

## NOTES ON WISCONSIN PARASITIC FUNGI. IV.

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These notes are a continuation of those of the late J. J. Davis who published at intervals on the parasitic fungus flora of the state of Wisconsin for a period covering nearly half a century, from 1893 to 1937. During the latter half of this period Dr. Davis, then retired from medical practice, covered the state so extensively that it seems likely that the plant parasitic fungi of Wisconsin are as well known as those of any other comparable region of the United States. I have, partly from necessity and partly from choice, largely confined my work to intensive collecting in small areas throughout entire seasons. As is known to anyone who has collected in this fashion, the range of parasites that will be encountered over a period of years seems limited only by the host plants which are present. Thus, it has been possible to find many parasitic fungi which are new to the state, and to find an even greater number which, although previously cited, are on host plants not before reported as bearing them in Wisconsin.

The fungi mentioned in the notes which follow were, unless it is otherwise stated, collected in the vicinity of Madison, Dane County, Wisconsin during the season of 1943.

**Physoderma Claytoniana** sp. nov.

Verrucis purpureo-brunneis, rotundatis, 0.7-1 mm. diam., in foliis, gregariis vel dispersis; sporis levibus, globosis vel subglobosis, aureo-brunneis, 16-23  $\mu$ , episporis 1-2  $\mu$  crassis.

Galls purplish-brown, rounded, 0.7-1 mm. diam., on leaves, gregarious or scattered; spores smooth, globose or subglobose, yellow-brown, 16-23  $\mu$ , epispore 1-2  $\mu$  thick.

On leaves of *Claytonia virginica*. Baxter's Hollow, Town of Sumpter, Sauk Co., Wis., U. S. A., April 30, 1938.

There appear to be no previous reports of *Physoderma* on members of the Portulacaceae.

Well-developed perithecia of **Erysiphe graminis** DC. were found on leaves of *Agropyron repens*, July 19. Records of perithecia in Wisconsin are very few and, so far as I am aware, there is none in the case of quack grass. The asci were well formed but contained no spores. The material in the field was examined at intervals over a six weeks period, but spores were not produced.

*Dryopteris Thelypteris* in marshes about Lake Wingra was heavily infected by **Taphrina lutescens** Rostr. in July. This was determined by Dr. A. J. Mix who (*Mycologia* 30: 564, 1938) points out that the asci may be considerably smaller than those of the original Danish form, and this is the case with the Wisconsin collections. Dr. Mix informs me

that only two or three additional collections of **T. lutescens** are known from the Western Hemisphere.

In coöperation with Dr. G. B. Cummins of Purdue University, cultures of **Puccinia Liatridis** (Webber) Bethel from *Koeleria cristata* have been made in the open on various species of *Liatris*, and a reciprocal culture on *Koeleria* obtained.

Arthur (*Mycologia* 9: 301, 1917) was the first to publish an account of successful cultures of this rust, on *Liatris punctata*, although Bethel had earlier made similar cultures without publishing his results. Dr. Cummins states that so far as he knows Arthur's is the only cultural work which has heretofore been carried out with **P. Liatridis**.

The current studies have been made in part by Dr. Cummins at Lafayette, Indiana and in part by the writer at Madison, Wisconsin. Aecial material was collected by Dr. Cummins in the field near Ogden Dunes on U. S. Highway 12, east of Gary, Indiana, June 25, 1942. The heavily infected *Liatris spherioidea* was closely associated with *Koeleria cristata* bearing uredia of **P. Liatridis**. On October 22, 1942 Dr. Cummins revisited this location and collected telial material in abundance. (This was overwintered in cheesecloth bags in the open at Lafayette.) At the same time *L. spherioidea* plants were dug and transplanted to plots at Lafayette, along with plants of *L. spicata* and *L. spherioidea* obtained near Monon, Indiana in an area where the rust has not been observed.

Cultures at Lafayette were made by mulching the *Liatris* plants with overwintered telial material on May 5, 1943. Pycnia were observed on all the mulched plants on May 23, followed by aecia on and after June 1, 1943.

The Wisconsin cultures were carried out in similar fashion with telial material furnished by Dr. Cummins. Two species of *Liatris* were employed, *L. squarrosa* and *L. ligulistylis*. The former is not indigenous to Wisconsin, but occurs in an abandoned nursery in the University of Wisconsin Arboretum at Madison. Plants of *L. squarrosa* were mulched on May 19. Pycnia appeared ten days later, but the development of aecia required nearly two weeks more, being slowed by unseasonably cold weather. The culture on *L. ligulistylis* was made on plants which had been transplanted in 1942 some five miles from their native habitat to property owned by the writer near Eagle, in Waukesha County. These were mulched on May 28, 1943. It was not possible to examine them again until three weeks later, at which time well-developed aecia were found on the blades and petioles of the leaves. Only the plants which had been mulched showed the infection, although others of the same species were growing very near them. In this connection it is of interest that naturally infected *L. ligulistylis* was found at the same time in its native locale on the Scuppernong Prairie, two miles northwest of Eagle, Wisconsin.

