

North American Ustilagineae

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## NORTH AMERICAN USTILAGINEAE.

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CONTRIBUTION FROM THE CRYPTOGAMIC LABORATORY OF HARVARD  
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The following paper is a result of studies made upon this group of fungi by the writer during the past two years in the Cryptogamic Laboratory of Harvard University. It is preliminary to a monograph of the Ustilagineae of North America that he hopes to issue in the near future, the work on this having been largely completed. In the present paper there is given a list of the species with their hosts and distribution so far as is now known. Synonyms have also been given in those cases where needed to show the identity of the species. The writer's studies have shown that a number of forms, described chiefly from this country, do not deserve distinct specific recognition and in such

cases these are also given as synonyms under the proper species. The generic position of a number of species has been changed and such changes are indicated at the proper place. A few new species are also described here for the first time. In this paper proper specific names are not capitalized in order to conform to the usage of this Journal though this does not represent the writer's ideas on the subject.

The writer is responsible for the following synonyms (printed in italics): *Cintractia patagonica* Cke. & Mass. (synonym of *Ustilago bromivora*); *Doassansia affinis* Ell. & Dearn. (*Doassansia intermedia*); *Entyloma castaliae* Holw. (*Entyloma nymphaeae*); *Entyloma holwayi* Syd. (*Entyloma polysporum*); *Schizonella subtriinda* Ell. & Ev. (*Thecaphora trailii*); *Sorosporium atrum* Pk. (*Thecaphora aterrira*); *Sorosporium bigeloviae* Griff. (*Thecaphora pilulaeformis*); *Sorosporium cenchri* Henn. (*Sorosporium syntherismae*); *Sorosporium williamsii* Griff. (*Ustilago hypodytes*); *Thecaphora astragali* (Pk.) Wor. and *Thecaphora desmodii* (Pk.) Wor. (*Thecaphora deformans*); *Tilletia serpens* Karst. and *Tilletia aculeata* Ule. (*Ustilago macrospora*); *Tilletia externa* Griff. (*Cintractia externa*); *Tilletia mixta* Mass. p. p. (*Ustilago mulfordiana*); *Tilletia rotundata* (Arth.) Ell. & Ev., *Ustilago maclagani* Berk. (*Tilletia maclagani*); *Tolyposporium davidsonii* Diet. & Holw., *Poikilosporium davidsonii* Diet., (*Thecaphora pilulaeformis*); *Urocystis gei* Ell. & Ev. (*Urocystis waldsteiniae*); *Ustilago ambiens* Karst., *Entyloma ambiens* Johan., (*Schizonella melanogramma*); *Ustilago americana* Speg. and *Ustilago hilariae* Henn. and *Ustilago stenotaphri* of both Hennings and Massee (*Ustilago affinis*); *Ustilago andropogonis-saccharoides* Henn. (*Sphacelotheca andropogonis-hirtifolii*); *Ustilago apiculata* Ell. & Gall. (*Tolyposporella brunckii*); *Ustilago caricicola* Tr. & Earle (*Ustilago olivacea*); *Ustilago caricis* var. *douglasii* Shear. (*Cintractia caricis*); *Ustilago cylindrica* Pk. (*Sphacelotheca ischaemi*); *Ustilago eriocauli* Clint. *Cintractia eriocauli* Mass., (*Ustilago eriocauli* [Mass.] Clint.); *Ustilago filifera* Nort. (*Ustilago hieronymi*); *Ustilago fimbriatylis* Thuem. (*Cintractia axicola*); *Ustilago holwayi* Diet. (*Ustilago lorentziana*); *Ustilago insularis* Henn. (*Ustilago panici-leucophaei*); *Ustilago juncicola* Speg.? (*Cintractia montagnei*); *Ustilago liebmanni* Henn. (*Cintractia junci*?); *Ustilago washingtoniana* Ell. & Ev. (*Ustilago striaeformis*).

The following species reported or described from North America are excluded from the Ustilagineae in this paper. The genera *Cerebella* and *Graphiola*, which have had several species reported from this country and which are usually placed by American botanists in this group, are omitted as not properly belonging here.

*Ustilago arenariae* Ell. & Ev. on *Arenaria congesta* from Colorado is certainly not an *Ustilago* but has the appearance of ascomycetous spores merely mechanically adhering to the host. *Ustilago cyanea*, parasitic on *Balsamea vulgaris*, was found in California by Harkness and made the basis of a new genus, *Sporophaga*, with possible relationship to the Uredineae or Ustilagineae. It may possibly belong with the Chytridineae but certainly not with the Ustilagineae. *Ustilaginoidea oryzae* (Pat.) Bref. has been reported in this country on imported rice seed. Brefeld's later work has shown that this genus does not belong with the Ustilagineae. *Ustilago flavo-nigrescens* B. & C. on *Scleria* sp. from Cuba and *Ustilago viridis* Ell. & Ev. on *Setaria* sp. from Louisiana appear, from an examination of authentic specimens, to be the sclerotial stages of species of Ustilaginoidea, the latter probably being the same as *Ustilaginoidea setariae* Bref. These species are therefore excluded. *Ustilago ficuum* on figs and *Ustilago phoenicis* on dates, both not uncommon in markets and *Ustilago fischeri* on kernels of corn (reported from Jamaica) are now known to be species of *Sterigmatocystis*. *Sorosporium borrichiae* Ell. & Ev. on *Borrchia argentea* from the island of Cozumel, off Yucatan, has been examined by the writer and likewise seems to be a species of *Sterigmatocystis*, appearing on the host apparently because the flower heads were dried under unfavorable conditions of moisture. *Ustilago gynerii* Vize on *Gynerium argenteum* from California was long ago shown to be a species of *Gymnosporium*. *Entyloma alsines* Hals. on *Stellaria media* from New Jersey seems not to be an *Entyloma*, at least a careful examination of the type material in several exsiccati and that received especially for examination failed to show any spore stage except the Cercospora-like conidia on the surface of the leaves. The writer is indebted to Bresadola for type material of *Doassansia sintensii* Bres. on *Cedro matchos* from Porto Rico. This is certainly no *Doassansia*. The diseased leaves are coriaceous and therefore not of the type infected by this genus; besides this, the discolored spots show nothing to indicate definitely what caused them. *Doassansia zizaniae* on old stems of *Zizania aquatica* and *Burrillia globulifera* occurring on similar parts of *Glyceria fluitans*, both described by Davis from Wisconsin, do not seem to be true Ustilagineae but are more probably sclerotial stages of species of Ascomycetes. *Ustilago osmundae* Pk., reported on *Osmunda regalis* first from New York and later from other eastern states, probably belongs with the Hyphomycetes instead of the Ustilagineae. This curious species needs further study. *Ustilago panic-miliacei* (Pers.) Wint. has been reported erroneously in this country, having been confused with *Sorosporium syntherismae*.

*Sphacelotheca* has been extended by the addition of a number of species usually placed under *Ustilago*. A few species have

also been changed from *Ustilago* to *Cintractia*. *Sphacelotheca* and *Cintractia* are not considered good genera by some botanists though apparently they deserve such recognition. As considered here *Sphacelotheca* is characterized by the possession of a false membrane of definite sterile fungous cells, that envelopes the sorus before its rupture. Groups of these sterile cells are also often found within the spore-mass. There is also present a central columella, usually composed of the remains of the plant tissues, and the spore mass when young shows a centripetal development around this. Because of this method of spore development certain of these species, as well as a few *Ustilagos*, have been placed under *Cintractia* by some botanists. *Cintractia* (including *Anthracoidea* of Brefeld), however, is characterized by spores, usually of a peculiar black-brown color, that develop gradually in a centripetal manner forming a sorus that remains rather permanently and firmly agglutinated. Species of this genus also often have more or less evidence of a false membrane and a columella. They occur usually on the *Cyperaceae* or on related families. The genus *Thecaphora*, as considered here, includes those species whose rather firmly united spore-balls consist of reddish-brown spores smooth on the contiguous surfaces but variously marked on the free. So far as is known the germination is by elongated germ tubes that usually produce solitary terminal conidia. *Sorosporium*, with which it has been confused, has spores much like *Ustilago* and the spore-balls are often only temporarily united. *Burrillia* has been made to include those *Doassansia*-like species that lack a true cortex.

The writer wishes to express his especial obligation to Professors Farlow and Thaxter, of Harvard, for their very great help, in many ways, in furthering his study of this group. He is also indebted to a considerable number of American and some European botanists who have furnished specimens or otherwise rendered aid. Specific acknowledgment of such aid will be made later. That a wealth of material has been available for examination is shown by the fact that every species listed from this country, except one, has been seen. Type material of all species described from North America has been examined. A great difficulty in the systematic study of the group is that with such an abundance of material one finds, in some cases, such great variation that it is often a matter of arbitrary decision as to the disposition of certain specimens or even as to the treatment of certain species. It is hoped that the minimum of errors of judgment have attended the work in this respect.

## USTILAGINACEÆ.

**\* Spores pale to dark reddish brown (Ustilago).**

USTILAGO HYPODYTES (Schl.) Fr.—*Ustilago minima* Arth., Bull. Ia. Agr. Coll. 1884:172. 1884. *Ustilago sporoboli* Ell. & Ev., Bull. Torr. Bot. Club. 24:282. 1897. *Ustilago funalis* Ell. & Ev., Bull. Torr. Bot. Club 24:457. 1897. *Sorosporium williamsii* Griff., Bull. Torr. Bot. Club 29:296. 1902.

