herb. Iowa State College (138) Ames, P. H. Rolfs; (141) Boone, L. H. Pammel; (142) Ames, G. W. Carver; (143) Council Bluffs, L. H. Pammel.

Ex. Herb. J. C. Arthur, (1815) Charles City, J. C. Arthur; Decorah, E. W. D. Holway; Ames, C. E. Bessey. Ex. Herb. Hume.

On some species of *Physalis* the affected spots are quite elevated on one side while on the opposite side there is a corresponding depression.

*Entyloma polysporum* (Pk.) Farl.

Host.—*Ambrosia trifida*, L.

Specimens from Iowa.—Herb. Mo. Bot. Garden. Herb. Hume, (88) Ames, G. W. Carver.

It is my belief that this species is distinct from *Entyloma compositarum*, Farl. The appearance of the spots is characteristically different, darker and more angular, a difference which is apparently independent of the degree of maturity of the disease. *Entyloma compositarum*, Farl. on

*Ambrosia artemisiæfolia*, L. is very common in the region of Ames and though *Ambrosia trifida* and *Ambrosia artemisiæfolia* are equally common, I have never collected the *Entyloma* on the former host though I have frequently collected *Ent. compositarum* on plants of *Ambrosia artemisiæfolia* growing side by side with *Ambrosia trifida*.

*Entyloma saniculæ*, Pk.

Host.—*Sanicula Canadensis*, Torr.

Specimens from Iowa.—Ex. Herb. J. C. Arthur (1823) Decorah, E. W. D. Holway.

*Entyloma leuto-maculans*, N. Sp.

Host.—*Mertensia Virginica*, DC.

Specimens from Iowa.—Type specimen in Ex. Herb. J. C. Arthur, collected at Decorah, Iowa, by E. W. D. Holway, May 31, 1885.

I have compared this with the two European species occurring on Boraginaceæ and it appears to be different. The character of the spots is quite unlike either, being lighter in color and surrounded (in a dried specimen) by a slightly elevated ring. The spores are thick walled and average larger in size, than either *Entyloma canescens*, Schroet., or *Entyloma serotinum*, Schroet. (Specimen 213 Kunze Fungi selecte, on *Myosotidis intermedia*, and 354 Krüger's Fungi Saxonici on *Symphytum tuberosum* examined.)

*Entyloma Pammelii*, N. Sp.

Host.—*Zizania aquatica*.

Specimens from Iowa.—Type specimen in Ex. Herb. J. C. Arthur (1806) collected at Decorah, Iowa, Oct. 11, 1885, by E. W. D. Holway.

This differs from *Entyloma crastophilum*, Sacc. and from *Entyloma irregulare*, Johans, in the color and size of the spots and the lighter color and more angular shape of the spores. *Entyloma crastophilum*, Sacc. on *Holcus mollis*, L. No. 1301. Krüger's Fungi Saxonici and *Entyloma irregulare*, Johans on *Poa annua*, No. 1402. Krüger's Fungi Saxonici 1301 was used for comparison. To this species is also referred the specimens collected by Dr. Pammel at

Madison, listed as *Entyloma crastophilum*, Sacc. by Dr. Trelease. Specimens in Herbaria of Iowa State College and Mo. Bot. Garden examined.

Host.—*Polygonum sagittatum*; L.

Locality.—Charles City.

*Schizonella*, Schröet. Pilze. Schles. 275. 1887.

*Schizonella melanogramma* (DC.) Schroet.

Host.—*Carex Pennsylvanica*, Lam. *Carex* sp.

Specimens from Iowa.—Herb. Iowa State College (114) Steamboat Rock, L. H. Pammel; (115) Boone, Miss Zimbleman; (116), (117) Ames, L. H. Pammel. Crypt. Dist. Iowa State College (17), Ames, G. W. Carver.

*Tolyposporium*, Woron. Schröet. Pilze. Schles. 276. 1882.

*Tolyposporium bullatum* Schroet.

Host.—*Panicum crus-galli*, L.

Specimens from Iowa.—Herb. Iowa State College (130) Ames, C. E. Bessey.

This specimen was collected by Dr. C. E. Bessey on September 29, 1874 and is certainly well worthy of note. The ovaries are swollen and congested and protrude from the glumes, otherwise the flower is uninjured; the glumes remain intact and apparently develop normally. In microscopic appearance it resembles *Ustilago pustulata*. Under a magnification of about 20 diameters the spore balls appear as rounded granules.

*Doassansia* Cornu. Ann. Sci. Nat. Bot. VI: 15; 285. 1883.

Affecting aquatic plants. Spore masses consisting of a large number of fertile spores surrounded and enclosed by a covering of sterile spores, imbedded in the plant tissues.

*Doassania*, Sp.

Specimen on *Sagittaria variabilis*, Ex. Herb. J. C. Arthur (1843) Decorah, E. W. D. Holway.

This specimen was very small and since Dr. J. J. Davis had said it was too imature for identification, no attempt was made to name it. The sori, however, appeared to be quite different from those of *Doassansia sagittariae* West) Fisch.

*Doassansia Alismatis* (Nees Cornu.

Host.—*Alisma* sp.

Specimens from Iowa.—Ex. Herb. J. C. Arthur (1842 Decorah, E. W. D. Holway.

*Thecaphora* Fingerh. Linn, 230. 1835.

*Thecaphora aterrima* Tul.

Host.—*Carex adusta*, Boott.

Locality.—Ames.

*Urocystis* Rabenh. in Klotzsch Herb. Myc. cd. II n. 393.

*Urocystis Agropyri*, (Preuss) Schroet.

Host.—*Elymus robustus*, S. & S., *E. canadensis*, and *Bromus ciliatus*, L. ?

Specimens from Iowa.—Herb. Iowa State College (100) Ames, C. E. Bessey; (103) (106) Ames, Miss A. Beach; (104) (109) Ames, F. C. Stewart; (107) Ames, C. E. Bessey. Sey. & Earl Ec. Fung. (97) Decorah, E. W. D. Holway; Ex. Herb. J. C. Arthur (1891) Decorah, E. W. D. Holway; Crypt. Dist. Iowa State College (115) Moingona, G. W. Carver; (12) Ames, G. W. Carver. Herb. C. R. Ball, Ames, C. R. Ball.

*Urocystis anemones* (Pers.) Schroet.

Host.—*Anemone Virginiana*, L. *Hepatica acutiloba*, DC.

Specimens from Iowa.—Herb. Iowa State College (105a) (105b) Ames, A. S. Hitchcock; (108) Ames, C. E. Bessey; (112) Steamboat Rock, L. H. Pammel; Ex. Herb. J. C. Arthur (1096) Decorah, E. W. D. Holway.

*Urocystis colchici* (Schlecht.) Rabenh.

Host.—*Polygonatum giganteum*, Diet.

Specimens from Iowa.—Herb. M. Bot. Garden, Decorah, E. W. D. Holway.

Mr. Holway's note at the time of collection was, "Very rare here."