The reciprocal culture was made by bringing a potted tuft of un-

rusted *Koeleria cristata* into contact with rusted *L. squarrosa* in the field. After approximately a month, both uredia and telia developed on leaves proliferated from the base of the clump. Other clumps of *Koeleria*, growing at the place where the experimental one was obtained, were examined at intervals throughout the summer without showing any signs of rusting.

Specimens of all these cultures have been deposited in the Arthur Herbarium at Purdue University and in the Cryptogamic Herbarium of the University of Wisconsin.

The names of the host species are based in part on a paper by L. H. Shinnars entitled "A Revision of the *Liatris scariosa* Complex" (Amer. Mid. Nat. **29**: 27-41, 1943). We are indebted to Dr. Shinnars for the determination of the Indiana specimens.

In the Wisconsin Herbarium there are aecial collections of **Puccinia Liatridis** on seven species of *Liatris*, namely, *L. cylindracea*, *L. ligulistylis*, *L. punctata*, *L. pycnostachya*, *L. spheroidea*, *L. spicata* and *L. squarrosa*. So far as I am aware no collections on *L. cylindracea*, *L. ligulistylis*, or *L. pycnostachya* have been made outside Wisconsin up to the present.

**Puccinia Helianthi** Schw. I on *Helianthus rigidus*. (*H. scaberrimus* of Gray's Manual, 7th ed), June 12. Aecia of **P. Helianthi** are rarely developed in Wisconsin. On *H. rigidus* they are very inconspicuous and small, being confined to a single cup in extreme cases. The only other aecial collections on this host in the Wisconsin Herbarium are No. 2961 of Fungi Columbiani, taken at Scotia, Nebraska, June 1909, and No. 2043 of North American Uredinales from Brownlee, Nebraska, July 1918. Dr. Cummins states that there are likewise no other specimens on this host in the Arthur Herbarium.

Some species of orchids grown in greenhouses are very susceptible to attack by *Gloeosporium*. A leaf die-back is the common result, with the tips being first involved, and the infection then spreading back toward the base, until ultimately the entire leaf may be killed. Rather cursory inspection of plants in greenhouses at and near Madison revealed the following orchids suffering from this disorder: *Bulbophyllum Ericksonii*, *Cattleya autumnalis*, *Cattleya Loddigesii*, *Cochlioda vulcanica*, *Cymbidium longifolium*, *Cymbidium Tracyanum*, two *Cymbidium* hybrids, *Laelia Perreni*, *Laelia tenebrosa*, *Maxillaria tenuifolia*, *Maxillaria variabilis*, *Odontoglossum Schlieperianum*, *Odontoglossum crispum* hybrid, *Odontoglossum eximum* hybrid, *Ornithidium densus*, *Phaius maculatus*, two *Phalaenopsis* hybrids, *Saccolabium ampullaceum*, *Stelis* sp. and *Trichopilia fragrans*. Provisionally these infections are all regarded as being caused by **Gloeosporium cinctum** B. & C. While there is considerable variation in the shape and size of individual conidia, there nevertheless seems to be a definite intergradation. However, in view of the diverse origins of the host plants, it may well be that more than one species of

*Gloeosporium* is involved. If so, morphological characters do not seem to be well enough defined to offer any certain means of differentiation. (**Gloeosporium** sp. on *Epidendrum atropurpureum* var. *roseum* has spores considerably wider (up to  $7\ \mu$ ) than most of the other forms which I have more or less arbitrarily assigned to **Gl. cinctum**. It may be that this is **Gl. Oncidii** which I have previously reported on *Oncidium sphacelatum*. That report was based primarily on the host, however, and it was noted at the time that **Gl. cinctum** and **Gl. Oncidii** seemed to intergrade. **Gloeosporium** sp. on *Aerides Houlettianum* has conidia which are of the dimensions of those described on **Gl. cinctum**, but on *Aerides* the hyaline conidia are produced on a compact, pulvinate, dematiaceous stroma which forces the smooth unruptured epidermis upward, so that the acervulus appears as a shining black hemisphere on the leaf surface. Various species of *Gloeosporium* have been described on orchids, but the exotic nature of most of the hosts and the similarity of most of the descriptions combine to create uncertainty in the observer seeking to identify species. It seems obvious that until much more material has been collected and studied, identifications of many fungi on greenhouse orchids must be tentative.)