Hosts: *Agropyron occidentale*, Mont., S. Dak.; *Distichlis maritima*, Nev., Ore., Tex.; *Elymus canadensis*, Ia.; *E. condensatus*, Nev., Ore., *E. sitanion*, Wash.; *E. striatus*, Mont.; *Oryzopsis cuspidata*, —; *Sporobolus cryptandrus*, Colo. (type *U. sporoboli*); *Sporobolus* sp., Calif.; *Stipa comata*, Mont., Neb.; *Sicoronata*, Calif.; *S. eminens*, Calif.; *S. occidentale*, Ore.; *S. richardsonii*, Wyo. (type *S. williamsii*); *S. setigera*, Calif., Tex.; *S. spartea*, Ia. (type *U. minima*), Ill., S. Dak.; *S. viridula*, S. Dak.; *Stipa* sp., Utah, Wash.

When the spores of this species begin to germinate they often swell in size and split off a cap from the epispore or else crack irregularly. *Sorosporium williamsii* seems to be merely this condition of this species. The so-called spore-balls are nothing more than a mechanical adhering of irregular masses of the spores that is often met with in *Ustilago* where the specimens have dried under certain conditions.

USTILAGO LONGISSIMA (Sow.) Tul.—Hosts: *Glyceria arundinacea*, Ia., Minn.; *G. grandis*, Mass., Mich., N. Y., Verm.; *Glyceria* sp. N. H.

The spores of the American specimens of this species average slightly larger than those from Europe even on the same host.

USTILAGO LONGISSIMA var. MACROSPORA Davis.—Hosts: *Glyceria fluitans*, Ill., Me., Wis. (type); *G. laxa*, Me.

The form on *G. laxa* from Maine is somewhat intermediate between this and the species.

USTILAGO MEXICANA Ell. & Ev.—Host: *Muhlenbergia* sp., Mex. (type).

USTILAGO HORDEI (Pers.) Kell. & Sw. Host: *Hordeum* sp. cult. More or less commonly found where barley is grown.

USTILAGO LEVIS (Kell. & Sw.) Magn.—Host: *Avena sativa*, Conn., Ia., Ill., Kans. (type), Ohio, Wis., W. Virg.

This species is often confused with *Ustilago avenae*. While probably not so common as that species it is much more common than the reported distribution would indicate.

USTILAGO PERENNANS Rostr.—*Cintractia avenae* Ell. & Tr., Journ. Myc. 6:77. My. 1890.

Host: *Arrhenatherum avenaceum*, Conn., Ia., Ill., Miss. (type *Cintractia avenae* Ell. & Tr.), Ohio, Verm.

USTILAGO AVENAE (Pers.) Jens.—Hosts: *Avena fatua* Calif.; *A. sativa*, commonly distributed over N. Amer. where oats are grown.

USTILAGO NUDA (Jens.) Kell. & Sw.—Host: *Hordeum* sps. cult., commonly found where barley is raised as a farm crop.

USTILAGO TRITICI (Pers.) Jens.—Host: *Triticum vulgare*, a common parasite on this host in North America.

USTILAGO MUHLENBERGIAE Clint. n. sp.—Sori in the inflorescence, ovoid to subspherical, about 3-6 mm. in length, protected by thin, semi-transparent membrane of the infected enveloping glumes, upon rupture disclosing black-brown dusty spore mass; spores rather dark reddish brown, chiefly spherical, with brittle epispore that breaks up into very small granular echinulations (especially at opposite sides of the spore thus leaving a darker less broken central band) 4-6  $\mu$  in diameter.

Host: *Muhlenbergia texana*, Ariz. (type).

The writer is indebted to Professor Farlow for this species which was collected by Pringle in southern Arizona in 1884. It is peculiar because of its very small spores and because of the curious way, as shawn by an immersion, in which the epispore breaks into granular echinulations. The germination of the spores has not been observed.

USTILAGO RESIDUA Clint. n. sp.—*Ustilago segetum* Auct. p. p. *Ustilago segetum* f. *Danthoniae* Ell. and Ev. N. A. F. 1893a. 1887.

Sori prominent, in the inflorescence, infecting the whole, or sometimes confined to the individual spikelets, usually enclosed by leaf sheaths, on exposure showing as olive brown dusty spore mass; spores rather light olive brown, ovoid or ovate to spherical or occasionally irregular, thin walled, with coarse granules giving granular reticulate appearance, usually 5.5-8.5 $\mu$ , sometimes even 11 $\mu$  in length.

Hosts: *Danthonia compressa* N. Y.; *D. spicata*, N. H.; *Danthonia* sp., Colo.

This is near *Ustilago tritici* but has spores more granular reticulate, averaging larger and not lighter colored on one side. It is one of the forms that have been included in the old species *Ustilago segetum*, and, so far as the writer can ascertain, has not, as yet, been given specific distinction. *Ustilago danthoniae* Kalchb., if described accurately, differs decidedly in its much larger spores.

USTILAGO AFFINIS Ell. & Ev. — *Ustilago affinis* Ell. & Ev. Bull. Torr. Bot. Club, 20:297. 1893. *Ustilago hilariae* Henn., Hedw. 37:267. 1898. *Ustilago stenotaphri* Henn., Hedw. 37:293. 1898. *Ustilago americana* Speg., Fung., Argent. Nov. Vel. Crit. no. 375. 1899. *Ustilago stenotaphri* Mass. Kew Bull. 153-4:184. 1899. *Ustilago henningsii* Sacc. & Syd., Syll. Fung. 16:368. 1902.

Hosts: *Hilaria cenchroides*, Mex. (type *U. hilariae* Henn.); *Stenotaphrum americanum*, Bermuda, Jamaica (type).

This fungus has been described a number of times during recent years by different botanists. The first named applied to it is apparently that used by Ellis and Everhart in 1893. *Ustilago hilariae* Henn. on *Hilaria* sp. does not seem distinct from the form on *Stenotaphrum* and so they have been placed together here. *Ustilago stenotaphri* of McAlpine is apparently a distinct species which was described in 1895.

USTILAGO LORENTZIANA Thüm.—*Ustilago holwayi* Diet., Bot. Gaz. 18:253. 1893.

Hosts: *Hordeum jubatum*, Mont., N. Dak., S. Dak.; *H. maritimum*, Ida.; *H. murinum*, Calif.; *H. pratense*, Calif. (type *U. holwayi*), Utah; *H. pusillum*, Calif.; *Hordeum* sp., Calif., Wash.

Dietel's *Ustilago holwayi* does not seem to be specifically different from de Thümen's species if one takes into consideration the variations that are met with in specimens from this country, some of which agree exactly with the South American type of the species.

USTILAGO BROMIVORA (Tul.) Fisch. d. Waldh.—*Cintractia patagonica* Cke. & Mass., Grev. 18:34. 1889.

Hosts: *Bromus arvensis*, Colo.; ? *B. breviaristatus*, Calif., Ia.; *B. ciliatus*, Colo.; *B. hookerianus*, Calif., Wash.; *B. hordeaceus* var. *glabrescens*, Wash.; *B. kalmii*, Utah; *B. marginatus*, Colo., Ore., Wy.; *B. mollis*, Wash.; *B. racemosus*, Wash.; *B. secalinus*, Calif., Ore.; *B. vulgaris*, Mont.; *B. vulgaris* var. *eximius*, Wash.

An examination of the type of *Cintractia patagonica* shows it to be only an unusually vigorous form infecting the basal parts of the outer glumes as well as the inner parts.

USTILAGO BROMIVORA var. MACROSPORA Farl.—Host: *Bromus ciliatus*, Colo (type), Ia.?

This seems entitled only to varietal rank though the spores are much larger than those ordinarily possessed by the species. Specimens have been found on the same host that apparently belong to the species rather than this variety.

USTILAGO CRAMERI Körn.—Host: *Setaria italica*, Ill., Ohio, N. Dak., S. Dak.

USTILAGO PANICI-PROLIFERI Henn.—Host: *Panicum proliferum* var. *acuminatum*, Mex. (type).

USTILAGO PANICI-LEUCOPHAEI Bref.—*Ustilago insularis* Henn. Hedw. 35:51. 1896.

Host: *Panicum leucophaeum*, Jamaica.

USTILAGO ULEI Henn.—Host: *Chloris submutica*, Mex.

USTILAGO CHLORIDICOLA Henn.—Host: *Chloris* sp., Calif. (type).

USTILAGO TILLANDSIAE Patters. n. sp.—Sori destroying inner flower parts, protected by enclosing bracts and perianth, forming an irregular dusty black spore mass about 1-3 cm. in length; spores olive brown, chiefly ovoid to spherical, thin walled, more or less collapsed or hemispherically cupped, smooth or with brittle epispore breaking up into thin polygonal areas, 7-13  $\mu$  in length.

Hosts: *Tillandsia leiboldiana*, Mex.; *Tillandsia* sp., Costa Rica (type).

The writer first learned of this species through Mrs. Flora W. Patterson of the Department of Agriculture and later on searching in the Gray Herbarium found it on specimens from Mexico. It is somewhat questionable whether the species is a true *Ustilago* or some *Hyphomycete* having the appearance of a smut, though it is more probably the former. A study of the method of spore production and germination may be necessary to determine its true position.

USTILAGO OLIVACEA (DC.) Tul.—*Ustilago caricicola* Tr. & Earle, Bull. Torr. Bot. Club 26:493. 1899.

Hosts: *Carex folliculata*, Miss. (type *U. caricicola*); *C. polystachya*, Mex.; *C. utriculata*, Wash.; *Carex* sp., Mex.

USTILAGO SPARSA Underw. — Host: *Dactyloctenium aegyptiacum*, Ala. (type), S. Car.

This is issued in Ravenel's *Fungi Amer.* No. 790 as *Ustilago destruens* Schl.

USTILAGO SPERMOPHORA B. & C.—Hosts: *Eragrostis major*, Ia., Ill., Ind., Kans., Mass., Miss., Neb., N. Car., N. Y., S. C. (type), S. Dak., Wisc.; *E. reptans*, D. C., S. Dak.

USTILAGO BOUTELOUAE Kell. & Sw.—Host: *Bouteloua oligostachya*, Kans. (type), Okl.

