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THE UREDINALES OF OREGON

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Since no account of the rusts of any of the states bordering on the Pacific coast is available for reference by the students of the flora of that region, it has seemed desirable to bring together in the form of an annotated list the results of a study of the species occurring in Oregon, which has extended, intermittently, over a period of eight years.

The account is the result of a study begun by the author in 1909 at the Oregon Agricultural College and finally prepared in the form here presented at the Purdue University Agricultural Experiment Station.

On account of the great diversity of conditions the State of Oregon presents a wonderful field for work in any phase of botanical study. The area of the State is approximately 96,000 square miles, an area considerably greater than that included in all the New England states combined. The great range of climatic and topographical features existing in the State offers favorable conditions for the development of a flora not only large in number of species, but very diverse in character. Within the confines of the State is to be found a range in altitude from sea level to perpetually snow-capped mountains. The annual rainfall varies from over 80 inches in some localities to below 10 inches in others, resulting in the development of a flora almost tropical in its luxuriance on the one hand, and one having many of the characteristics of a desert on the other.

The diversity of the Phanerogamic flora which has developed under these conditions offers an especially attractive field for the student of the parasitic fungi. Many species of all groups are to be found especially in those portions of the State having a heavy annual rainfall.

Rusts are found in great profusion in all sections of the State. The first collections of this group made by the writer were accumulated in connection with an effort to obtain general material for class use. The greater part of the collections have been made in connection with local excursions, the primary object of which was recreation.

1 Contribution from the Botanical Department of Purdue University Agricultural Experiment Station.
Many of the collections made by the writer at localities outside of Benton County have been picked up in spare moments on trips taken in connection with Experiment Station or Extension Service duties. During 1914 and 1915, however, a number of special excursions were made primarily for collecting this group of fungi.

In addition to those made by the writer, several hundred collections made by his former associates, assistants and students at the Oregon Agricultural College are included. The greater number of these were collected by Prof. H. P. Barss, Mr. F. D. Bailey and Mr. G. B. Posey. To these have been added a considerable number of records obtained from miscellaneous sources. Several of these were obtained from the herbarium of the New York Botanical Garden, and of the National Museum. A considerable number are in the Arthur Herbarium at the Purdue University Agricultural Experiment Station. The greater number of these were obtained originally from phanerogamic specimens mainly collected and distributed by pioneer botanists of the region, particularly W. C. Cusick, Thomas Howell, J. B. Lieberg and E. P. Sheldon, E. R. Lake and others.

A few collections were made in Oregon by Dr. David Griffiths and associates, most of which were distributed in his "West American Fungi." Mr. E. Bartholomew collected at a few localities in Oregon in 1915 and distributed the specimens in the exsiccati, "Fungi Columbiani" and "North American Uredinales," which he edits. A number of specimens of rusts, the records of which were obtained mainly from the Arthur Herbarium, were made by Moses Craig, at one time botanist at the Oregon Agricultural College. It is evident that he made quite an extensive collection of rusts in Oregon, but the location of his collection at the present time is unknown to the writer.

One of the most interesting collections which it has been the privilege of the writer to examine was made by Dr. J. R. Weir, mainly in the northeastern and southwestern parts of the State. This collection consists of about 130 numbers and was sent to this laboratory for study in 1915 and 1916. Another interesting collection of about 30 numbers was made by Dr. E. P. Meinecke in southwestern Oregon and forwarded to the writer for study.

Approximately thirteen hundred collections have been examined in the preparation of this account and are listed in the following pages. By far the greater number of these, about one thousand, were made in western Oregon, including the Cascade Mountains. Of this number about six hundred were made in the Willamette Valley, four hundred having been collected in Benton County, mostly in the vicinity of Corvallis. Two hundred and fifty are listed from the Cascade mountain region, most of the collections having been made in the vicinity
of Mt. Jefferson or in Hood River County. About sixty collections are recorded from the counties bordering on the coast, only a few of which are from the southern coast counties. Less than three hundred collections have been made in eastern Oregon, almost half of which are from the mountainous region of the northeastern part.

It will be seen from the above summary of the distribution of the collections recorded that only a very small portion of the State has been explored for this group of fungi. Much remains to be done, particularly in southwestern Oregon and in eastern Oregon. The mountains of the Coast Range have been explored only in Benton County, where several collections have been made on Mary's Peak. The coast counties also offer a rich field for the collector. The region around Corvallis in Benton County is the only portion of the State that can be said to have been carefully explored for rusts. Corvallis is situated at the junction of the Willamette River and Mary's River and lies in the edge of the foothills of the Coast Range.

In spite of the fact that the exploration so far conducted is inadequate to furnish a very accurate idea of the rust flora of the State, records for 220 species are brought together in the account which follows. These occur on about 500 different host plants. In connection with the study of the collections 10 species have been found which are believed to be new to science, 8 of which are described in the following pages. A number of European species not previously recorded for North America have also been collected in the State. A large number of unrecorded host plants have been encountered.

The number of species of economic importance found in the State is worthy of mention. All of the grain rusts recorded for North America with the exception of the corn rust (Puccinia Sorghi) are known to occur in the State, including the recently discovered Puccinia glumarum. All of the rusts troublesome to florist's crops in the greenhouse, including Puccinia Antirrhini, are known to occur. The Pacific coast rust of pears and quinces promises to become of considerable economic importance. The large number of forest-tree rusts found in the State offers an especially attractive field for investigation. Many heteroecious species are known to occur whose life history is not yet determined. The rusts occurring on Salix are especially in need of investigation.

In the notes given in connection with the account of the species which follows, an effort has been made to summarize the available information on the life history as shown by any culture work which may have been conducted either by American or European authors. Notes on the distribution in North America are given whenever it was considered of sufficient importance. The genera are listed alpha-
betically under each family and the species similarly under the genus. The host plants are also arranged alphabetically under each species.