**Asteromella astericola** J. J. Davis has been found on *Aster ericoides* (*Aster multiflorus* of Gray's Manual, 7th ed.). Davis (Trans. Wis. Acad. Sci. **21**: 281, 1924) described this species on *Aster lateriflorus* from Blue River, Grant County, as follows: "Pycnidia epiphyllous on indefinite purple areas in compact orbicular groups, black, globose, 100–165  $\mu$  diam.; wall parenchymatous of dark firm cells 6–10  $\mu$  in diameter; sporules sessile (?), hyaline, terete to fusoid-cylindrical, mostly straight, 20–30 x 3–4  $\mu$ ." This organism seems to me to be of highly dubious status. It is decidedly reminiscent of so-called **Rosenscheldia Heliopsidis** (Schw.) Theiss. & Syd. on various species of *Helianthus* and *Aster*. In my specimen a considerable proportion of the very large spores show a medium septation, and I find that Davis' specimens show this character even more pronouncedly. Why Davis failed to observe this I do not know. At any rate this would seem to remove the organism from *Asteromella* as defined. Davis suggests that this may be a better developed form of **Asteromella Asteris** Peck which, however, has much smaller spores, 6–8 x 2–2.5  $\mu$ , and continuous.

In this connection, on leaves and portions of living stems of *Helianthus strumosus* (Madison, Wis., June 1938) I made a large collection of what was taken in the field for **Rosenscheldia Heliopsidis**. The material was examined and, as expected, was sterile. Only one or two mounts were made, from lesions on the stem, which appeared more mature than those on the leaves. The specimen was filed and not re-examined until recently, when one of the leaf lesions was sectioned. Surprisingly it bore the clustered pycnidia of a well-developed *Phyllosticta* with relatively large subglobose spores. It was found that a small

number of the supposed immature *Rosenscheldia* perithecia likewise contained conidia. A specimen on *Helianthus* sp. collected by Davis at Ferry Bluff, Sauk County, shows the same characters in so far as the leaf lesions are concerned. Like myself, Davis apparently did not examine the leaf spots, and he put the specimen in the herbarium as sterile **R. Heliopsisidis**. Davis (Trans. Wis. Acad. Sci. **9**: 172, 1893) reported **Phyllosticta Helianthi** Ell. & Ev. on *Helianthus* sp. from Racine County. So far as I have been able to determine no such species has been published. It seems possible that Davis sent a specimen to Ellis who gave the fungus this name, and then neglected to publish it. There is no specimen at the University of Wisconsin. A brief description of the recent material is as follows: Leaf spots brownish, rounded, 0.5–2 mm. diam.; pycnidia epiphyllous, gregarious or crowded in a thin brown stroma, erumpent or deeply immersed, globose or subglobose, 65–165 x 50–120  $\mu$  diam., ostiole 15–20  $\mu$  diam.; conidia hyaline, subglobose to ovoid, 6–12 x 5–8  $\mu$ ; conidiophores slender, very short. All these forms are similar externally, but their relation, if any, to one another and to **Rosenscheldia Heliopsisidis** is obscure and will require further study.

**Phyllosticta guttulatae** Hals. on *Oxalis stricta*. June 18. This species has distinctively biguttulate spores and is notable in that on this host the pycnidia are frequently most numerous on the crown and even occur on some of the smaller roots. They also occur on the stems and petioles, but very sparsely on the leaves. In the original description, based on material on "*Oxalis corniculata* var. *stricta*," the leaves only are indicated as the substratum. In a later specimen on *Oxalis europea* (*O. corniculata* of Gray's Manual, 7th ed.) the leaves only are infected. This fungus has not been reported from Wisconsin before.

It appears from examination of specimens of *Phyllachora oxalina* Ell. & Ev. (Jour. Myc. **3**: 41, 1887), described on the basis of a conidial stage only, that it is the same thing as *Phyllosticta guttulatae*, the latter published May 1, 1893 by means of a printed label (Seymour & Earle, Economic Fungi No. 271). Dearness (Mycologia **16**: 155, 1924) reported finding an ascigerous stage on the stromatically blackened stems of plants which had earlier borne the stylosporous stage. He assumed that the two are connected, but offered no proof therefor, and so far as I have been able to determine such connection is still unsubstantiated. It seems to me that Halsted's name should continue to be used for the present.

**Phyllosticta solidaginicola** sp. nov.

Maculis conspicuis, cinereo-brunneis, cum marginibus fuscis, centris cinereis plusve minusve, orbicularibus, 2–10 mm. diam., plerumque 5 mm.; pycnidiis atro-brunneis, muris tenuibus, subglobosis vel late ellipticis, 100–200  $\mu$  diam., subepidermidibus, epiphyllis; conidiis angustis-cylindratis, rectis vel leviter curvatis, 5–7 x 1.5–2  $\mu$ ; conidiophoris angustis, confertis, prope obsoletis.