USTILAGO TRICUSPIDIS Ell. & Gall. n. sp.—Sori in ovaries, ellipsoidal, about 4 mm. in length, infecting an occasional spikelet and showing between the spreading glumes; spores medium reddish brown, ovoid to chiefly subspherical or spherical, rather prominently verruculo-echinulate, chiefly 8-11  $\mu$  in length.

Host: *Triodia cuprea* (*Tricuspis seslerioides*), Mo. (type).

This species bears the above name in the U. S. Dept. Agr. Herbarium and is evidently new. The writer is indebted to Mrs. Flora W. Patterson for the privilege of examining specimens. The fungus was collected by M. B. Waite at Charleston, Mo., in the fall of 1889. It is related to *Ustilago spermophora* but has spores that are more regular, more prominently verruculo-echinulate and darker colored.

**USTILAGO MINOR** Nort.—Host: *Bouteloua hirsuta*, Kans. (type).

Griffiths has listed a number of additional hosts for this species but they seem to the writer, who has examined the type of the species, to come more properly under *Ustilago hieronymi*. The specimens assigned to these two species show such variation that it is difficult to determine where the specific lines should be drawn.

**USTILAGO HIERONYMI** Schröt.—*Ustilago filifera* Nort., Trans. Acad. Sci. St. Louis 7:237. 1896.

Hosts: *Bouteloua aristidoides* Ariz., Mex.; *B. bromoides*, Ariz.; *B. eriopoda*, Ariz.; *B. oligostachya*, Ariz., Kans. (type *U. filifera*), Mont.; *B. polystachya*, Ariz.; *B. racemosa*, Kans. (type *U. filifera*), Tex.; *Pappophorum wrightii*, Ariz.

Perhaps some of the larger spored forms (on *B. oligostachya* for instance) deserve specific recognition. The writer is also somewhat in doubt about the specific position of the specimens issued by Griffiths in his West American Fungi on *Pappophorum wrightii* and *Bouteloua polystachya* as in both of these cases the sori are in the aborted inflorescence instead of on the leaves.

**USTILAGO BUCHLOES** Ell. & Tr.—Host: *Buchloe dactyloides*, Neb., N. Mex. (type).

Further study may possibly show this to be the same as the last species.

**USTILAGO PUSTULATA** Tr. & Earle.—Hosts: *Panicum proliferum*, Ia., Ill., Kans., Miss. (type); *P. virgatum*, Tex.

**USTILAGO SPHAEROGENA** Burr.—Host: *Panicum crus-galli*, Conn., Ia., Ill. (type), Neb.

**USTILAGO CRUS-GALLI** Tr. & Earle.—*Ustilago crus-galli* Tr. & Earle, Bull. Torr. Bot. Club 22:175. 1895. *Cintractia seymouriana* Magn. Ber. Deut. Bot. Ges. 14:217. 1896. *Cintractia crus-galli* Magn., Ber. Deut. Bot. Ges. 14:392, 1896.

Host: *Panicum crus-galli*, Ark., Ill., Mass., Minn., Ore., S. Dak., Utah (type), Wash.

Magnus has placed this species under the genus *Cintractia* because of the method of spore formation. As considered here

Cintractia is limited to species possessing quite a different type of spores.

USTILAGO ZEAЕ (Beckm.) Ung.—Hosts: *Euchlaena luxurians*, Ala., Ia., Ill., Kans., Wisc.; *Zea mays*, common throughout N. Amer.

USTILAGO PANICI-GLAUCI (Wallr.) Wint.—*Ustilago neglecta* Niessl, Rab. Fungi Eur. 1200. 1866.

Host: *Setaria glauca*, Conn., Ia., Ill., Ind., Kans., Mass., Neb., N. H., N. J., N. Y., Ohio, S. Dak., Verm., Wisc.

USTILAGO UNIOLAE Ell. & Ev.—Host: *Uniola gracilis*, Miss., Tex. (type).

USTILAGO ERIOCAULI (Mass.) Clint.—*Cintractia erio-cauli* Mass. Grev. 22:67. 1894. *Ustilago erio-cauli* Clint., *Rhodorhiza* 3:82. 1901.

Host: *Eriocaulon septangulare*, Mass. (type *U. erio-cauli* Clint.), N. H., Conn.

This was described by the writer in 1901 as a new species, as it was considered distinct from *Cintractia erio-cauli* on *Eriocaulon fenestratum*, described by Masee from Madagascar. Since then specimens of the latter have been received from Masee and the two prove to be the same. Masee's original description is at fault in that it gives the spores as smooth when they are distinctly verruculose; the fungus, also, seems to come more properly under *Ustilago* than under *Cintractia*.

USTILAGO ORNATA Tr. & Earle.—Host: *Leptochloa mucronata*, Miss. (type).

USTILAGO SPOROBOLI Tr. & Earle.—Host: *Sporobolus junceus*, Miss. (type).

USTILAGO VILFAE Wint.—Host: *Sporobolus vaginae-florus*, Kans., Penn. (type).

USTILAGO RABENHORSTIANA Kühn.—Hosts: *Panicum filiforme*, N. J., Mex.; *P. glabrum*, Ill., Kans., Minn., N. H.; *P. sanguinale*, Ala., Conn., D. C., Ia., Ill., Ind., Kans., Mary., Mass., Miss., Mo., Neb., N. J., Ohio, N. Car., Tex., Wisc.; *Panicum sp.*, N. Y., S. Car.

USTILAGO HOLWAYANA Henn.—Host: *Paspalum velutinum*, Mex. (type).

USTILAGO MULFORDIANA Ell. & Ev.—*Tilletia mixta* Mass., Kew Bull. 153-4:145. 1899.

Hosts: *Festuca tenella*, Ariz., Ida., Mont., Ore., Wash., Wyo.; *Festuca sp.*, Calif., Ida. (type).

USTILAGO HILARIAE Ell. & Tr.—Uredo hilariae Sacc., not Ell. & Tr., Syll. Fung. 9:333. 1891.

Host: *Hilaria jamesii*, Colo., N. Mex. (type).

USTILAGO AEGOPOGONIS Henn.—Host: *Aegopogon cenchroides*, Mex. (type).

USTILAGO ELEGANS Griff.—Host: *Chloris elegans*, Ariz. (type).

USTILAGO DIETELIANA Henn.—Host: *Tripsacum dactyloides*, Mex. (type).

USTILAGO STRIAEFORMIS (West.) Niessl.—*Tilletia striaeformis* Oud., Bot. Zeit. 36:440-1. 1878. *Ustilago washingtoniana* Ell. & Ev., Bull. Torr. Bot. Club 22:57. 1895.

Hosts: *Agrostis alba* var. *vulgaris*, Conn., Ia., Ill., Mo.; *Ammophila arundinacea*, Mass.; *Elymus canadensis* var. *glaucofolius*, Wisc.; *E. virginicus*, Ill.; *Phleum pratense*, Ia., Ill., Ind., Mass., Mo., Ohio, N. J., N. Y., Wisc., Can.; ? *Poa annua*, Mass.; *P. pratensis*, Ia., Ill.; Unknown grass, Mass., N. J., N. Y., Tex., Wash. (type *U. washingtoniana*).

USTILAGO CALAMAGROSTIDIS (Fckl.) Clint. n. nom.—*Tilletia calamagrostis* Fckl., Symb. Myc.: 40. 1869.

Hosts: *Calamagrostis canadensis*, Verm.; *C. canadensis* var. *acuminatus*, Wyo.; *C. pickeringii*, N. Y.

USTILAGO MACROSPORA Desm.—*Ustilago macrospora* Desm., Pl. Crypt. II, 1727. 1850. *Tilletia serpens* Karst., Fung. Fenn. 599. 1886. *Tilletia aculeata* Ule, Verh. Bot. Ver. Prov. Brand. 25: 213. 1884.

Host: *Agropyron repens*, Ia., Mass., Wisc.

USTILAGO ECHINATA Schröt.—Host: *Phalaris arundinacea*, Neb., Wash.

USTILAGO TULIPAE (Heufl.) Wint.—*Ustilago erythronii* Clint., Bull. Buff. Soc. Nat. Sci. 1:67. 1873.

Host: *Erythronium americanum*, Mo., N. J., N. Y. (type *U. erythronii*), Penn.

### \*\* Spores golden. (Ustilago.)

USTILAGO VAILLANTII Tul.—Host: *Scilla praecox*, Mass.

USTILAGO OXALIDIS Ell. & Tr.—Host: *Oxalis stricta*, Conn., Ill., Miss. (type), Mo., N. Y., Wisc.

\*\*\* **Spores lilac to purple. (Ustilago.)**

USTILAGO KOENIGIAE Rostr.—Host: *Koenigia islandica*, Greenland (type).

USTILAGO VINOSA (Berk.) Tul.—Host: *Oxyria digyna*, Calif., Greenl.

USTILAGO VIOLACEA (Pers.) Fckl.—Hosts: *Arenaria groenlandica*, Me., N. H., N. Y.; *A. lateiflora* var. *glabrescens*, Wash.; *Cerastium maximum*, Alaska; *Lychnis* sp., Minn.; *Silene acaulis*, N. H.; *S. douglasii* var. *macounii*, Mont.; *S. multicaulis*, Wash.; *S. tetonensis*, Wyo.; *S. watsoni*, Calif., Wash; *Stellaria borealis*, Greenl.

USTILAGO VIOLACEA var. MAJOR Clint. n. var.—Sori inconspicuous, filling swollen anthers, soon rupturing and disclosing violet colored dusty mass of spores; spores pale lilac to violet, ovoid to spherical, occasionally somewhat irregular, with rather conspicuous spore wall covered with numerous minute reticulations (1  $\mu$  or less in diameter), chiefly 7-12  $\mu$  in length.

Host: *Silene watsoni*, Wash. (type).