No attempt has been made to give a full list of synonyms. In general, however, sufficient synonymy is given to show the origin of the specific name used as well as any names which have been in general use. For convenience of reference the specific nomenclature used is that in use in this laboratory, and in general conforms to that used in the “North American Flora.” For similar reasons the generic nomenclature follows that proposed by Dr. Arthur, for use in the “North American Flora,” except that Melampsora, Puccinia and Uromyces, are retained. In order to follow this system consistently it has been found necessary to establish a number of new combinations.

Under each host is given a list of the specimens examined, with locality, county, date and collector, followed by the collector’s number. Numbers between 1000 and 3450 refer to collections in the Oregon Agricultural College Herbarium, if made by members of the botanical staff or by students. If no collector is given it may generally be assumed that the collection was made by the writer. In order to prevent unnecessary repetition, Benton County is not cited following collections made at Corvallis and Philomath. Similarly Hood River County is implied for all collections from Hood River or Mt. Hood and all collections made at Portland are from Multnomah County.

The writer is under great obligations to all those who have contributed specimens for study and especially to those whose names have been mentioned previously. He is also greatly indebted to those botanists who have given so generously of their time in determining host plants. Dr. A. S. Hitchcock and Mrs. Agnes Chase have named most of the grasses. Dr. Theo. Holm and Dr. K. K. Mackenzie have each determined a considerable number of species of Carex. Dr. C. R. Ball has named most of the willows. Dr. F. V. Coville and Dr. K. M. Wiegand have each determined several specimens of Juncus. Mr. Paul Standley has determined a large number of specimens from miscellaneous families.

Dr. J. C. Arthur and his former associates very kindly determined a considerable number of specimens of the rusts occurring on grasses and sedges, and verified the determinations of others, which the writer sent from Oregon at various times during the period when the collections were being made. The greater part of the collections recorded, however, have been worked over since the writer took charge of the work of this laboratory. During this period it has been his privilege to be able to consult freely with Dr. Arthur and to have the unrestricted use of the collections, catalogues, and manuscript notes on the rusts, which have been accumulated at the Purdue University
Agricultural Experiment Station during the many fruitful years of Dr. Arthur's administration of the department of botany. Without this assistance the preparation of this account in the form presented would not have been possible and the writer takes great pleasure in acknowledging his indebtedness to Dr. Arthur and to the various assistants in this laboratory for any help which they may have given.

COLEOSPORIACEAE

1. Coleosporium Adenocaulonis sp. nov.

O. and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, few, scattered on conspicuous angular yellowish spots, small, 0.1–0.2 mm. across, early naked, orange yellow fading to whitish, becoming pulverulent, ruptured epidermis conspicuous; urediniospores globoid to ellipsoid, 18–24 by 23–26 μ, wall light golden brown or colorless, 2–3 μ thick, prominently and moderately verrucose; pores indistinct.

III. Telia unknown.

ON CARDUACEAE:

Adenocaulon bicolor Hook.—Corvallis, Sept. 20, 1914, I549.

This species is very inconspicuous, developing very small sori on the under side of the leaves on yellowish spots.


ON CARDUACEAE: II, III.


Madia exigua (Sm.) Greene—Corvallis, July 29, 1914, I475; Philomath, Aug. 15, 1914, I516.


Madia ramosa Piper—Corvallis, July 29, 1914, I470.


The aecial connection of this very common species has not been demonstrated by cultures and no field observations have been made in Oregon. Judging from distributional data, however, it seems probable that Peridermium californicum Arth. & Kern may be genetically connected.
From field observations made by the writer it is evident that in western Oregon this species overwinters in the uredinial stage.


On Carduaceae: II.

Senecio triangularis Hook.—Mary’s Peak, Benton Co., Aug. 15, 1914, 1518.

This species is known otherwise only from the type collection made in Falcon Valley, Washington, on S. hydrophiloides Rydb., by W. N. Suksdorf in 1900.

The aecial connection is not known and no clues are available. The aecia, in common with other species of Coleosporium whose life history is known, should be looked for on the leaves of Pinus sp. The above collection, however, was made in a region where no pines exist in a radius of several miles. It is probable that this species, in common with some other members of the genus, is capable of being carried over the winter in the uredinial stage.

The only pine-leaf-inhabiting Peridermium known to the writer in the present range of this species is P. montanum Arth. & Kern, which has been shown to be genetically connected with a Coleosporium on Aster and Solidago, referred to C. Solidaginis.


On Pinaceae: I.

Pinus contorta Dougl.—North slope Mt. Hood, Aug. 7, 1914, 1610.

On Carduaceae: II, III.

Aster conspicuus Lindl.—Hilgard, Union Co., July 10, 1914, 1532; Austin, Grant Co., Aug. 1915, J. R. Weir, 150.

Aster Cuseckii Gray?—Corvallis, Sept. 21, 1914, 1548.

Aster Douglasii Lindl.—Hood River, Aug. 26, 1915, E. Bartholomew, 5072 (Barth. Fungi Columb. 4911); Corvallis, June 29, 1914, G. B. Posey, 1310.


Aster Hallii Gray—Corvallis, July 29, 1914, 1471; Wren, Benton Co., July 26, 1914, 1318.


Solidago tolmieana Gray?—Hood River, July 23, 1915, 3254.


The single collection of aecia listed above (1610) agrees with the description of P. montanum Arth. & Kern and was collected in the immediate vicinity of Solidago caurina (1605). The possibility of genetic relationship was made note of at that time. Hedgcock (Mycologia 4: 144. 1912; Phytopath. 3: 16. 1913) has also made similar observations and more recently (Phytopath. 6: 65. 1916) has cultured this Peridermium successfully on Aster conspicuus, using aecial material on Pinus contorta collected in Montana. Weir and Hubert (Phytopath. 6: 68. 1916) working independently from Hedgcock, with similar aecial material, have also demonstrated by cultures that this Peridermium has its uredinia on both Aster and Solidago, having obtained infection on A. laevis geyeri, S. canadensis and S. missouriensis.