Spots conspicuous, grayish-brown, with narrow dark brown margin, center more or less cinereous, orbicular, 2–10 mm. diam., mostly about

5 mm.; pycnidia blackish-brown, thin-walled, subglobose or broadly elliptical, 100–200  $\mu$  diam., subepidermal, epiphyllous; conidia slender-cylindric, straight or sometimes slightly curved, 5–7 x 1.5–2  $\mu$ ; conidiophores slender, closely ranked, almost obsolete.

On leaves of *Solidago serotina*. Madison, Wis., U. S. A., August 16, 1943.

This was abundant on *Solidago serotina* in marshes in the vicinity of Madison in the 1943 season and a number of collections were made. I have not seen it in previous years in the same area. Had it been present in quantity it could scarcely have escaped notice. Occasional pycnidia are somewhat larger than indicated in the description.

**Phyllosticta Solidaginis** Bres. on *Solidago serotina* occurred associated with **Ph. solidaginicola**, but the two seem distinct. **Ph. Solidaginis** was rather inadequately described by Bresadola, but the Madison specimen appears to be much the same thing as No. 2377 of Krieger's *Fungi saxonicus* which should be authentic. Descriptive notes on the Wisconsin material are as follows: Spots large, faintly zonate, rounded on the inner side, extending to leaf margin on the other, grayish brown; pycnidia dark brown, numerous flattened, subepidermal, epiphyllous, narrowly ostiolate, 50–130  $\mu$  diam., mostly 75–100  $\mu$ ; conidia hyaline, ellipsoid, 2.5–3.5 x 4–6  $\mu$ . Bresadola reports narrower conidia for this species but I find those of the Krieger specimen to be about of the dimensions given above.

**Neottiospora arenaria** Syd. on *Carex rostrata*. September 25. Sydow described this unusual species from overwintered material, collected in May, and thus it was not possible to judge whether or not the fungus had developed parasitically. The present specimen was collected from living plants with many healthy green leaves. Some of the leaves bearing the fungus were still partially green, although most had died down completely. It appears possible that the organism is at least weakly parasitic, and if it was the primary agent it is a destructive parasite. The spherical carbonaceous pycnidia are borne almost free in the chambers of the disintegrating host tissue. Under a hand lens the pycnidia look like sclerotia, each resting on a small weft of dark mycelium.

**Sphaeropsis foliicola** (Berl. & Roum.) Sacc. on *Crataegus* sp. September 11. Coll. M. P. Backus. Berlese and Roumeguere in their description of **Sphaeropsis demersa** (Bon.) Sacc. var. **foliicola** Berl. & Roum. (*Rev. Mycol.* 9: 163. 1887) state that the pycnidia are on pale yellow spots. Here they are on well-defined silvery gray, orbicular spots, about 2–3 mm. diam. The silvery tinge seems to be due to the cuticle, for a later specimen where this has fallen away has spots with a sordid yellowish color. In microscopic characters this corresponds well with *Fungi Columbiani* No. 4687, issued as **S. foliicola**.

In June 1938, near Lodi, Columbia County, leaves of *Panicum virgatum* were found bearing what appeared to be the elongated uredia of a rust, light tan in color. However, microscopic examination disclosed what seemed to be a species of *Sporonema* with long-chambered, ramifying pycnidia. A description was prepared, but not published because of the small size of the original collection, and the seeming entire lack of reports of *Sporonema* on Gramineae. The descriptive notes are as follows: Pycnidia epiphyllous, pale brown, elongate, scattered or closely ranked, imperfectly formed, splitting open above, tending to be internally divided, 200–500  $\mu$  long x 75–125  $\mu$  diam., somewhat flattened; conidiphores hyaline, simple and unbranched, slender, 5–6  $\mu$  long, or sometimes almost obsolete, closely crowded over all inner surfaces of the fruiting body; conidia hyaline, ellipsoid to subcylindrical, 4–8 x 3–3.5  $\mu$ , mostly 6–7 x 3  $\mu$ . In September 1942 and in August 1943 collections of supposed **Phyllachora graminis** were made on *Panicum virgatum* at Madison. No *Phyllachora* asci were found, and Professor Orton informs me that this is the usual case with material on *Panicum virgatum*. It was noted that most of the black stromata had whitish "blisters" on top, and that these were pierced by a rather definite, more or less elongated pore. Sections show a basal sporiferous layer with small conidia, identical with those of the supposed *Sporonema*. It seems probable therefore that the "*Sporonema*" is but an early stage in the development of the tar spots. (Professor Orton states that he has several specimens of *Phyllachora* on *P. virgatum* with mature asci and spores, and that, although conidial stages were found with some of these, phylogenetic relationships remain to be proved.)