European botanists seem inclined to keep Schroeter's species of *Ustilago major* on *Silene otites* distinct from *Ustilago violacea*. The spores of the variety described here are much like those of the former species and if the two are the same it seems doubtful if the European form on *Silene otites* deserves specific rank. This variety represents the extreme variation from the species as found in this country. *Silene watsoni* is also a host for the species.

USTILAGO GAYOPHYTI Hark.—Host: *Gayophytum ramosissimum* Calif. (type), Ore.

USTILAGO ANOMALA Kze.—Hosts: *Polygonum ciliode*, Me., N. H., N. Y., Verm.; *P. convolvulus*, Ill.; *P. dumetorum* var. *scandens*, Ind., Mo., Verm., W. Virg.

USTILAGO UTRICULOSA (Nees.) Tul.—Hosts: *Polygonum acre*, Ill., Kans., Miss.; *P. amphibium*, Ind., Penn.; *P. aviculare*, Calif.; *P. erectum*, Miss.; *P. hydropiper*, Ala., Conn., Ia.; *P. hydropiperoides*, Conn., Miss., Verm.; *P. lapathifolium*, Ill.; *P. lapathifolium* var. *incarnatum*, Ia., Ill.; *P. pennsylvanicum*, Ala., Ia., Ill., Kans., Mass., Miss., Mo., Neb., N. H., N. J., N. Y., Ohio, R. I., Verm., W. Virg.; *P. sagittatum*, N. Y.; *Polygonum* sp., Ill., Mass., Mich., Mo., N. Car., N. J., R. I., Mex.

On some of these hosts, especially those growing in moist situations, as *Polygonum acre* and *Polygonum hydropiperoides*, the smut approaches very closely to *Ustilago anomala*.

USTILAGO KUEHNEANA Wolff.—Host: *Rumex acetosella*, S. Car.

USTILAGO PARLATOREI Fisch. d. Waldh.—Hosts: Rumex britannica, Mo., Neb.; R. mexicanus, Mex.

USTILAGO BISTORTARUM (DC.) Körn.—Host: Polygonum viviparum, Colo., Wyo., Greenl.

SPHACELOTHECA PAMPARUM (Speg.) Clint. n. nom.—Ustilago setariae Niessl?, Speg. Fung. Argent. pug. 2 no. 24. 1880. Ustilago pamparum Speg., Fung. Guar. pug. 1:49. 1886. Ustilago kolaczekii Kühn, Rab-Wint. Fungi Eur. 3401. 1886.

Host: Setaria sp., Mex.

SPHACELOTHECA DIPLOSPORA (Ell. & Ev.) Clint. n. nom.—Ustilago diplospora Ell. & Ev., Journ. Myc. 6:119. 1891.

Hosts: Panicum crus-galli, Ill.; P. sanguinale, Miss. (type).

SPHACELOTHECA SORGHII (Lk.) Clint. n. nom.—Ustilago sorghii Pass., Hedw. 12:114. 1873. Cintractia sorghii-vulgaris Clint., Bull. Ill. Agr. Exp. Stat. 47:404. 1897.

Hosts: Sorghum vulgare and vars., Ala., Calif., Conn., D. C., Ia., Ill., Kans., Neb., N. J., N. Y., Ohio, S. Dak., Wisc., Jamaica, Ontario.

SPHACELOTHECA ISCHAEMI (Fckl.) Clint. n. nom.—Ustilago ischaemi Fckl., Enum. Fung. Nass. 22. 1861. Ustilago cylindrica Pk., Bot. Gaz. 7:55. 1882. Cintractia ischaemi Syd., Oesterr. Bot. Zeit. 51:12. 1901

Hosts: Andropogon contortus, Mex.; A. furcatus, Kans.; A. saccharoides Ariz., Mex.; A. scoparius, Ill.; Andropogon sp., Ariz. (type U. cylindrica).

SPHACELOTHECA PASPALI-NOTATI (Henn.) Clint. n. sp.—Ustilago paspali-notati Henn., n. sp. in Herb. Holway.

Sori in the inflorescence, linear, about 4-6 cm in length, with evident false membrane gradually flaking away from apex and exposing reddish brown dusty spore mass surrounding evident often forked columella; sterile cells hyaline, with those of the membrane adhering rather firmly, with inner loose ones in roundish clusters, usually larger than the spores; spores light reddish brown, ovoid to spherical or slightly angled, apparently smooth but very minutely verruclose, 7-10  $\mu$  in length.

Host: Paspalum notatum, Mex. (type).

This species is very near Sphacelotheca ischaemi, in fact is scarcely to be distinguished from the verruculose forms of that species, though it has a more luxuriant sorus and different host. For this reason there may be some question if it is entitled to the specific rank given it by Hennings.

SPHACELOTHECA MONILIFERA (Ell. & Ev.) Clint. n. nom. — *Ustilago monilifera* E. & Ev., Bull. Torr. Bot. Club 22:362. 1895. *Ustilago andropogonis-contorti* Henn., n. sp., in Herb. Holway.

Hosts: *Andropogon contortus*, Ariz. (type), Mex. (type U. *andropogonis-contorti* Sandw. Isl.

It is possible that *Ustilago nealii* Ell. & And. is the same as this species. It is a true *Spathelotheca* but the writer has not decided definitely if it comes here or is distinct.

SPHACELOTHECA ANDROPOGONIS-HIRTIFOLII (Henn.) Clint. n. nom. — *Ustilago andropogonis-hirtifolii* Henn., Bot. Gaz. 28:274. 1899. *Ustilago andropogonis-saccharoidis* Henn., Syd. Ust. 251. 1901.

Hosts: *Andropogon hirtifolius pubiflorus*, Mex. (type); *A. saccharoides*, Mex. (type U. *andropogonis-saccharoidis*).

SPHACELOTHECA OCCIDENTALIS (Seym.) Clint. n. nom. — *Sorosporium ellisii* var. *occidentalis* Seym., Ell. & Ev. N. A. F. 2265. F. 1889. *Ustilago andropogonis* Kell. & Sw., Journ. Mycol. 5:12-13. Mr. 1889.

Hosts: *Andropogon furcatus*, Kans. (type U. *andropogonis*), N. Dak. (type), Neb.; *A. hallii*, Kansas (type U. *andropogonis*, Neb.; *A. hallii* var. *flaveolus*, Ill. (cult.); *A. macrourus*, Calif.

SPHACELOTHECA MONTANIENSIS (Ell. & Holw.) Clint. n. nom. — *Ustilago montaniensis* Ell. & Hollw., Ell. & Ev. N. A. F. 2263. 1899. Described in Journ. Mycol 6:19, 1891.

Hosts: *Muhlenbergia glomerata*, Mont.; *M. glomerata* var. *setiformis*, Mont.; *Muhlenbergia* sp., Mont. (type).

SPHACELOTHECA REILIANA (Kühn) Clint. n. nom. — *Ustilago reiliana* Kühn, Rab. Fung. Eur. 1998. 1875. *Cintractia reiliana* Clint., Bull. Ill. Agr. Exp. Stat. 57:346. 1900.

Hosts: *Sorghum vulgare*, Ia., Ill., Kans., Minn., Miss., Neb., N. J., Ohio, Tex.; *Zea mays*, Kans., Ohio.

SPHACELOTHECA HYDROPIPERIS (Schum.) DeBy. — Hosts: *Polygonum acre*, Ill., Mass.; *P. bistortoides*, Wash., Wyo.; *P. hydropiper*, Neb., R. I.; ? *P. persicaria*, N. Y.; *P. sagittatum*, Ia., Ill., Me., N. Y., Verm., W. Virg.; *P. viviparum*, Wyo., Greenl.; *Polygonum* sp., Mo.

MELANOPSICHIMUM AUSTRO-AMERICANUM (Speg.) Beck. — *Ustilago austro-americana* Speg., Fung. Argent. pug. 4, n. 45. 1881. *Melanopsichium austro-americanum* Beck, Ann. Natur. Hofmus. Wien, 9:22. 1894.

Hosts: *Polygonum aviculare*, Calif.; *P. hydropiper*, D. C., Mo.; *P. lapathifolium*, Calif., Ill.; *P. lapathifolium* var. *incar-*

natum, Ill., Mo.; *P. pennsylvanicum*, Ill., Kans., Mo., N. Y.; ?*P. virginianum*, Mo.; *Polygonum* sp., D.C., Ia., Mo., N. J., Tex.

**CINTRACTIA TAUBERTIANA** (Henn.) Clint. n. nom.—*Ustilago taubertiana* Henn., Engl. Bot. Jahrb. 17:525. 1893.

Hosts: *Rhynchospora alba*, Mass., N. J.; *R. cephalantha*, Miss.; *R. fascicularis*, Fla.; *R. inexpansa*, S. Car.; *Rhynchospora*, ? Tex.

This smut has smaller and usually lighter colored spores than *Cintractia montagnei*.

**CINTRACTIA MONTAGNEI** (Tul.) Magn.—*Ustilago caricis* Auct. p.p. ?*Ustilago juncicola* Speg., Fungi Guar. 15. 1891.

Hosts: *Rhynchospora alba*, Me., Newf., N. Y., Verm.; *R. eximia*, Mex.; *R. glomerata*, Mass., Miss., N. Y.; *R. tenuis*, Mex.; *Rhynchospora* sp., N. Car., S. Car.

**CINTRACTIA PSILOCARYAE** (Tr. & Earle) Clint. n. nom.—*Ustilago psilocaryae* Tr. & Earle, Bull. Torr. Bot. Club 26:493. 1899.

Hosts: *Psilocarya nitens*, Fla., Miss. (type); *P. scirpoides*, Mass., R. I.