Sydow (Monographia Ured. 3: 621. 1915) suggests that the form on Aster in North America is different from C. Solidaginis on Solidago and should either be united with the Asiatic C. Asterum (Diet.) Syd. or that it represents an unrecognized species having a different Peridermium as its aecial form. The culture work of Weir and Hubert (l. c.), however, shows that P. montanum is genetically connected with uredinia on both Aster and Solidago and does not lend support to Sydow's view.

While the two species of Peridermium included here are widely separated as to range and are morphologically distinguishable, it seems best until further culture work is conducted to recognize but one American species.

UREDINACEAE

5. Calyptospora columnaris (Alb. & Schw.) Kühn; Rab.-Wint.

Fungi Eur. 3521. 1886. (Hedwigia 26: 28. 1887.)


Calyptospora Geoppertiana Kühn, Hedwigia 8: 81. 1869.
On Pinaceae: I.


*Abies magnifica* A. Murr.—Road to Crater Lake, Union Creek, Camp Grant, Klamath Co., Sept. 23, 1913, E. P. Meinecke, Cr D 20.

On Vaccinaceae: III.

*Vaccinium macrophyllum* (Hook.) Piper—Austin, Grant Co., June, 1913, J. R. Weir, 25; Sumpter, Baker Co., June, 1913, J. R. Weir, 24; Silver Creek, Josephine Co., July 28, 1913, E. P. Meinecke, St (D6) D1.

*Vaccinium myrtilloides* S. Wats.—Road to Crater Lake, Union Creek to Camp Grant, Klamath Co., Sept. 23, 1913, E. P. Meinecke, Cr D 19.


Specimens of aecia collected in various parts of North America on *Abies balsamea*, *A. concolor* and *A. lasiocarpa* are now referred to this species in the Arthur herbarium.

The life history was first demonstrated by Hartig (Allg. Forst.- u. Jagdzeitg. 289. 1880), who conducted culture investigations using aecia on *Abies pectinata* and telia on *Vaccinium Vitis-idaea*. He obtained successful infection in both directions. Other European investigators, notably Dr. G. Winter, have amply confirmed these results. (Klebahn, Die Wirtsw. Rostpilze 391. 1904.)

In America, Arthur (Mycologia 2: 231. 1910) was the first to culture this species and succeeded in obtaining aecia on *Abies Fraseri* following exposure to infection from telia on *Vaccinium pennsylvanicum* sent by W. P. Fraser from Nova Scotia. Later in the same year Fraser made the first field collection of aecia on *Abies balsamea* (Science 30: 814. 1909) and later (Mycol. 4: 177. 1912; 6: 27. 1914) confirmed Arthur's work by obtaining infection on *Abies balsamea* from telia on *Vaccinium pennsylvanicum*.


On Pinaceae:

*Picea Engelmannii* Parry—Whitman Nat. Forest, Oregon, July 17, 1913, J. R. Weir, 271.
This species differs from *C. Abietis* in the narrower, somewhat smaller spores which do not long remain in chains but soon break apart. No evidence of germination has been seen in any of the collections. This is the only American representative of the genus as restricted by Arthur. (Result Sci. Congr. Bot. Vienne 338. 1906.) It is known to the writer otherwise only from single collections from British Columbia and Idaho. It is doubtless not uncommon in the northwest.

   *Uredo coleosporioides* Dietel & Holway, Erythea 1: 247. 1893.
   *Cronartium coleosporioides* Arth. N. Am. Flora 7: 123. 1907.

On **Pinaceae**: I.

*Pinus contorta* Dougl.—Scotts, Anna Creek, Klamath Co., May 23, 1912, E. P. Meinecke, used for inoculation on *Castilleja miniata*; Gold Center, June 20, 1914, H. F. Wilson, 1856; North slope Mt. Hood, elev. 3,000–4,000 ft.; Aug. 7, 1914, 3332; Sumpter, Baker Co., May, 1916, J. R. Weir.

On **Scrophulariaceae**: II, III.

*Castilleja* sp.—North slope Mt. Hood, 3,000–4,000 ft., Aug. 7, 1914, 1612, 1615 (collected near 3332); Ashland Toll House, Jackson Co., Sept. 27, 1913, E. P. Meinecke, *Cr D 22*.

Hedgcock (l. c.) was the first to publish a record of connection of *Peridermium filamentosum* with a *Cronartium* on *Castilleja* by cultures. He considered this distinct, however, from *Cronartium coleosporioides*, which Meinecke had cultured in 1911 (Phytopath. 3: 167–168. 1913) and shown to have for its aecial form *P. stalactiforme*. Meinecke's culture material was collected in Klamath Co., Oregon.

Further culture work has been carried on by Weir and Hubert (Jour. Agr. Research 5: 781–785. 1916) in which it is shown that the gall-forming *Peridermium* on *Pinus contorta* which has previously been commonly referred to *P. Harknessii* Moore is but a form of *P. filamentosum*.

All the records of the aecial stage given above are of the gall-forming type. The Hood River material was collected in the immediate vicinity of the telial form on *Castilleja*.


On Pinaceae: I.


On Santalaceae: II, III.


The collection of aecia on Pinus ponderosa made at Hood River consisted of a large fusiform gall at the base of the trunk of a young tree about 2 inches in diameter. The gall entirely encircled the tree which was noticeably stunted from the effects of the parasite. The foliage also showed a distinct yellow cast.

The life history of this common and widespread species was first demonstrated by Hedgcock and Long (l. c.). They succeeded in obtaining the development of uredinia on Comandra umbellata by exposing them to infection from aecia on Pinus ponderosa collected in Washington and California and on Pinus pungens from Pennsylvania. In a later publication the authors (Bull. U. S. Dept. Agr. 247: 1-20. 1915) discuss the economic importance of this fungus as a disease of pines and record in detail the results of extensive culture work.


On Polyodiaceae:


Uredo laeviuscula Dietel & Holway, Erythea 2: 127. 1894.

On Polyodiaceae:


The urediniospores in this species are smooth in all collections as shown by very careful examination with the oil immersion objective.
This species has not previously been recorded on the latter host so far as the writer is aware.