On various grasses in the vicinity of Madison, there have been found specimens of what may be a single species of a coarse-spored *Stagonospora*. The pycnidia are rather large, erumpent, with spores about of the order of 30–35 x 10–12  $\mu$ , several septate and markedly guttulate. These have been observed on *Sorghastrum nutans*, *Andropogon furcatus*, *Panicum Scribnerianum* and *Phragmites communis*. Dr. Sprague tells me that he has found a similar fungus on *Calamovilfa longifolia* at Mandan, North Dakota. **Stagonospora Paspali** Atk., described on *Paspalum laeve* from Alabama, and **S. simplicior** Sacc. & Berl. f. **Andropogonis** Sacc., described as on dead stems of *Andropogon furcatus* from North Dakota, seem very close to the Wisconsin collections. On *P. Scribnerianum* and on *A. furcatus* there are well-defined spots. On *S. nutans* the pycnidia occur seriatly on rather elongate, poorly delimited lesions, while on *P. communis* most of the leaf is involved. Whether, as suggested, a single species of *Stagonospora* is concerned is probably determinable only by cross inoculations, so far not possible.

**Septoria Thlaspii** sp. nov.

In fructificationibus, maculis nullis, pycnidiis subepidermidibus, pallidis brunneis, numerosis, gregariis, subglobosis, rostratis, late ostiolatis, 65–100  $\mu$  diam.; conidiis

hyalinis, angustis, rectis vel leviter curvatis, sursum angustioribus, 2-3-septatis, 20-35 x 2  $\mu$ .

On silicles, no definite spots; pycnidia subepidermal, pale brown, numerous, gregarious, subglobose, rostrate, widely ostiolate, 65-100  $\mu$  diam.; conidia hyaline, slender, straight or slightly curved, tapered distally, 2-3-septate, 20-35 x 2  $\mu$ .

On partially ripened silicles of *Thlaspi arvense*. Dane Co., near Sauk City, Wis., U. S. A., July 10, 1943.

Associated with this is a microconidial form, perhaps the precursor of a perfect stage. There seems to be no previous report of *Septoria* on any species of *Thlaspi*, in America or in Europe.

**Septoria Andropogonis** var. **Sorghastri** Greene & Sprague var. nov.

Sporulis filiformibus, 3-9 septatis, hyalinis, 50-100 x 1.5-2.5  $\mu$ .

In foliis vivis *Sorghastri nutantis*. Madison, Wis. (typus) et Long Pine, Nebr., U. S. A.

**Septoria Andropogonis** was described by Davis from Wisconsin material (Trans. Wis. Acad. Sci. **18** (1): 88, 1915) as having the sporules 2-4 septate, 30-50 x 2-3  $\mu$ . Thus, the fungus on *Sorghastrum* differs from the species proper in having much longer, multiseptate, curved sporules. While at first glance the spores of the variety appear distinct from those on *Andropogon* the difference appears to be largely due to the addition of septa and increase in length of the spores with accompanying crowding in the pycnidia. This condition may be partly brought about by tardily formed ostioles in var. **Sorghastri**.

Rev. J. M. Bates collected this fungus at Long Pine, Nebraska, Sept. 13, 1899, while one collection which we are making the type has been made recently at Madison, Wis.

**Septoria emaculata** Peck & Clint. on *Lathyrus palustris* var. *linearifolius*. Waukesha County, Eagle, August 8. This interesting species, new to Wisconsin, was taken accidentally in the course of collecting specimens of **Uromyces Fabae**. As the name indicates, there is no spotting whatever, and the pycnidia are remotely and evenly dispersed in a fashion that is reminiscent of the pycnia of **Tranzschelia Pruni-spinosae**.

A fungus which is morphologically identical with **Phaeoseptoria Calamagrostidis** Sprague, described in a recent article (Mycologia **35**: 487, 1943) has been found at Madison on *Calamagrostis canadensis*. A specimen was submitted to Dr. Sprague who confirms the determination. The Madison material, however, has the *Phaeoseptoria* borne in, or in close connection with, *Phyllachora*-like lesions, which was not the case with the Oregon fungus on which the description was based. These lesions are much like those produced in char-spot of certain western grasses, caused by **Septogloeum oxysporum** Sacc., Bomm. & Rouss. and discussed extensively by Sprague in an article entitled "A Blotch and Char-Spot of Western Grasses," (Northwest Science, Nov. 1941). Im-

perfect pycnidia which contain spores somewhat similar to those of *S. oxysporum* have been found in lighter areas adjoining the char-spots. Dr. Sprague states, however, that he would hesitate to assign these to *S. oxysporum* since the spores do not seem quite typical.

