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New Species of Uredineae.—I

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In the examination of material sent by various collectors for identification, and of other material that has been in the author's herbarium for a time, some forms of *Uredineae* have come to light that seem worthy of description as new species. The collections were made at various localities in the United States west of the Mississippi river. The type specimen is in each case preserved in the author's herbarium, but other specimens of the type collection, which may be identified by data attached, especially by time of collection, have been freely distributed as far as material permitted.

Puccinia Batesiana sp. nov.

Spots inconspicuous; fungus hypophyllous; teleutospores arising from the aecidial mycelium; uredospores wanting.

I. Aecidia in small groups; peridia shallow, rather large, border irregular; spores pale, subglobose, 18–26 μ in diameter, evenly and conspicuously verrucose; wall thin.

III. Teleutosori primarily arising close to the aecidia, black, shining, forming dense rounded masses; spores oblong to obovate, usually much attenuated, very little constricted, 15–20 \times 45–58 μ , wall thin; apex obtuse or acuminate, more or less thickened, often up to 12 μ ; base narrowed; pedicel slender, colored, 10–25 μ long.

On leaves of *Heliopsis scabra* Dunal, Long Pine, Neb., Aug. 4, Aug. 24 and Oct. 3, 1900. *J. M. Bates*. The first collection is taken as the type. Also Ames, Iowa, July, 1887, *A. S. Hitchcock*, communicated by E. W. D. Holway. This is a very distinc-

tive species, easily recognized. No collection of the aecidial form in its prime has yet been made and the description is necessarily based upon aecidial remains accompanying well developed teleutospores. Since the name of the species was suggested by the writer, it has appeared twice in botanical publications: in Shear's *Ellis and Everhart's Fungi Columbiani continued*, No. 1463, accompanying exsiccati, and in *Botanical Survey of Nebraska*, No. 5:23, in both cases as *nomina nuda*. The specific name is bestowed in recognition of the valuable services to uredinology, especially in observations upon the Nebraska rust flora, rendered by the discoverer of the species, Rev. J. M. Bates.

Puccinia epicampus sp. nov.

Sori amphigenous, largely sunken between the veins, oblong or linear.

II. Sori brownish-yellow, soon naked, ruptured epidermis prominent; uredospores oblong or nearly globose, $22-24 \times 26-30 \mu$; wall rather thick, colored, obscurely echinulate or papillose; pores four, equatorial.

III. Sori dark brown, soon naked; teleutospores oblong or elliptical, slightly or not at all constricted, rounded at apex and base, $22-26 \times 30-40 \mu$; wall thick, thicker at apex; pedicel firm, hyaline, tinted at base, once to thrice length of the spore.

On leaves of *Epicampes ringens* Benth., Hot Springs, N. Mex., Sept. 13, 1896. *E. W. D. Holway*.

Puccinia xylorrhizae sp. nov.

O. Spermogonia amphigenous nearly colorless, small, sunken in the substratum.

III. Teleutosori amphigenous, circinating about a small roughened area, nearly black, opening progressively from the center outwardly, soon naked; teleutospores oblong or narrowly oblong, slightly narrowed at both ends, very little constricted at the septum, $21-26$ by $43-50 \mu$, apex subacute or obtuse, much thickened, pedicel thick, firm, somewhat tinted, usually about as long as the spore.

On leaves and stems of *Xylorrhiza glabriuscula*, Laramie Plains, Wyoming, June 27, 1897 (*Aven Nelson*), and Coopers Lake, Wyoming, June 17, 1901 (*Leslie Goodding*, no. 19), the latter being the type.

The sori of this species are deep seated in the tissues of the host, not simply beneath the epidermis, as usually is the case, and the opening at first is a pore, which is gradually enlarged. In each sorus there are generally a few uredospores, which are golden yellow, globose, $24-26\ \mu$ in diameter, and minutely verrucose. There are also a few pseudospores, which are colorless, globose, $37-52\ \mu$ in diameter, and coarsely verrucose. Before dehiscence of the sorus these are situated between the layer of teleutospores and the roof of the sorus. The nature of the pseudospores is not apparent.

***Puccinia vilis* sp. nov.**

Sori amphigenous, oblong or linear, seated on brown spots, long covered by the epidermis.

II. Sori brown; uredospores elliptical, ovate or globose, $18-26 \times 22-30\ \mu$, brownish-yellow; wall thick, $3-4\ \mu$, bluntly echinulate appearing verrucose; pores four, equatorial, conspicuous.

III. Sori dark brown; teleutospores elliptical to obovate, $19-23 \times 33-45\ \mu$; wall of medium thickness; apex obtuse, thickened, somewhat deeper color; base rounded or narrowed; pedicel tinted, firm, shorter than the spore.

On leaves of *Panicum Crus-galli* L., Nordness, Iowa, Sept. 17, 1898. Alois F. Kovarik, comm. by E. W. D. Holway. Appears to be most closely related to the South American *Puccinia Huberi* Henn., which occurs on *Panicum ovalifolium*.

***Puccinia paniculariae* sp. nov.**

Sori amphigenous, oblong, small, long covered by the epidermis.