Uredo Polypodii DC. Fl. Fr. 6: 81. 1815.

On POLYPODIACEAE:

Filix fragilis (L.) Underw.—Road to Lost Lake, Hood River Co., July 24, 1915, 3024.

12. Melampsora sp.

II. Uredinia amphigenous, chiefly epiphyllous, scattered or occasionally gregarious, round, 0.5–1 mm., early naked, somewhat pulverulent, orange fading to yellowish, ruptured epidermis not conspicuous; uredospores ellipsoid or obovoid, 15–19 by 21–24 μ, wall colorless, uniformly 2.5–3 μ in thickness, moderately to closely verrucose-echinulate; paraphyses numerous, chiefly peripheral, clavate or occasionally capitate, 18–26 by 45–70 μ, wall colorless, usually uniformly 1–2 μ thick, occasionally thickened at apex to 4 μ.

On SALICACEAE:


The only other American collection on this host known to the writer is one in the Arthur herbarium, collected by E. Bethel, Aug. 7, 1913, at San Jose, Cal. These specimens differ from all other North American collections on Populus. It seems most probable that this is an introduced European species. Only uredinia are present in American collections and it is quite impossible to assign it to any known species without telial material. A description of the uredinial stage drawn up from the Oregon collections is given for the benefit of those who may have occasion to study this form.

The Oregon collections were all made from low, rapidly growing water sprouts.


On PINACEAE: I.


The life history of this species has been studied by Arthur (Mycologia 4: 29 and 59, 1912), who obtained infection resulting in pycnia
and aecia on *Pseudotsuga* by exposing the foliage to infection from germinating telia on *Populus tremuloides* collected in Colorado. Out of four trials, three were successful. No infection was obtained on *Larix*.

It is noteworthy in this connection that all of the northwestern collections have larger spores than specimens from Colorado. The former show spores 20–28 by 24–32 μ while the average of the latter are 16–20 by 19–26 μ. The culture work was conducted with Colorado material, nearly if not all of which was collected in immediate association with *M. albertensis* on *P. tremuloides*. The type of *Caemona occidentale*, on the other hand, was collected in British Columbia and has larger spores. It seems entirely possible that the northwestern collections may represent a different species and have genetic relationship with some form on *Populus* other than *M. albertensis*.


On **Salicaceae**:

- *Salix fendleriiana* And.—Sumpter, Baker Co., June, 1913, J. R. Weir, 8.
- *Salix* sp.—Scott’s, 7 miles from Fort Klamath, Klamath Co., Sept. 20, 1913, E. P. Meinecke, Cr D 6.

It is with considerable hesitation that the above collections have been referred to this species. Only those collections which have small, rather thin-walled uredospores, accompanied by an abundance of thin-walled, clavate paraphyses, are included.

Fraser, working with material collected in Nova Scotia (Mycol. 4: 187. 1912; 5: 238. 1913), has made a cultural study of this species. He succeeded in obtaining infection on *Abies balsamea* with production of pycnia and aecia following exposure to germinating telia from *Salix discolor*.


On **Pinaceae**: I.

- *Larix occidentalis* Nutt.—Hood River Co., elevation 4000°, July 23, 1915, 3305, 3305.

On **Salicaceae**: II, III.


Salix pseudocordata Anders.—Hilgard, Union Co., July 10, 1914, 1536.


The above specimens are tentatively assigned to this species. There are quite certainly not less than four species of Melampsora on Salix in North America. The characteristics by which they may be separated in the uredinial stages are not well worked out at the present time. The larger spored forms have been included here under M. Bigelowii.

Arthur (Jour. Myc. 11: 60. 1905) first established the fact that this rust has its aecia on Larix. He succeeded in infecting Larix decidua in two trials, by inoculating with basidiospores from germinating telia on Salix amygdaloides collected in Wisconsin. This result was later confirmed (Jour. Myc. 13: 194. 1907) with telial material collected in Indiana.

Weir and Hubert (Phytopath. 6: 372. 1916) have succeeded in obtaining infection of this species from Salix bebbiana Sarg. collected in Montana on Larix occidentalis, and from S. cordata mackensieana collected in Idaho on Larix europaea. The same authors (Phytopath. 7: 109. 1917) have recently repeated the work with the last-named species of Salix and obtained infection with development of pycnia and aecia on both L. occidentalis and L. europaea.

16. Melampsora confluentes (Pers.) comb. nov.


On Grossulariaceae: I.

Ribes lacustre (Pers.) Poir.—Philomath, May 3, 1913, F. D. Bailey, 1107.

On Salicaceae: II, III.

Salix argophylla Nutt.—Freewater, Umatilla Co., June 17, 1913, F. D. Bailey, 1164, Aug. 12, 1915, F. D. Bailey, 3344.


It is impossible to assign with any degree of certainty the collections which should be referred to this combination. Only those collections having small, rather thick-walled spores, accompanied by an abundance of capitate, thick-walled paraphyses, are included. It is possible that some of the collections included under M. Bigelowii should be referred here.

No culture work has been conducted in America. A summary of European work has been made by Klebahn (Die Wirtsw. Rostpilze 424, 1904).

In addition to the above, aecia have been collected in America on Ribes saxosum from Utah, R. vallicola, Colorado, and R. lacustre, British Columbia.


On Linaceae:

Linum Lewisii Pursh—Blue Mts., 7,000-8,000 ft., eastern Oregon, 1807 (from phanerogamic specimen in Gray Herb. Harvard Univ.); Hermiston, Umatilla Co., May 12, 1915, 2664.

Arthur (Jour. Myc. 13: 207. 1907) has shown this species to be autoecious. He sowed basidiospores from Linum usitatissimum on the same host and on L. Lewisii and obtained the development of pycnia and aecia.

18. Melampsora occidentalis Jackson, Phytopath. 7: 354. 1917.

On Salicaceae: II, III.