A curious and well-marked species is *Dilophospora Alopecuri* Fr. found on *Calamagrostis canadensis*. Davis reported this for Wisconsin on the basis of an illustrated article by E. A. Bessey (Jour. Mycol. 12: 57, 1906). Davis had sent leaves of the grass to Bessey, who wished to study nematode action, and Bessey discovered the fungus, apparently in small quantity, for there is no specimen at Madison. In the recent specimen the pycnidia are on narrow, elongated, arid lesions.

*Cylindrosporium triflori* sp. nov.

Maculis pallidis brunneis, cum centris aliquanto fuscioribus, depressis, marginibus angustis, fuscis; maculis cum halis rubellis-purpureis, paucis vel multis, raro confluentibus, rotundatis, 1.5–3 mm. diam., plerumque ca. 2 mm.; acervulis numerosis, gregariis, epiphyllis, parvulis, 40–60  $\mu$ , plerumque ca. 50  $\mu$  diam.; conidiophoris brevissimis, confertis in stromatis flavido-brunneis; conidiis filiformibus, hyalinis, saepe septatis indistincte, 35–65 x 1.5–2.5  $\mu$ .

Spots pale brown with centers somewhat darker, sunken, border narrow, dark brown; spots surrounded by discolored reddish-purple host tissue, few to many, rarely confluent, rounded, 1.5–3 mm. diam., mostly about 2 mm.; acervuli numerous, gregarious, epiphyllous, small, 40–60  $\mu$ , mostly about 50  $\mu$  diam.; conidiophores very short, aggregated into erumpent yellowish-brown stromata; conidia filiform, hyaline, often indistinctly septate, 35–65 x 1.5–2.5  $\mu$ .

On leaves of *Geum triflorum*. Scuppernong Prairie, two miles northwest of Eagle, Waukesha Co., Wis., U. S. A. Coll. H. C. Greene & M. P. Backus. August 8, 1943.

This seems distinct from *Cylindrosporium Gei* Farl. which is amphigenous and is a decidedly coarser form. The spots show distinctly on both sides of the leaf, but the acervuli are borne only on the upper surface. This has also been collected near Mazomanie in Dane County, Wisconsin.

A large species of *Botrytis* of the *B. cinerea* type has been observed in an interesting relationship to *Puccinia rubigo-vera* (DC.) Wint. I on *Thalictrum dasycarpum*. The *Botrytis* overgrew the hypophyllous aecia and apparently was responsible for the necrosis of adjacent tissues of the leaf. The necrotic areas extend well beyond the limits of the aecia and are plainly not due to the action of the rust. Probably the *Botrytis* gained a foothold on the tissues killed by the rust and then functioned as a weak parasite.

Elongated lesions bearing *Fusarium* were observed on stems of wilted plants of *Astragalus canadensis*, July 28. Fresh material was sent to Dr. William C. Snyder of the Division of Plant Pathology at the Uni-

versity of California. Dr. Snyder kindly made single spore cultures and found **Fusarium moniliforme** and **F. tricinctum**, or a closely related species, to be present. He stated that as **F. moniliforme** was present in abundance, and since it is somewhat parasitic on several hosts it may be considered as a possible primary agent. He suggests that another possibility that deserves consideration is that the wilting may have been caused by one of the necrotic or streak viruses, and that the fungi occur as secondary parasites. This has occurred on certain leguminous plants in California.

A find of considerable interest is **Dicoccum nebulosum** Ell. & Ev. on *Fraxinus americana* in a nursery in the University of Wisconsin Arboretum. Ellis and Everhart based their species on material from Somers, Kenosha County, Wisconsin, collected by Davis in 1893. A specimen which is presumably part of the type is in the Davis Herbarium, but no other collections from Wisconsin or elsewhere are in the University Herbarium.

**Cercoseptoria Blephiliae** sp. nov.

Maculis angulatis, indefinitis, frequenter 5 mm. latis, melleis, immarginatis, limitatis pars interioribus venis amplioribus; conidiis hypophyllis, hyalinis, confertis, numerosis, acutisculis, frequenter obscure 6-8 septatis, plerumque curvatis, granulosis, 35-80 x 3-4  $\mu$ ; tuberculis infra stomatibus, gibbis, 20-40  $\mu$  diam., cum olivaceis, pseudoparenchymatibus cellis, 6-8  $\mu$  diam.

Spots angular, indefinite in extent, often about 5 mm. wide, pale yellow, immarginate, limited by the larger veins; conidia hypophyllous, hyaline, massed, numerous, tapered, often obscurely 6-8-septate, usually curved, granular, 35-80 x 3-4  $\mu$ ; tubercles substomatal in origin, convex, 20-40  $\mu$  diam., composed of olivaceous, pseudoparenchymatous cells 6-8  $\mu$  diam.

On leaves of *Blephilia ciliata*. Madison, Dane Co., Wis., U. S. A., June 25, 1943.