**CINTRACTIA CARICIS** (Pers.) Magn.—*Ustilago caricis* Ung., Infl. Bodens 211. 1836. *Anthracoidea caricis* Bref., Unters. Gesammt. Myk. 12:144. 1895. *Cintractia caricis* Magn., Abh. Bot. Ver. Prov. Brand. 37:78. 1896. *Ustilago caricis douglasii* Shear, Fungi Col. 1485. 1901.

Hosts: *Carex* sps., distributed over North America; *Kobresia caricina*, N. Amer.; *K. scirpina*, Greenl.; *Scripus caespitosus*, Greenl.

The writer has listed this smut on over forty species of *Carex*.

**CINTRACTIA EXTERNA** (Griff.) Clint. n. nom.—*Tilletia externa* Griff., Bull. Torr. Bot. Club 29:290. 1902.

Host: *Carex flifolia*, Mont. (collected by F. W. Anderson, Apr. 1888 at Sand Coulee), Neb. (collected by T. A. Williams, June 23, 1890, at War Bonnet Canon), Wyo. (type *T. externa*).

This species was first collected nearly fifteen years ago by Anderson who distributed it to several herbaria under the name of *Ustilago caricis*. Later it was collected by Williams. Recently it has been described from Wyoming, as a new species, by Griffiths. The writer had it described (in manuscript) as a new species when Griffiths description came to hand. It is related to *C. caricis* but differs by having more regular, smooth spores with evident hyaline enveloping membranes. These membranes are evidently hygroscopic and by means of the absorbed water the

spores are shed, becoming glued over the adjacent parts. When dry the spores are very firmly agglutinated in the sorus.

CINTRACTIA SUBINCLUSA (Körn.) Magn.—*Ustilago subincluse* Körn., Hedw. 13:159. 1874. *Anthracoidea subinclusa* Bref., Unters. Gesammt. Myk. 12:146. 1895. *Cintractia subinclusa* Magn., Abh. Bot. Ver. Prov. Brand. 37:79. 1896.

Hosts: *Carex lanuginosa*, Nev.; *C. michauxiana*, Brit. Amer., New Bruns.; *C. oligosperma*, Newf.; *C. trichocarpa* var. *deweyi*, N. Dak.; *C. utriculata*, Nev., Ore.

CINTRACTIA LUZULAE (Sacc.) Clint. n. nom.—*Ustilago luzulae* Sacc., Myc. Ven. Spéc. 73. 1873.

Host: *Luzula campestris*, Ind.

CINTRACTIA JUNCI (Schw.) Trel.—Hosts: *Juncus acuminatus*, Miss.; *J. effusus*, N. J.; *J. tenuis*, Conn., Ia., Ill., Mass., Ohio, N. J., N. Y., Penn. (type), Verm., Wisc.; *Juncus* sp., Mass., N. Car., Mex.

CINTRACTIA AXICOLA (Berk.) Cornu.—*Ustilago axicola* Berk., Ann. Mag. Nat. Hist. II, 9:200. 1852. *Ustilago fimbristylis* Thm., Bull. Torr. Bot. Club 6:95. 1876. *Cintractia axicola* Cornu., Ann. Sci. Nat. Bot. VI, 15:279. 1883.

Hosts: *Fimbristylis autumnalis*, Ala., Miss., Virg. (type *U. fimbristylis*); *Fimbristylis* sp., Costa Rica, Cuba, Mex., San Domingo (type).

CINTRACTIA AXICOLA var. MINOR Clint. n. var.—Sori and spores as in the species except latter smaller, chiefly 10-13  $\mu$  in length.

Host: *Cyperus grayii*, N. Y.

This variety is based on the specimen issued in Ell. and Ev. N. A. F. no. 2423 as *Ustilago* (*Cintractia*) *axicola* Berk. Besides having a different host it differs from this species in having smaller spores. It sometimes occurs at the base of the spikelets forming a conspicuous smutty mass. In some respects it agrees with a species Spegazzini has described from South America as *Cintractia peribebuyensis* on *Cyperus*.

CINTRACTIA UTRICULICOLA (Henn.) Clint. n. sp.—*Cintractia leucoderma* f. *utriculicola* Henn., Hedw. 34:336. 1895. *Cintractia axicola* f. *spicularum* Juel, Bih K. S. Vet. Akad. Handl. 23 (3<sup>o</sup>):7. 1897.

Sori in ovaries, ovoid to subspherical, chiefly 3-6 mm. in length, covered by an evident whitish false membrane that ruptures irregularly from the apex disclosing semi-agglutinated black spore mass; sterile cells hyaline, chiefly subspherical, often semi-gelatinized; spores dark reddish brown, often subopaque, with irregular lighter areas, somewhat compressed laterally and there-

fore in cross-section appearing oblong to circular according to view, smooth, 11-16  $\mu$  in length.

Host: *Rhynchospora* sp., Mex.

This form is described from specimens issued in Sydow's *Ustilagineen* no. 220 from Mexico. The synonyms given are those that have been assigned by others, the writer not having seen type specimens of these. This Mexican collection, at least, seems to deserve specific distinction from both *Cintractia axicola* and *Cintractia leucoderma*. From the former it differs not only in the host and part infected but also in its darker colored spores and from the latter in the position and size of the sorus and in its smooth spores.

**CINTRACTIA LEUCODERMA** (Berk.) Henn.—*Cintractia krugiana* Magn. *Engl. Jahrb.* 17:490. 1893.

Hosts: *Rhynchospora gigantea*, Porto Rico (type *C. krugiana*), *Rhynchospora* sp., Mex.; ?*Rhynchospora*, Cuba, San Domingo (type).

**SCHIZONELLA MELANOGRAMMA** (DC.) Schröt.—*Ustilago ambiens* Karst., *Oefv. Svensk. Kongl. Vet. Akad. Förh.* 29:108. 1873. *Entyloma ambiens* Johans. *Oefv. Svensk. Kongl. Vet. Akad. Förh.* 41<sup>9</sup>:160. 1884.

Hosts: *Carex atrata*, Colo.; *C. laxiflora*, Ill.; *C. pennsylvanica*, Conn., Ia., Ill., Mass., Mich., N. Y.; *Carex* sp., Calif., Colo., Ind., Mich., Ore., Utah, Wyo.

The writer has received a specimen of the type of *Ustilago ambiens* from Karsten and it proves to be this species.

**MYKOSYRINX CISSI** (DC.) Beck.—*Schroeteria cissi* De Toni, *Sacc. Syll. Fung.* 7<sup>2</sup>:501. 1888. *Mykosyrinx cissi* Beck, *Ann. Natur. Hofmus. Wien*, 9:123. 1894.

Hosts: *Cissus acida*, Porto Rico; *C. erosa*, Porto Rico; *C. sicyoides*, Fla., Bahamas, Jamaica, Porto Rico, San Domingo (type); Vitaceae, Haiti, Mexico.

**SOROSPORIUM CONSANGUINEUM** Ell. & Ev.—*Ustilago aristidae* Pk., *Bull. Torr. Bot. Club* 12:35. 1885.

Hosts: *Aristida basiramea*, S. Dak.; *A. longiseta robusta*, Neb.; *A. purpurea*, Neb.; *A. rusbyi*, Ariz. (type); *A. scheideana*, Ariz.; *Aristida* sp., Kans., Tex. (type *U. aristidae*).

With age the spore-balls very easily separate into the individual spores and then the fungus may be taken for an *Ustilago*.

**SOROSPORIUM SYNTHERRISMAE** (Pk.) Farl.—*Ustilago syntherismae* Pk. (not Schw.) *Ann. Rep. N. Y. St. Mus.* 27:103. 1875. *Sorosporium syntherismae* Farl., *Host Index N. A. F.* 152. 1891. *Sorosporium cenchri* Henn, *Hedw.* 35:221-2. 1896.

Hosts: *Cenchrus multiflorus*, Mex.; *C. tribuloides*, Conn., Ia., Ill., Ind., Kans., Mich., Minn., Neb., N. Y., S. Dak., Tex., Wisc.; *Cenchrus* sp., Kans., Mex.; *Panicum agrostoides*, Mo.; *P. capillare*, Ia., Ind., Kans., Mass., Neb., S. Dak.; *P. proliferum*, Ia., Ill., Kans., Mo.; *Panicum* sp., Kans., D. C., Mo.

**SOROSPORIUM ELLISII** Wint.—*Sorosporium syntherismae* Amer. Auct. p. p.

Hosts: *Andropogon scoparius*, Conn., Ill., Kans.; *A. virginicus*, N. J. (type); *Aristida dichotoma*, Ohio, Penn. (type).

**SOROSPORIUM EVERHARTII** Ell. & Gall.—*Tolyposporium everhartii* Diet., Nat. Pflanzenf. 1<sup>1</sup>\*:14. 1897.

Hosts: *Andropogon macrourus*, Fla.; ? *A. scoparius*, Ala.; *A. virginicus*, Ala., Miss., N. J. (type).

**SOROSPORIUM PROVINCIALE** (Ell. & Gall.) Clint. n. sp.—*Sorosporium ellisii* var. *provincialis* Ell. & Gall., Journ. Mycol. 6:31-2. 1890.

Sori in the inflorescence, linear, often 6 or more cm. in length, concealed within the leaf sheath or the upper part protruding, with false membrane that becomes lacerated as exposed and with black brown granular spore mass; spore-balls variable, apparently gradually wearing away, chiefly 50-100  $\mu$  or possibly even longer; spores medium light reddish brown though often darker in places, rather regular, ovoid to chiefly subspherical, minutely verruculose, with thick (3  $\mu$ ) uniform cell wall, 14-19  $\mu$  in length.

Host: *Andropogon furcatus*, Mo. (type), Neb.

This species is based on specimens No. 2425 in Ell. & Ev. N. A. F. It seems entitled to specific rather varietal rank as it is the most sharply marked off of the related species on *Andropogon*. It is especially distinguished by the thick uniform walls of the spores.