This species differs from all other species of Melampsora on Populus
in the large size of the urediniospores which are only slightly flattened and are evenly verrucose-echinulate. The teliospores are much longer than those of *M. Medusae* and are thickened at the apex. The character of the telial sori suggests that this species may be closely allied to *M. albertensis*. The sori are much larger as are also both uredinio- and teliospores.

This species may be the same as that recently cultured by Weir and Hubert (Phytopath. 7: 108. 1917), who used telial material from *P. trichocarpa* referred to *M. Medusae* and obtained successful infection on *Larix europea* and *L. occidentalis*. The actual material used for infection and the aecia resulting have not been seen by the writer but telial material sent by Dr. Weir from Montana agrees with the form described above. Aecia from the same locality on *L. occidentalis* agree in general with aecia of *Melampsora Medusae* and *M. Bigelowii*. The walls of the aeciospores are however somewhat thinner, 1–2 μ, and considerably thickened on opposite sides to 3–5 μ. They measure 17–19 by 19–26 μ. Additional culture work, and a careful comparison of the resulting aecia with those of *M. Medusae* would be desirable. In any case, the morphological characters of the uredinial and telial stages are considered sufficient to warrant separation.

19. *Melampsora Piscariae* sp. nov.
   O. and I. Pycnia and aecia unknown.
   III. Uredinia hypophyllous, scattered, rounded, 0.3–0.5 mm. across, early naked, somewhat pulverulent, orange yellow fading to whitish, ruptured epidermis conspicuous; urediniospores globoid to ellipsoid, 14–16 by 16–19 μ; wall colorless, 1.5–2 μ in thickness, finely and closely verrucose-echinulate; paraphyses numerous, intermixed with the spores, capitate, smooth or with an occasional conical echinulate marking, 32–64 μ long; heads 12–18 μ broad, wall uniformly thick, 2.5–4 μ.
   III. Telia not seen.

**ON EUPHORBIACEAE:**

*Piscaria setigera* (Hook.) Piper (*Eremocarpus setigerus* Benth.)—Corvallis, Sept. 20, 1914, 3308, type.

Known only from the type locality.

This species is referred to the genus *Melampsora* with considerable confidence in spite of the absence of telia, on account of the structure of the sori, the character of the spores, and the presence of scattered capitate paraphyses.


**On Pinaceae:** I


**On Caryophyllaceae:** II, III.

*Cerastium vulgatum* L.—Corvallis, May 1, 1915, 2667.

*Cerastium viscosum* L.—Corvallis, June 28, 1915, 3019.

*Stellaria borealis* Bigel.—Corvallis, April 5, 1914, 1287.

This rust, which is doubtless common throughout the state, is remarkable in that both stages develop from a perennial mycelium. The aecial stage forms large or small witches' brooms on the branches of various species of *Abies*, each leaf of which bears the conspicuous aecia in two rows on the under surface of the leaves.

The life history was first worked out by Fischer (Zeitschr. für Pflanzenkr. 11: 321. 1901) and has been amply confirmed by other European investigators. A summary of this work has been made by Klebahn (Die Wirtsw. Rostpilze 397. 1904).

In America Arthur (Mycol. 4: 58. 1912), using aecial material on *Abies lasiocarpa* collected in Colorado, has succeeded in obtaining infection resulting in uredinia on *Cerastium oreophilum*.


**On Ericaceae:**


*Aecidium (?) Pirolae* DC. Fl. Fr. 6: 99. 1815.


ON PINACEAE: O, I.


ON PYROLEACEAE: II, III.


The genetic relation of this species with _Peridermium conorum_ _Piceae_ was first suggested by Rostrup (l. c.). So far as the writer is aware the first culture work confirming this observation was made by Fraser (Mycol. 4: 183. 1912), who succeeded in obtaining infection resulting in pycnia and aecia on the cones of _Picea mariana_ and _P. canadensis_, following exposure to germinating telia on _Pyrola americana_ and _P. elliptica_.

23. _Milesia Polystichii_ Wineland n. sp.

O. and I. Unknown.

II. Uredinia hypophyllous, scattered, roundish, 0.2–0.3 mm. across, bullate, brownish yellow, tradly dehiscent by a central pore, peridium well developed, cells above polygonal, approximately isodiametric, diameter about 7 μ, cells at the sides elongated to 21 μ, outer walls 2–2.5 μ, inner walls 2.5–3 μ; urediniospores obovoid, ellipsoid, or oblong, 18–23 by 26–35 μ, wall colorless, 1.5–2.5 μ in thickness, strongly and sparsely echinulate, pores obscure.

III. Telia unknown.

ON POLYPODIACEAE:


This species was separated from material referred to _Hyalopsora laeviuscula_ in the writer's herbarium by Miss Grace O. Wineland who has been studying the fern rusts of North America in this laboratory.


ON PINACEAE: I.

_Abies grandis_ Lindl.—Dee, Hood River Co., July 23, 1915, 3355.

_Abies lasiocarpa_ Nutt.—North slope Mt. Hood, 4,500 ft., Aug. 9, 1914, 3295.

ON ONAGRACEAE: II, III.

_Chamaenerion angustifolium_ (L.) Scop.—Bonneville, Multnomah Co., Aug. 11, 1910, 1075; Garden Home, Multnomah Co., Aug. 1911, 1990; Southwest slope Mt. Jefferson, July 3, 1914, F. D. Bailey,
Odell, Hood River Co., Aug. 5, 1914, 1618; Crater Lake, Klamath Co., Sept. 21, 1913, E. P. Meinecke, Cr Pk D (2) 2; Portland, Aug. 24, 1915, E. Bartholomew (Barth., N. Am. Ured. 1482).