The lower leaf surface where the conidia are massed is a dead white and the presence of individual fascicles is not apparent from a hand lens inspection. The tubercles become intrastomatal, as it were, for they protrude up through the stomata. **C. Blephiliae** has also been found on *Pycnanthemum virginianum* in the same vicinity where the original collection was made on *Blephilia*. The general appearance is the same, although fewer conidial tufts per unit area are produced on *Pycnanthemum*. The microscopic aspect is identical. So far as one can judge from the inadequate description, it seems possible that this is close to Atkinson's **Cercospora Pycnanthemum**, described as on *Pycnanthemum* sp. in Alabama.

A most distinctive fungus has been found on living stems of *Equisetum laevigatum*. After considerable study I have decided that it is best placed under **Ramularia Equiseti** C. Mass., although it diverges in some respects from that species as described. The spots produced on the stems

are extremely irregular, wavy, resembling the most imaginative camouflage. The stem of *E. laevigatum* is highly silicified, with straight longitudinal rows of sunken stomates. These stomates are developed between the ridges of the stem and over the patches of green mesophyll which are interspersed at regular intervals between masses of mechanical tissue. The fungus produces a yellow-brown, globose stroma beneath each of the stomates within an infected area. From each stroma there is produced upward through the stomate a fascicle of rather long subclavate conidiophores which spread out fanwise at the surface of the stem. The conidiophores show a single apical scar. They are hyaline, subclavate,  $50-60 \times 5-6 \mu$ , non-septate or 1-septate. The hyaline conidia are of two types (1)  $40-65 \times 7 \mu$ , 2-3-septate, distinctly clavate, tapering to a width of 4 at the apex, and (2)  $25-35 \times 7 \mu$ , non-septate to 2-septate, cylindrical. It seems possible that the shorter cylindrical conidia are but incompletely developed. July 8, 1942. Also collected in 1943.

Professor Chupp states that the *Cercospora* on *Barbarea vulgaris* which was named by Saccardo *C. Nasturtii* var. *Barbareae* does not resemble any of the other species reported on the Cruciferae. Therefore, with Professor Chupp's authorization the species is here listed as *Cercospora Barbareae* (Sacc.) Chupp n. comb.

A new species of *Cercospora* which occurred on *Bouteloua curtipendula* is described as *Cercospora Boutelouae* Chupp & Greene.

*Cercospora Boutelouae* sp. nov.

Maculis anguste ellipticis vel elongatis, 0.5-4 mm. longis, brunneis pallidis vel tantum non nigris, immarginatis vel cum halis ochraceis; fructificationibus maxime hypophyllis, in seriebus; stromatibus nullis vel cum paucis cellis brunneis; fasciis 2-14 cauliculis divergentibus; conidiophoris pallidis mediisve brunneis, leviter pallidioribus et angustioribus ad apices, paucis septatis, non ramosis, 0-1 praerupte geniculatis, rectis vel curvatis, apicibus subtruncatis,  $3.5-5 \times 20-100 \mu$ ; conidiis hyalinis, obclavatis, leviter curvatis, indistincte multiseptatis, basibus longis obconicis truncatis, apicibus subobtusatis,  $3.5-5 \times 20-80 \mu$ .

Spots narrowly elliptic to elongate, 0.5-4 mm. in length, pale brown to almost black, immarginate or with a yellowish halo; fruiting mostly hypophyllous, seriate; stromata lacking or only a few brown cells; fascicles 2-14 spreading stalks; conidiophores pale to medium brown, slightly paler and narrower near the tip, sparingly septate, not branched, 0-1 abruptly geniculate, straight to curved, tip subtruncate,  $3-5.5 \times 20-100 \mu$ ; conidia hyaline, obclavate, mildly curved, indistinctly multi-septate, base long obconically truncate, tip subobtuse,  $3.5-5 \times 20-80 \mu$ .

On leaves of *Bouteloua curtipendula*, Madison, Wis., U. S. A., July 26, 1943. Coll. H. C. Greene.

A new species of *Cercospora* which occurred on *Alnus crispa* is described as *Cercospora Alni* Chupp & Greene.

**Cercospora Alni** sp. nov.

Maculis indistinctis. fructificationibus hypophyllis, effusis, fusco-olivaceis, parvis, irregularibus, 0.5–5 mm. longis; stromatibus nullis vel tantum paucis fuscis cellis, fasciis compactis vel diffusis, 3–20 cauliculis; conidiophoris cumulis fuscis, singulatim pallidis vel modicis olivaceo-brunneis, apicibus nonnihil pallidioribus, irregularibus vel clavatis, obscure multiseptatis, raro ramosis, sursum confertim undulatis vel multigeniculatis, apicibus obtusis, rotundatis, 3–5.5 x 25–90  $\mu$ ; conidiis pallidis vel pallidissimis olivaceis, obclavato-cylindraceis, plerumque 1-septatis, cellis inferioribus saepe inflatis, rectis vel minimis curvatis, basibus longis obconicis truncatis, apicibus obtusis, 3.5–5 x 20–60  $\mu$ .