**SOROSPORIUM RHYNCHOSPORAE** Henn.—Host: *Rhynchospora semiplumosa*, Miss.

**SOROSPORIUM GRANULOSUM** Ell. & Tr.—Host: *Stipa viridula*, Col. (type).

**THECAPHORA PILULAEFORMIS** B. & C.—*Thecaphora pilulaeformis* B. & C., Grev. 3:58. 1874. *Tolyposporium davidsonii* Diet. Holw., Bot. Gaz. 19:395. 1894. *Poikilosporium davidsohnii* Diet., Flora 83:87. 1897. *Poecilosporium davidsonii* Sacc. & Syd., Syll. Fung. 16:380. 1902. *Sorosporium bigeloviae* Griff., Bull. Torr. Bot. Club 29:295. 1902.

Host: *Bigelovia veneta*, Calif. (type); *Bigelovia* sp., Ariz. (type *S. bigeloviae*).

Dietel and Holway erroneously reported the host as *Atriplex*. The writer has examined both the Berkeley and Curtis specimens

and those of Dietel and Holway and the two prove to be the same fungus. Recently Griffiths has described the species under the name of *Sorosporium bigeloviae*.

**THECAPHORA TRAILII** Cke.—*Thecaphora trailii* Cke., Grev. 11:155. 1883. *Thecaphora cirsii* Boud., Bull. Soc. Myc. Fr. 3:149. 1887. *Schizonella subtrifida* Ell. & Ev., Journ. Mycol. 6:119. 1891. *Poikilosporium trailii* Vesterg., Micr. Rar. Sel. 452. 1902.

Host: *Cnicus ochrocentrus* Colo. (type *S. subtrifida*).

**THECAPHORA CALIFORNICA** (Hark.) Clint. n. nom.—*Sorosporium californicum* Hark., Bull. Calif. Acad. Sci. 1:161-2. 1885.

Host: *Grindelia robusta*, Calif. (type).

**THECAPHORA CUNEATA** (Schof.) Clint. n. nom.—*Sorosporium cuneatum* Schof., Contr., Bot. Dep. Uni. Neb. 3:48. 1892. *Sorosporium solidaginis* Ell. & Ev., Proc. Acad. Nat. Sci. Phil. 1893:156. 1893.

Hosts: *Grindelia squarrosa*, Neb. (type), Kans.; *Solidago missouriensis*, Kans. (type *S. solidaginis*).

**THECAPHORA DEFORMANS** Dur. & Mont.—*Thecaphora deformans* Dur. & Mont., Ann. Sci. Nat. Bot. III, 7:110. 1847. *Thecaphora lathyri* Kühn, Rab. Fungi Eur. 1797. 1873. *Thecaphora affinis* Schneid., Jahrb. Schles. Ges. Vat. Kult. 1874:90. 1874. *Sorosporium desmodii* Pk., Bot. Gaz. 3:35-1878. *Sorosporium astragali* Pk., Bot. Gaz. 4:218. 1879. *Thecaphora astragali* Wor., Abh. Senck. Nat. Ges. 12:579. 1882. *Thecaphora desmodii* Wor., Abh. Senck. Nat. Ges. 12:579. 1882.

Hosts: *Astragalus bisulcatus*, Colo.; *A. drummondii*, Colo. (type *S. astragali*); *A. multiflorus*, Utah; *A. scopulorum*, Colo.; *Desmodium acuminatum*, N. J. (type *S. desmodii*); *D. nudiflorum*, Mary., Penn.; *Hosackia parviflora*, Wash.; *Lupinus* sp. Colo.; *Trifolium tridentatum*, Calif.

**THECAPHORA MEXICANA** Ell. & Ev. n. sp.—Sori on stems, prominent, forming clustered subglobose pustules each about 4 mm. in diameter, firm, upon rupture scattering dusty umber spore mass and leaving behind the remains of the hollowed pustules; spore-balls light reddish yellow, ovoid to spherical, composed of 15-30 spores separated by prominent hyaline areas that apparently widen with maturity, 50-90  $\mu$  in length; spores angular when young but with age becoming more rounded, irregular, oblong to polyhedral or subpherical, with distinct inner and outer coats, the latter thick and provided with prominent irregular papillae, chiefly 16-22  $\mu$ , most elongated rarely 25  $\mu$  in length.

Host: *Guardiola platyphylla*, Mex. (type).

This interesting species bears the above name in the U. S. Dept. Agr. Herb. (Div. Veg. Path. & Phys.) and is evidently

new. It was collected by Dr. Palmer in Mexico. The pustules are larger and more clustered than those formed by *Thecaphora pilulaeformis*. The hyaline intersporal areas are peculiar and it is probable that by further gelatinization of these the spores become separated. In the younger conditions the spore-balls are imbedded in the prominent semi-gelatinized mycelium. The germination of the species is not known.

**THECAPHORA ATERRIMA** Tul.—*Sorosporium atrum* Pk., Bot. Gaz. 5:35. 1880. *Tolyposporium aterrimum* Diet., Nat. Pflanzenf. 11\*\*:14. 1897.

Hosts: *Carex adusta*, Ia.; *C. pennsylvanica*, Colo. (type *S. atrum*), Kans.; *Carex sp.*, Ia.

There is some doubt as to the true generic position of this species. Dietel places it under *Tolyposporium*.

**TOLYPOSPORELLA BRUNKII** (Ell. & Gall.) Clint. n. nom.—*Ustilago* (*Sorosporium*?) *brunkii* Ell. & Gall., Journ. Mycol. 6:31. 1890. \* *Ustilago apiculata* Ell. & Gall., Tex. Agr. Exp. Sta. Bull. 9:29. 1890.

Hosts: *Andropogon argenteus*, Tex. (type); *A. perforatus*, Mex.; *A. saccharoides*, Tex., Mex.

This species is related through its very thick but much more regular epispore to *Tolyposporella chrysopogonis* though it does not form the definite spore-balls of that species. Its spores have considerable resemblance to *Kuntzeomyces ustilaginoideus* but the outer coat, upon pressure, does not break open and let out the unruptured spore as does that species but the fissure extends clear through the spore.

**TOLYPOSPORELLA CHRYSOPOGONIS** Atk.—Host: *Chrysopogon nutans*, Ala. (type), Tex.

**TOLYPOSPORIUM BULLATUM** Schröt.—Host: *Panicum crus-galli*, Conn., Ia., Ill., Mass.

**TOLYPOSPORIUM ERIOCAULI** Clint.—Host: *Eriocaulon septangulare*, Mass. (type), N. H.

**TESTICULARIA CYPERI** Klotz.—Hosts: *Rhynchospora macrostachya*, N. Y.; *Cyperaceae*, N. Amer. (type).

## TILLETIACEÆ.

### \* Spores smooth. (*Tilletia*.)

**TILLETIA FOETENS** (B. & C.) Trel.—Host: *Triticum vulgare*, Ia., Ind., Ill., Kans., Ky., Md., Mass., Mich., Minn., Mont., Neb., N. Car. (type), N. Dak., N. J., Ohio, S. Dak., Wisc., Wyo., Manitoba, N. W. Ter.

\* Listed by Jennings as a new species but not described.

**\*\* Spores reticulate. (Tilletia.)**

TILLETIA TRITICI (Bjerk.) Wint.—Host: Triticum vulgare, Ia., Kans., Mich., Minn., Nev., N. J., Ohio, W. Virg. on leaves (?).

TILLETIA ANTHOXANTHI Blytt.—Host: Anthoxanthum odoratum, Conn.

This species was first described in 1896 from Norway. It has not been reported very often. The writer found it the past summer at New Haven, Conn. Apparently this is the only time it has been collected in this country.

TILLETIA ELYMI Diet. & Holw.—Hosts: Elymus glaucus, Mont.; Elymus sp., Wash. (type).

TILLETIA CEREBRINA Ell. & Ev.—Host: Deschampsia caespitosa, Rocky Mts. (type).

TILLETIA MONTANA Ell. & Ev.—Hosts. Redfieldia flexuosa, Neb.; Sporobolus gracillimus, Rocky Mts. (type).

TILLETIA FUSCA Ell. & Ev.—Hosts: Festuca microstachya, Rocky Mts. (type), Wash.; F. tenella, Ida., Mont., Ore., Wyo.

TILLETIA ASPERIFOLIA Ell. & Ev.—Hosts: Sporobolus asperifolius Colo., Mont., N. Mex., Ore., Rocky Mts. (type), Wash., Wy.; ?S. simplex, Mont.

**\*\*\* Spores verruculose. (Tilletia.)**

TILLETIA MACLAGANI (Berk.) Clint. n. nom.—Ustilago maclagani Berk., Grev. 3:58-9. 1874. Ustilago rotundata Arth., Bull. Ia. Agr. Coll. 1884:173. 1884. Tilletia rotundata\* Ell. & Ev., N. A. F. no 1894. 1887. Tilletia rotundata Mass., Kew Bull. 153:145. 1899.

Host: Panicum virgatum, Conn., Ia. (type U. rotundata). Kans., Neb., Montreal (type).

The writer is indebted to Massee for a specimen of Berkeley's type of Ustilago maclagani and this proves to be the same as Arthur's Ustilago rotundata. The smut is evidently a Tilletia though its germination has not been reported.

\* Ellis and Everhart called the fungus Ustilago rotundata Arth., but said it was evidently a Tilletia and therefore American botanists have since called the fungus Tilletia rotundata (Arth.) Ell. & Ev.

\*\*\*\* **Spores with prominent tubercles, spines or scales. (*Tilletia*.)**

*TILLETIA EARLEI* Griff.—Host: *Agropyron occidentale*, S. Dak. (type).

This species is peculiar in that the sorus occurs in the modified culm of his host.