This species is separated from *P. pustulatum* largely on the basis of culture investigations. All of the culture work has been conducted with the above host species or other members of the same genus or section of *Epilobium*. European investigators have amply demonstrated the connection of this form with aecia on *Abies* (Klebahn, Die Wirtsw. Rostpilze 393. 1904). In America, Fraser, working in Nova Scotia (Mycol. 4: 176. 1912), was the first to conduct culture experiments. He obtained, in three trials, the development of aecia on *Abies balsamea*, from sowings with teliosporic material from *C. angustifolium*. With the aecia thus obtained he sowed back to *Chamaenerion* and obtained uredinia. Weir & Hubert ( Phytopath. 6: 373. 1916) conducted similar work with Idaho material and succeeded in obtaining the development of aecia on *Abies lasiocarpa*. The aecia thus obtained were sown back on the telial host (Phytopath. 7: 109. 1917), with the result that uredinia were developed in abundance.


**On Rubiaceae: II.**


This species is known to the writer from North America only from the above collections and a specimen collected by J. W. Macoun in British Columbia in 1915, one from Palmer Lake, Colorado, Sept. 6, 1913, by E. Bethel, both in the Arthur Herbarium, and a collection made by Dr. H. Fitzpatrick and the writer at Michigan Hollow Swamp near Ithaca, N. Y., July, 1916. All are on *G. triflorum*. The species is evidently common in western Oregon and if aecia are developed, doubtless occur on *Abies grandis*. Field observations made by the writer, however, would indicate that this rust winters over in the uredinial stage.


ON ORCHIDACEAE: II.


**Pucciniastrum Vacciniorum** (DC.) Dietel, in E. & P. Nat. Pfl. 1**: 47. 1897.

ON VACCINIACEAE: II.


**Vaccinium caespitosum** Michx.—Mary's Peak, Benton Co., Aug. 15, 1914, 1517, 1520.


**Vaccinium ovatifolium** Sm.—Whitewater Ranger Station, West slope Mt. Jefferson, Aug. 12, 1914, H. P. Barss & G. B. Posey, 3315.

**Vaccinium** sp.—North slope Mt. Hood, 4,000 ft., Aug. 7, 1914, 1606, 1609; Sucker Creek, Josephine Co., July 27, 1913, E. P. Mein- ecke, St (D6) D3.

Clinton (Rep. Conn. Agr. Exp. Sta. 1909–1910: 719. 1911) was the first to show that the aecial stage of this species occurred on *Tsuga canadensis*. He successfully infected *Gaylussacia baccata* by sowing with aeciospores from *Tsuga*, resulting in the development of the typical uredinia of this species.

Fraser in 1912 (Mycol. 5: 237. 1913) confirmed Clinton's work by obtaining the development of aecia on the leaves of *Tsuga canadensis* following sowings from teliosporic material on *Vaccinium canadense*. The same author in 1913 (Mycol. 6: 27. 1914) obtained aecia on *Tsuga canadensis* following sowing of teliosporic material from *Gaylussacia resinosa*. The aecia developed in these experiments are similar to those of *Peridermium Peckii*, but may represent an undescribed form.

No aecia collected in the west have been referred to this species though they doubtless occur on *Abies* or *Tsuga heterophylla*.

28. **Pucciniastrum pustulatum** (Pers.) Dietel, in E. & P. Nat. Pfl. 1**: 47. 1897.


ON ONAGRACEAE:

*Epilobium adenocaulon* Haussk.—Corvallis, Oct. 29, 1911, F. D.


No successful culture work has been conducted with this form, as here interpreted, either in Europe or America. Aecia doubtless occur on species of Abies.

From field observations it is quite evident that in western Oregon at least this species overwinters in the uredinial stage.


Melampsora sparsa Wint. in Rab. Krypt. Fl. 1: 245. 1881.

On Ericaceae:

Arbutus Menziesii Pursh—Myrtle Creek, Douglass Co., June 8, 1914, F. D. Bailey, 1837; Glendale, Douglass Co., July 17, 1914, 1298; Ashland, Jackson Co., Sept. 10, 1914, 1838; Corvallis, April, 1911, 3374; Grant’s Pass, Josephine Co., Sept. 3, 1916, J. R. Weir, 244.


No aecial collections have been referred to this species in America. Fischer (Cent. für Bakt. 46: 333. 1916) has cultured this species. He used germinating telial material on Arctostaphylos alpina and sowed
on species of *Abies* and *Picea*, obtaining the development of pycnia and aecia on *Picea excelsa*. This is the only case in which culture investigations have shown the aecia of *Pucciniastrum* to occur on *Picea*.


**On Pinaceae: I.**


**On Poly podiaceae: II, III.**


There seems to be no good reason for separating *U. Copelandii* Sydow from *U. Atkinsonii*. All gradations in the length of the beak of the urediniospores are found on the above collections. Most of the material has urediniospores with long beaks and some of the collections show spores with both long and short beaks.

Field observations as well as a study of morphological characters would support the view that the aecia commonly referred to *Peridermium balsameum* occurring on *Abies grandis* and *A. nobilis* in western Oregon are genetically connected.

Fraser (Mycol. 5: 236. 1913) has cultured *U. Atkinsonii* by sowing aeciospores of *Peridermium balsameum* on *Aspidium Thelepteris* followed sparingly by the development of uredinia.


**On Pinaceae: I.**

*Abies amabilis* (Loud.) Forb.—Whitewater Creek, near Mt. Jefferson, Aug. 11, 1914, H. P. Barss & G. B. Posey, 3294.

*Abies grandis* Lindl.—Corvallis, Aug. 1910, 3299, May 8, 1909, comm. Clarence D. Learn, April 29, 1914, F. D. Bailey, 3303; Ump-
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ON POLYPODIACEAE: II, III.


This species in all its stages is very common in western Oregon and the association of the infected aecial and telial hosts is everywhere apparent.

From field observations made by the writer and others it has been assumed that Peridermium pseudo-balsameum was the aecial stage of this species. Recently Weir and Hubert (Am. Jour. Bot. 4: 328-332. 1917) have conducted cultures showing the genetic connection of this species with aecia on Abies grandis. The authors evidently do not consider the aecia identical with P. pseudo-balsameum. The description which they give, however, agrees very well with the type of that species.