II. Uredospores subglobose or oblong, pale yellow, $15-21 \times 18-26\ \mu$; wall of medium thickness, minutely echinulate; pores six, scattered.

III. Teleutospores oblong, clavate or almost linear, brown, very little constricted, $15-19 \times 43-70\ \mu$, apex rounded or obtuse, occasionally with a few papillae, somewhat deeper tinted but not thickened; base narrowed into the very short, colored pedicel; paraphyses none.

On leaves of *Panicularia Americana* (Torr.) MacM. (*Glyceria grandis* Wats.), Spirit Lake, Iowa, Oct. 20, 1894, Dec. 28, 1896, and Aug. 3, 1898, the last taken as the type. J. C. Arthur. An

inconspicuous species, found in only one locality. In the same locality *Aecidium Boltoniae* was found, and nowhere else, and this exclusive association naturally suggests that the two forms are genetically related. The uredo- and teleutospores are formed beneath the epidermis of the mesophyll, and on the upper surface, beneath the bulliform cells.

***Aecidium boltoniae* sp. nov.**

Spots pale yellow; spermogonia amphigenous, waxy orange; spermatia oblong to ovate, $3 \times 5 \mu$; peridia mostly hypophyllous in well-defined groups, shallow, border irregular; spores pale yellow, subglobose, $13-17 \mu$, inconspicuously verrucose; wall thin.

On leaves of *Boltonia asteroides* (L.) L'Her., Spirit Lake, Iowa, June 15 and 22, 1900, and June 18, 1901. *J. C. Arthur*. Host growing in wet ground in the midst of *Panicularia Americana*.

***Aecidium magnatum* sp. nov.**

Spots pale, circular; peridia hypophyllous, cylindrical, sometimes elongated, border jagged; spores yellow, subglobose, large, $26-37 \mu$, prominently, closely and uniformly verrucose.

On leaves of *Vagnera stellata* (L.) Morong (*Smilacina stellata* Desf.). Valley of the Teton, northern Montana, July, 1889. *F. W. Anderson*. This is readily distinguished by the size and roughness of the spores from the aecidium on the same host belonging to *Puccinia majanthae* (Schum.) A. & H.

***Aecidium anograe* sp. nov.**

Spots reddened, somewhat thickened and bullate; peridia densely clustered, mostly hypophyllous, elongated, cylindrical, border torn into narrow fringe, at length somewhat revolute; spores yellow, $22-26 \mu$, subglobose, evenly verrucose; wall thick, 3μ .

On leaves of *Anogra pallida* (Lindl.) Britt. Type collection from Long Pine, Neb., May 23, 1900, No. 1325. Subsequent collection from Merriman, Neb., June 6, 1900. Both by *J. M. Bates*. Spores much larger and rougher than in *Aecidium Peckii* De T.

Peridermium ornamentale sp. nov.

Peridia in two rows along the under surface of the leaves, cylindrical, 1–2 μ long, at first bright orange, margin entire or erose; spores obovate, elliptical or nearly globose, 13–17 \times 20–26 μ ; wall thin, closely and finely verrucose.

On *Abies lasiocarpa* Nutt., Mount Paddo, Wash., at about 6000 ft. alt., Sept. 4, 1900. *W. N. Suksdorf*, comm. by E. W. D. Holway.

Gymnosporangium Nelsoni sp. nov.

Sporiferous masses globose, pulvinate cinnamon-brown, 1–2 μ in diameter, solitary, or occasionally aggregated to form swellings; spores angular-oval or elliptical, not constricted at the septum, 22–26 by 41–52 μ , obtuse, usually narrowed toward each end; wall uniformly thin; pedicels hyaline, slender, firm, once to thrice the length of the spore; mycelium annual.

On the leaves or leafy branches of *Juniperus scopulorum* Sargent, Laramie Hills, Wyoming, May 10, 1895, No. 1886. *Aven Nelson*. The type collection has been rather widely distributed as *G. clavipes*, a species which it resembles, but from which it is readily distinguished by the slender pedicels and general habit.

Roestelia Nelsoni sp. nov.

Spermogonia epiphyllous, in clusters on yellow spots, prominent, nearly black, very numerous.

Aecidia hypophyllous in groups; peridia long, 2–4 mm., linear, somewhat curved, dehiscent by longitudinal slits toward the base, apex subacute, remaining closed; spores globose, 24–30 μ in diameter, wall rather thick, chestnut-brown, minutely verrucose or smooth, pores about eight, without order, prominent.

On leaves of *Amelanchier alnifolia* Nutt., Laramie Hills, Wyoming, August 5, 1901. *A. Nelson*, no. 8597, communicated by F. S. Earle.

An interesting species, and especially so as it appears to be the aecidial form of *Gymnosporangium Nelsoni*, described above. In a letter Professor Nelson says: "This was collected in the exact spot where the *Gymnosporangium* was secured. There can be little doubt of the interrelation of the *Roestelia* and *Gymnosporangium*." I have given the same specific names to both forms, hoping that cultures in the near future will establish their identity.



Arthur, Joseph Charles. 1901. "New species of Uredineae." *Bulletin of the Torrey Botanical Club* 28, 661–666.

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