Leaf spots none or indistinct; fruiting hypophyllous, effuse, dark olivaceous, in small irregular patches, 0.5–5 mm. long; stromata lacking, or composed of only a few dark brown cells; fascicles compact to spreading, 3–20 stalks; conidiophores in mass dark in color, singly pale to medium olivaceous-brown, somewhat paler near the tip, irregular in width or clavate, indistinctly multiseptate, rarely branched, top half closely undulate or multigeniculate, tip rounded bluntly, 3–5.5 x 25–90  $\mu$ ; conidia pale to very pale olivaceous, obclavate-cylindric, mostly 1-septate, often with bulging lower cell, straight to slightly curved, base long obconically truncate, tip obtuse, 3.5–5 x 20–60  $\mu$ .

On leaves of *Alnus crispa*. Winneboujou, Douglas Co., Wis., U. S. A., September 3, 1942. Coll. J. W. Thomson.

The list which follows is of parasites on hosts which, so far as known to me, have not been previously reported (from Wisconsin or elsewhere) as bearing the fungi concerned:

**Synchytrium aureum** Schroet. on *Viola sagittata*. Sauk Co., Town of Sumpter, Baxter's Hollow, April 30, 1938.

**Peronospora alta** Fckl. on *Plantago Purshii*. Dane Co., Madison, June 21.

**Puccinia Eleocharidis** Arth. III on *Eleocharis acicularis*. Dane Co., Madison, September 25.

**Puccinia Andropogonis** Schw. I on *Polygala polygama*. Douglas Co., T44N, R12W, S1, SW $\frac{1}{4}$ , July 23, 1929. Coll. L. R. Wilson. This is *P. Andropogonis* var. *Polygalina* of Arthur's Manual, hitherto known only on *Polygala senega*. The rust was found in small quantity on the stem of a phanerogamic specimen of *P. polygama* in the University of Wisconsin Herbarium.

**Ascochyta Thaspiae** Ell. & Ev. on *Zizia cordata*. Waukesha Co., Scuppernong Prairie, 2 miles northwest of Eagle, August 8.

**Septoria Anemones** Desm. on *Anemone cylindrica*. Dane Co., Madison, June 17; also from Waukesha Co., Eagleville, June 20. Ellis and Everhart described *Septoria cylindrica* on this host with fusoid-cylindrical spores, 25–35 x 2 $\frac{1}{2}$ –3  $\mu$ . These collections, however, have spores 16–20 x 1  $\mu$ , slightly shorter than those of *S. Anemones* as described.

Davis (Trans. Wis. Acad. Sci. **18** (1): 103, 1915) described provisionally the new species **Septoria Senecionis-aurei** on *Senecio aureus*, stating that its relationship to other species, such as **S. Senecionis-sylvatici** Syd., was uncertain. A similar form has recently been found on *Senecio balsamitae* and is assigned to **S. Senecionis-aurei**. It does not correspond well with other species described on *Senecio*. Dane Co., Madison, September 9.

**Septoria Cacaliae** Ell. & Kell. on *Cacalia suaveolens*. Dane Co., Black Earth, August 3. Davis (Trans. Wis. Acad. Sci. **21**: 288, 1924). states that the *Septoria* which occurs on *Cacalia atriplicifolia* in Wisconsin has spots with a more or less broad dark purple border like those of **S. Nabali** B. & C., but that the single specimen on *Cacalia reniformis* has brown spots with a narrow darker border. The collection on *C. suaveolens* is similar to that on *C. reniformis*. The spores are very short, mostly scarcely more than 20  $\mu$ , while those on *C. reniformis* approach 30  $\mu$ .

**Cercospora Violae** Sacc. on *Viola pedata*. Dane Co., Madison, September 9. Many of the leaves of this early flowering species which are produced in the course of the summer undergo great development, becoming much expanded and succulent, presenting a favorable substratum for the development of parasites.

**Cercospora gentianicola** Ell. & Ev. on *Gentiana procera*. Dane Co., Madison, September 29. This collection shows very close correspondence with the species description (Jour. Myc. **4**: 2, 1888) based on material on the nearly related *Gentiana crinita*.

**Cercospora incarnata** Ell. & Ev. on *Asclepias verticillata*. Dane Co., Madison, July 26. Determined by Professor Chupp. The infected leaves become a bright yellow in strong contrast to the normal green foliage. **C. incarnata** is new to Wisconsin.

**Cercospora briareus** Ell. & Ev. on *Acerates lanuginosa*. Dane Co., Madison, June 25. Determined by Professor Chupp.



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