According to the writer’s present interpretation, there are two closely related species of Peridermium on Abies grandis in western Oregon. One is to be referred to P. balsameum and is presumably genetically connected with Uredinopsis Copelandii (cf. 31). The other is P. pseudo-balsameum and is genetically connected with the species under discussion.

The walls of the aeciospores in P. balsameum are considerably thinner than those of P. pseudo-balsameum. In the former they are 1-1.5 μ while in the latter they are 2-2.5 μ in thickness.

Pucciniaceae


Aregma speciosa Fr. Syst. Myc. 3: 496. 1832.

Phragmidium speciosum Cooke, Grevillea 3: 171. 1875.

On Rosaceae:

Rosa gymnocarpa Nutt.?—I, Austin, Grant Co., Aug. 1915, J. R. Weir, 188.


On Maloaceae: I.


On Juniperaceae: III.


Another specimen on Crataegus sp. indet. from eastern Oregon (ex herb. Ellis) bearing no date is in the Arthur herbarium and has been examined by the writer.

The life history of this species was first demonstrated by Arthur (Jour. Myc. 14: 23. 1908) and later repeatedly confirmed. Telia are otherwise known only on Juniperus scopulorum from Colorado, Idaho and Montana. Aecia are known to occur only on Crataegus sp. in the Rocky Mt. region and in eastern Oregon and Washington.


Aecidiun Blasdaleanum Dietel & Holway, Erythea 3: 77. 1895.


On Maloaceae: I.


Crataegus Douglasii Lindl.—Halsey, Linn Co., June 9, 1913, 3214; Albany, Linn Co., D. W. Rumbaugh, 3212; Cottage Grove, Lane Co., May 21, 1913, 3169, June 14, 1913, 3209; Eugene, Lane Co., May 8, 1913, 3173.

Cydonia japonica Pers.—Eugene, Lane Co., June, 1914, G. H. Godfrey.

Cydonia vulgaris L., Halsey—Linn Co., June 9, 1913, 3166; Irving, Lane Co., 1913, Comm. S. J. Quigley, 1871; Creswell, Lane Co.,

_Pyrus baccata_ Linn.—Lorane Valley, Lane Co., May, 1915, C. E. Stewart, 3387.


_Pyrus diversifolia_ Bong. (_P. rivularis_ Dougl.)—Cottage Grove, Lane Co., June 13, 1913, 3775, 3211.

_Pyrus ioensis_ (Wood) Bailey—Cottage Grove, Lane Co., June 13, 1913, 1854; Eugene, Lane Co., May 21, 1913, 3210.


_Sorbus aucuparia_ Linn.—Cottage Grove, Lane Co., June 13, 1913, 3718; Eugene, Lane Co., June 1, 1914, G. H. Godfrey, 3222.

_Sorbus hybridia_ Linn.—Cottage Grove, Lane Co., May 21, 1913, 3716, June 13, 1913, 3167.

On Juniperaceae:


This species is very common in its aecial stage on all the native members of the Malaceae as well as most of the cultivated fruits and ornamental plants belonging to this family which may occur in the range of the incense cedar. There is considerable evidence also that the disease is gradually spreading beyond the natural range of the telial host. Observations made at Corvallis support this view. Previous to 1915 no specimens of this species had been collected in Benton County though careful search had been made many times. The incense cedar does not occur naturally in that locality but is frequently planted for ornament. There are several fine examples on the campus at the Oregon Agr. College. In 1915 a very sparing infection of the aecial stage was found in the vicinity on native hosts only, and the cedar trees on the campus were found to be sparingly infected. Reports of the occurrence on quince have come from Salem, far north of the natural range of the incense cedar. The writer believes that the disease will gradually spread throughout the Wil-
lamette Valley on the incense cedars planted for ornament and, in
certain cases, will become a serious menace to cultivated pears and
quinces.

The life history of the species was first worked out by Arthur
(Mycol. 1: 252. 1909; 4: 57. 1912). He succeeded in showing
that aecia occurred on Crataegus and Amelanchier. The telial material
used for the cultures was collected at Eugene, Oregon, by Prof. A. R.
Sweetzer. The writer has also studied this species in some detail
(Phytopath. 4: 261–269. 1914; Ore. Expt. Sta. Biennial Crop Pest
Rep. II: 204–212. 1915) and has reported the results of culture
work and field observations. Similar work is also briefly reported by
O’Gara (Science N. S. 39: 620–621. 1914). The previous records of
the occurrence of this species on Ijilalus floribundus Siebold and Sorbus
sambucifolia Roem. made by the writer (l. c.) should be corrected to
read Pyrus ioensis and S. aucuparia respectively. For the correct
determination of these hosts the writer is indebted to Prof. W. W.
Eggleston.

This species has since been successfully cultured in the greenhouse
on Pyrus sinensis by Prof. H. P. Barss. The writer, using aecial
material on quince, the result of infection experiments made in 1914,
has obtained sparing infection on Libocedrus resulting in telia which
matured in February 1915. The trees were kept in the greenhouse
at the Oregon Agr. College.

N. Y. Bot. Gard. 7: 441. 1911.

*Roestelia Harknessiana* Ell. & Ev. Kern, Bull. Torrey Club 34:
462. 1907.

On Malaceae: I.

Amelanchier alnifolia Nutt.—Redmond, Crook Co., July 2, 1914,

This very interesting species has otherwise been reported only
from northern California. The telia form is unknown. In the collec-
tion made by the writer listed above, the aecia occurred only on
fruits and twigs. There was every evidence that this fungus is
perennial. Some of the specimens show fresh aecia on branches having
four annual rings, surrounding or extending from cankered areas
bearing evidence of old aecial cups. There is slight hypertrophy.
The branches are frequently girdled and killed.

333. 1817.

*Tremella juniperina* L. Sp. Pl. 1157. 1753.
On Malaceae: I.


On Juniperaceae: III.