*TILLETIA TEXANA* Long n. sp.—Sori in ovaries, ovoid or oblong, about 3-5 mm. in length, more or less hidden by enveloping glumes, forming a somewhat agglutinated light-reddish brown spore mass; sterile cells not very numerous, hyaline, with very thick often lamellate walls and central contents; spores very light-colored, orange yellow (appearing as if somewhat immature) chiefly subspherical or spherical, with prominent conical tubercles (blunt or sometimes quite pointed) which extend out 2-3  $\mu$  to the evident hyaline envelope, chiefly 19-25  $\mu$  in diameter.

Host: *Hordeum pratense*, Tex. (type).

In Europe *Tilletia hordei* occurs as a parasite on a species of *Hordeum* but that smut possesses reticulate spores and so is quite distinct from the species described here. This description is based on the single collection made by Long and as the spores have somewhat the appearance of being immature, it may be that the description will need some changing with further study of the fungus. It is closely related to *Tilletia buchloeana* but apparently differs in the slightly larger lighter colored spores with more prominent tubercles and in the character of the hyaline membrane. The spores have not been germinated.

*TILLETIA BUCHLOEANA* Kell. & Sw.—Host: *Buchloë dactyloides*, Kans. (type).

*TILLETIA CATHESTECI* (Henn.) Clint. n. nom.—*Ustilago cathesteci* Henn., Hedw. 36:212. 1897.

Host: *Cathestecum procumbens*, Mex. (type).

*TILLETIA CORONA* Scrib.—Hosts: *Leersia lenticularis*, Miss.; *L. oryzoides*, D.C. (type), Mo.; *L. virginica*, D.C. (type), Ill., Miss.; Ohio.

*TILLETIA PULCHERRIMA* Ell. & Gall.—*Tilletia pulcherrima* Ell. & Gall., Bull. Torr. Bot. Club, 23:210. 1896.

This herbarium name was merely mentioned here by Earle. The writer believes the fungus to be a distinct species from *Tilletia corona* Scrib.

*TILLETIA RUGISPORA* Ell. & Gall.—Hosts: *Paspalum plicatum*, Tex. (type); *Paspalum* sp., Mex.

*TILLETIA HORRIDA* Tak.—Host: *Oryza sativa*, S. Car.

NEOVOSSIA IOWENSIS Hume & Hods.—Host: *Phragmites communis*, Ia. (type), Conn.

TUBURCINIA CLINTONIAE Kom.—*Urocystis colchici* Amer. auct. p. p. *Tuburcinia trientalis* Amer. auct. pp. *Tuburcinia clintoniae* Kom. Jacq-Koö-Tranz. *Fungi Rossiae* 260. 1899.

Hosts: *Polygonatum giganteum*, Ia.; *Smilacina stellata*, Mont.; *Smilacina*, Wisc.; *Streptopus roseus*, Brit. Col.

TUBURCINIA TRIENTALIS B. & Br.—Host: *Trientalis europaea*, Alaska.

UROCYSTIS WALDSTEINIAE Pk.—*Urocystis waldsteiniae* Pk., Ann. Rep. N. Y. Stat. Mus. 46:32. 1893. *Ustilago waldsteiniae* Paz., Rab-Wint-Paz. *Fungi Eur.* 4011. 1895. *Urocystis gei* Ell. & Ev., Bull. Torr. Bot. Club 27:572. 1900.

Hosts: *Geum ciliatum*, Wash. (type *Urocystis gei*); *Waldsteinia fragarioides*, N. Y. (type), Wisc.

This is not a typical *Urocystis* since it lacks the sterile peripheral cells. Pazschke has placed it under *Ustilago* but it has characters not in entire agreement with that genus. It seems best to let it remain under *Urocystis* until more is known of its development; especially of the germination of the spores.

UROCYSTIS ANEMONES (Pers.) Wint.—Hosts: *Actaea alba*, W. Virg.; *Anemone caroliniana*, Kans., Tex.; *A. nemorosa*, Conn., Ia., Mass., Me., Mich., N. Y., Wisc.; *A. patens* var. *nuttalliana*, Colo.; *A. pennsylvanica*, N. Y., Wisc.; *A. virginiana*, Tex.; *Anemonella thalictroides*, N. Y.; *Hepatica acutiloba*, Ia., Ill., Ind., N. Y., Wisc.; *H. triloba*, Mo.; *Ranunculus fascicularis*, Ill.; *Trollius* sp., N. Y.

UROCYSTIS CARCINODES (B. & C.) Fisch. d. Waldh.—Host: *Cimicifuga racemosa*, N. Car., Ohio, Penn. (type). Tenn.

UROCYSTIS SOROSPORIOIDES Körn.—Hosts: *Aconitum columbianum*, Utah; *Aquilegia coerulea*, Utah; *Delphinium* sp., Calif.; *Thalictrum alpinum*, Greenl.; *Thalictrum* sp., Mass.

UROCYSTIS VIOLAE (Sow.) Fisch. d. Waldh.—Hosts: *Viola odorata*, Canada; *Viola* sp., Minn.?

UROCYSTIS CEPULAE Frost.—Hosts: *Allium cepa*, Conn. (type), Ind., Mass., N. J., N. Y., Ohio; *A. nevadense*, Nev.

UROCYSTIS OCCULTA (Wallr.) Rab.—Host: *Secale cereale*, Conn., Mass., Minn., Ohio, N. J., N. Y., R. I.

UROCYSTIS AGROPYRI (Preuss) Schröt.—Hosts: *Agropyron divergens*, Wash.; *A. repens*, Mass., Verm.; *Bromus ciliatus*, Ia.; *Calamagrostis canadensis*, Ore.; *Elymus arenarius*, Greenl.; *E. canadensis*, Ia., Ill., Mo., Neb., Wisc.; *E. robustus*, Ia.; *E. virginicus*, Ill.

UROCYSTIS JUNCI Lagerh.—Host: *Juncus balticus*, Nev.

UROCYSTIS GRANULOSA Clint. n. sp.—Sori in the spikelets, ovoid to oblong, about 5-10 mm. in length, chiefly confined to the inner parts but showing through the more or less infected glumes, forming a granular, black spore mass; spore-balls reddish to black brown, ovoid to spherical, not easily ruptured, chiefly 28-50  $\mu$  in length; sterile cells reddish yellow, ovoid to subspherical, completely covering the spores, often somewhat indefinite in appearance through the collapsing of outer wall, about 8-13  $\mu$  in length; spores dark reddish brown, ovoid to spherical or polyhedral through pressure, smooth, about 13-19  $\mu$  in length.

Host: *Stipa comata*, Ida. (type).

This species is based on a specimen in S. M. Tracy's herbarium labeled *Sorosporium granulosum* Ell. & Tr. on *Stipa comata*, collected by Dr. F. V. Hayden in Idaho in 1859. It differs from the type of *Sorosporium granulosum* in the same herbarium on *Stipa viridula* in that the sori are in the spikelets, and the spore balls, have fewer spores and possess a definite covering of sterile cells.

UROCYSTIS HYPOXYIS Thaxt.—Host: *Hypoxys erecta*, Conn. (type), Mass.

**\*Spores dark colored. (Entyloma.)**

ENTYLOMA LINEATA (Cke.) Davis.—*Entyloma crastophilum*. Amer. auct. p. p.

Host: *Zizania aquatica*, Conn., Ga. (type), Ill., Neb., S. Dak., Wisc.

ENTYLOMA CRASTOPHILUM Sacc.—Hosts: *Holcus lanatus*, N. Y.; *Phleum pratense*, Ia., Ill.

ENTYLOMA IRREGULARE Johans.—Host: *Poa pratensis*, Ill.

ENTYLOMA SPECIOSUM Schröt. & Henn.—Hosts: *Alopecurus geniculatus*, Tex.; *Panicum proliferum*, Ill.; *Panicum* sp., Ill.

ENTYLOMA CARICINUM Rostr.—Host: *Carex rigida*, Greenland (type).

**\*\* Spores light colored. (Entyloma.)**

ENTYLOMA THALICTRI Schröt.—*Entyloma ranunculi* forma *thalictri* Farl., Bot. Gaz. 8:275. 1883.

Hosts: *Anemone nemorosa*, Wisc.; *Thalictrum dioicum*, Wisc. (type *E. ranunculi* forma *thalictri* Farl.); *T. purpurascens*, Ill.

This is probably the same as Schröter's *E. thalictri* though no specimen of the European fungus has been available for comparison.

ENTYLOMA MENISPERMI Farl. & Trel.—Host: *Menispermum canadense*, Ia., Ill., Kans., Minn., Mo., N. Dak., Wisc. (type).

ENTYLOMA COMPOSITARUM Farl.—Hosts: ?*Ambrosia artemisiaefolia*, Mass.; *A. psilostachya*, Kans., Wisc.; *A. trifida*, D.C., Ill., Mo., Wisc.; *Ambrosia* sp., Ohio; *Aster cordifolius*, Mass.; *A. novi-belgii*, Mass., Me.; *A. paniculatus*, Wisc.; *A. puniceus*, Mass., N. H. (type); *Aster* sp., N. Bruns.; *Bidens chrysanthemoides*, Kans.; *Erigeron elatus*, Wash.; *E. philadelphicus*, N. Dak.; ?*Eupatorium ageratoides*, Ill.; *Gnaphalium* sp., Ala.; *Helenium autumnale*, Wisc.; *Heterotheca lamarkii*, Kans.; *Lactuca canadensis*, Minn.; *Lepachys pinnata*, Ia., Ill., Minn., Wisc.; *Rudbeckia laciniata*, Mo., Ohio; *Senecio aureus*, Neb., Wisc.; *S. aureus* var. *balsamitae*, Kans.; *Silphium integrifolium*, Wisc.

The writer has not examined this species on all of the above hosts and in such cases has depended upon the reported identity of the species. It is possible that on some of these hosts the species may be *E. polysporum*. In some cases the same host may have either species attacking it, however.

ENTYLOMA POLYSPORUM (Pk.) Farl.—*Entyloma holwayi* Syd. Ust. 282. 1901.

Hosts: *Ambrosia artemisiaefolia*, Ia., Ill., Ind., Mich., N. Y., Wisc.; *A. bidentata*, Ill.; *A. trifida*, Ill., N. Y. (type); *Cosmos sulphureus*, Mex. (type *E. holwayi*); *Gaillardia pulchella*, Kans.; *Helianthus annuus*, Mont.

ENTYLOMA ARNICALIS Ell. & Ev.—Hosts: *Arnica chamissonis*, Wash. (type); *A. cordifolia*, Ida.; *A. latifolia*, Wash.

ENTYLOMA GUARANITICUM Speg.—Hosts: — ?*Bidens frondosa*, Mass.; *B. leucantha*, Fla.

ENTYLOMA FLOERKEAE Holw.—Host: *Floerkea proserpinacoides*, Ill., Ohio, Wisc.

ENTYLOMA COLLINSIAE Hark.—Host: *Collinsia bartisiaefolia*, Calif. (type).

ENTYLOMA LOBELIAE Farl.—Host: *Lobelia inflata*, Conn., Ill., Mass., Me., (type), Mo., N. Car., N. H., Ohio, Wisc., W. Va.

ENTYLOMA PHYSALIDIS (Kalchb. & Cke.) Wint.  
— *Entyloma besseyi* Farl., Bot. Gaz. 8:275. 1883.

Hosts: *Physalis angulata*, Miss.; *P. lanceolata*, Ill., Kans., Ohio, S. Dak.; *P. lanceolata* var. *laevigata*, Kans.; *P. Philadelphica*, Ind.; *P. pubescens*, Ill., Ind., Kans., Tex., Wisc.; *P. virginiana*, Ia., Ill., Mich., N. J., N. Y., Wisc., Can.; *Physalis* sp., Conn., Ia. (type *E. besseyi* Farl.), Kans., Ky., Neb., N. Y., Tex., Wisc.; *Solanum nigrum*, Ia., Kans.; *S. triflorum*, N. Dak.

ENTYLOMA SEROTINUM Schröt.—Host: *Mertensia virginica*, Ia., Mary.

ENTYLOMA SANICULAE Pk.—Hosts: *Sanicula marylandica*, Ia., Ill., N. Y. (type), Wisc.; *S. menziesii*, Calif.; *Sanicula* sp., Ala., Ind.

ENTYLOMA ERYNGII (Cda.) DeBy.—Host: *Eryngium yuccaefolium*, Ia.

ENTYLOMA LINARIAE Schröt.—Host: *Linaria vulgaris*, N. J.

ENTYLOMA LINARIAE var. VERONICAE Hals.—Hosts: *Veronica americana*, Colo., N. Y.; *V. peregrina*, Ia., Ill., Mary., Mo., Wisc.

ENTYLOMA ELLISII Hals.—Host: *Spinacia oleracea*, N. J. (type).

ENTYLOMA ESCHSCHOLTZIAE Hark.—Host: *Eschscholtzia californica*, Calif. (type).

ENTYLOMA FUSCUM Schröt.—Host: *Papaver* sp. cult., Me., N. Brunsw.

ENTYLOMA MICROSPORUM (Ung.) Schröt.—Hosts: *Ranunculus fascicularis*, Wisc.; *R. septentrionalis*, Ill., Wisc.; *Ranunculus* sp., Ia.

ENTYLOMA MICROSPORUM var. PYGMAEUM Al-lesch.—Host: *Ranunculus pygmaeus*, Greenl. (type).

The writer has not seen a specimen of this variety. Judging from the description it does not seem to differ very essentially from the species.

ENTYLOMA NYMPHAEAE (Cunn.) Setch.—*Entyloma castaliae* Holw., Trans. Wisc. Acad. Sci. Arts. Let. 11:174-6. 1897.

Hosts: *Nuphar advena*, Conn., Ill., Mass., Wisc.; *Nymphaea odorata*, Conn., Mass., Ohio; *N. reniformis*, Ia., Ill., Wisc.; *Nymphaea sp.*, Ia., N. J., Ohio.

**BURRILLIA DECIPIENS** (Wint.) Clint. n. nom. — *Doassansia decipiens* Wint., Journ. Mycol. 1:102. 1885.

Host: *Limnanthemum lacunosum*, N. J. (type).

The spore-balls of this species have no definite cortical layer and for this reason it has been placed by the writer under *Burrillia*.

**BURRILLIA ECHINODORI** Clint. n. sp. — *Doassansia alismatis* of Hark. in Proc. Calif. Acad. Sci. II, 2:231. 1889.

Sori in the leaves, forming irregular to sub-circular areas, showing spore-balls as closely clustered very minute elevations on both surfaces of the leaf; usually a single spore-ball occupying entire section of leaf between layers of the epidermis, more or less merged sidewise, often irregular but chiefly oblong to sub-spherical, without distinct cortex but composed of sterile cells and spores intermixed; sterile cells light reddish brown, with thinner walls than the spores and more irregular in shape and size; spores light-colored, chiefly ovoid to spherical, occasionally somewhat flattened, apparently thick-walled, 12-18  $\mu$  in length.

Host: *Echinodorus rostratus*, Calif., Fla. (type).

This species was, apparently, first reported from California by Harkness, who called it *Doassansia alismatis*. Setchell evidently made an examination of this material as he states that it is not this species but an *Entyloma* with a compact sorus. The writer's description is based on a specimen in the herbarium of the U. S. Dept. Agr., Div. Veg. Path. and Phys., collected by Simson in Florida in 1892. Sections from this material show that the sori have no definite cortex and that the spores are larger and thicker walled than either *Doassansia alismatis* or *D. sagittariae* to which the species has superficial resemblance. The sori are also much larger; these larger sori in some cases, however, appear to be due to a very complete fusion of smaller sori. The peculiarity of the species is that the sori are not composed entirely of spores but of sterile cells and spores intermixed. The sterile cells are not strikingly different from the spores but have more the appearance of the ordinary cortical cells. Upon staining with eosin the spores become more evident through their thicker more regular walls.

**BURRILLIA PUSTULATA** Setch.—*Doassansiopsis pustulata* Diet., Nat. Pflanzenf. 1<sup>1\*\*</sup>:22. 1897.

Host: *Sagittaria variabilis*, Ill. (type), Wisc.

\* **Eudoassansia.**

DOASSANSIA EPILOBII Farl.—Host: *Epilobium alpinum*, N. H. (type).

DOASSANSIA RANUNCULINA Davis.—Host: *Ranunculus multifidus*, Wisc. (type).

DOASSANSIA SAGITTARIAE (West.) Fisch.—Hosts: *Sagittaria arifolia*, Ill.; *S. graminea*, Ill.; *S. heterophylla*, Wisc.; *S. variabilis*, Kans., Mo., Ohio, N. Y., Wisc.; *Sagittaria* sp., Mo., Verm., Can.

DOASSANSIA ALISMATIS (Nees.) Cornu.—Host: *Alisma plantago*, Calif.?, Ia., Kans., Minn., Mo., Neb., Wisc. *Alisma plantago*, Calif.?, Ia., Kans., Minn., Mo., Neb., N. Y. Wisc.

DOASSANSIA OPACA Setch. — Host: *Sagittaria variabilis*, Conn., Ill., Mass. (type), R. I.

\*\* **Pseudoassansia.**

DOASSANSIA OBSCURA Setch.—Host: *Sagittaria variabilis*, Conn. (type), Mass. (type), Wisc.

\*\*\* **Doassansiopsis.**

DOASSANSIA OCCULTA (Hoffm.) Cornu.—*Doassansiopsis occulta* Diet., Nat. Pflanzenf. 1<sup>1\*\*</sup>:21. 1897.

Hosts: *Potamogeton pennsylvanicus*, Conn., N. Y.; *Potamogeton* sps., Ill.?, Kans.

DOASSANSIA OCCULTA var. FARLOWII (Cornu.) Setch.—Hosts: *Potamogeton natans*, Can.; *P. pennsylvanicus*, Verm.; *P. perfoliatus* var. *lanceolatus*, Can.; *P. pusillus*, Can.; *P. vaseyi*, Can. (type).

There is some question whether the variety is distinct. It has been studied especially only on *Potamogeton vaseyi*.

DOASSANSIA MARTIANOFFIANA (Thüm.) Schröt.—*Doassansiopsis martianoffiana* Diet., Nat. Pflanzenf. 1<sup>1\*\*</sup>:21. 1897.

Hosts: *Potamogeton natans*, Mass.; *Potamogeton* sps., Conn., Ill., N. Y., Wisc., Can.

DOASSANSIA DEFORMANS Setch.—*Doassansiopsis deformans* Diet., Nat. Pflanzenf. 1<sup>1\*\*</sup>:21. 1897.

Hosts: *Sagittaria variabilis*, Conn. (type), Ill., Mass., Mo., R. I., S. Dak., Wisc., Can.; *S. variabilis* var. *angustifolia*, Ill.; *Sagittaria* sps., Fla., Tex.

DOASSANSIA INTERMEDIA Setch.—Doassansia intermedia Setch., Bot. Gaz. 19:185-6. 1894. Doassansia affinis Ell. & Dearn., Bull. Torr. Bot. Club 22:364. 1895.

Host: *Sagittaria variabilis*, Minn., N. H. (type), Can. (type *D. affinis*).

TRACYA LEMNAE (Setch.) Syd.—*Cornuella lemnae* Setch., Proc. Amer. Acad. Arts. Sci. 26:19. 1891. *Tracya lemnae* Syd., Hedw. Beibl. 40:2. 1901.

Host: *Spirodela polyrrhiza*, Conn., Mass. (type), R. I., Wisc.

Conn. Agr. Exp. Station, September, 1902.





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