The genetic connection of the forms of this alpine species has been abundantly demonstrated by European investigators, first by Hartig (*Lerb. Baum-Kr. 133. 1882*), and later by many others. Arthur in 1911 (*Mycol. 4: 57. 1912*), using telial material from *J. sibirica* collected in Colorado, succeeded in obtaining infection resulting in pycnia only on *Sorbus americana*. The species is known in America only from the Rocky and Cascade Mountains of the United States and Canada.


On Malaceae: I.

*Amelanchier* sp.—Hurricane Creek, Wallowa Co., July 24, 1897, E. P. Sheldon, 8622.

On Juniperaceae: III.


This species causes witches' brooms on the telial host somewhat similar to the eastern *G. nidus-avis* Thax.

Arthur has repeatedly cultured it, showing that the aecia occur on *Amelanchier* and *Sorbus* (*Jour. Myc. 13: 203. 1907; 14: 18. 1908; Mycol. 1: 239. 1909; 4: 195. 1912*).


On Juniperaceae: III.


The above specimens are somewhat doubtfully referred to this species. The witches' brooms are large and open, sometimes reaching 2–3 feet in diameter. The teliospores are somewhat more tapering at the apex than is typical for the species and average shorter and somewhat narrower, 19–22 by 45–65 μ. The only aecia collected in the vicinity are properly referred to *G. Harknessianum*. There was no very direct field evidence, and unless the above collections represent an undescribed form there is little possibility that the two can be genetically connected. Arthur (*Mycol. 4: 62. 1912*) has cultured 16
G. Kernianum on Amelanchier but obtained the development of pycnia only. Field observations and collections by Bethel in Colorado indicate strongly that the aecial stage occurs on Amelanchier. The Roestelia, however, is quite different from R. Harknessiana.

   Roestelia koreensis P. Henn. in Warburg, Monsunia 1: 5. 1899.
   Gymnosporangium asiaticum Miyabe, Bot. Mag. Tokyo 17: 34. 1903. (Hyponym.)

ON MALACEAE: I.
   Pyrus sinensis Lindl.—Portland (Orient), June 11, 1914, 2666.

ON JUNIPERACEAE: III.
   Juniperus chinensis L.—Portland (Orient), March 29, 1915, 2668.
   This species has been shown by the writer (1. c.) to have been established at Portland (Orient), Oregon, on trees imported from Japan. It has been cultured on Pyrus sinensis and Cydonia vulgaris.


ON JUNIPERACEAE: III.
   Juniperus occidentalis Nutt.—Austin, Grant Co., April, 1916, J. R. Weir, 257.
   Juniperus scopulorum Sarg.—Whitman Nat. Forest, Aug. 1915, J. R. Weir, 166.
   This species causes conspicuous galls on the branches of Juniperus. The aecial stage has been collected on Amelanchier, Cydonia, Peraphyllum, Pyrus and Sorbus.
   Arthur (Mycol. 4: 61. 1912; 7: 78. 1915) has conducted cultures, using telial material from Colorado. Weir & Hubert (Phytopath. 7: 109. 1917) have recently confirmed these results, using material collected in Montana, on J. communis and J. scopulorum.


ON JUNIPERACEAE:
   Chamaecyparis nootkatensis (Lamb.) Spach—North slope Mt. Jefferson, trail to Hanging Valley, Aug. 15, 1914, H. P. Barss & G. B.
Posey, 1904; Whitewater Ranger station, Aug. 28, 1916, H. P. Barss; 

The material collected by Barss and Posey in 1914 contained 
teliospores in the uredinia and forms the basis of the transfer of the 
very interesting and much discussed Uredo nootkatensis to Gymnosporangium. A full account of the history of this species has been 
given by Arthur (1. c.). In the collections of 1916 made in the same 
locality by Prof. Barss, teliospores were found in great abundance 
with the uredinia, and in many sori predominated. The urediniospores 
were germinated in this laboratory and the germ tubes found to 
develop in the usual way for urediniospores.

43. Gymnosporangium Sorbi (Arth.) Kern, Bull. N. Y. Bot. Gard. 7: 
438. 1911.

ON MALACEAE: I.

Sorbus occidentalis (S. Wats.) Greene—Whitewater Ranger station, 

There is little doubt that the suggestion of the genetic relationship 
of this species with Gymnosporangium nootkatensis (cf. 42) originally 
made by Kern (Science 31: 833. 1910) and later re-affirmed by 
The above collection extends the range of the aecia to correspond 
exactly with the range of the known collections of uredinia and is the 
most southern record.

It seems best, however, for the purpose of this list to retain the 
above name till actual cultures confirming the prediction have been 
made.

44. Gymnosporangium tubulatum Kern, Bull. N. Y. Bot. Gard. 7: 
451. 1911.

Roestelia tubulata Kern; in M. E. Jones, Bull. Univ. Mont. 61: 64. 
1910.

ON MALACEAE: I.

Crataegus Douglasii Lindl.—Minam River, Wallowa Co., Oct. 5, 
1897, E. P. Sheldon, 9061; Wallowa Nat. Forest, Sept. 28, 1910, 
G. G. Hedgcock, 1944.

The above collections were found in the Arthur herbarium at the 
Purdue University Experiment Station. The specimens show chiefly 
foliage infection, though the first-mentioned collection also includes 
infected fruit.

Weir (Phytopath. 5: 218. 1915) has recently demonstrated by 
cultures that the telia, which were previously unknown, occur on the 
twigs of Juniperus scopulorum forming irregularly lobed galls. Telia
have been collected only in Idaho and western Montana. Weir and Hubert in 1916 (Phytopath. 7: 109. 1917) have confirmed the above results.


On Rosaceae:

Rubus nigrofaccus Bailey—Freewater, Umatilla Co., June 27, 1913, F. D. Bailey, 1243.

Rubus vitifolius Cham. & Schlecht. (cult. loganberry)—LaGrand, Union Co., July 20, 1914, C. C. Cate, 1851.

Kunkel’s results (Bull. Torrey Club 40: 361. 1913; 43: 559. 1916; Amer. Jour. Bot. 1: 37. 1914) indicate that two rusts on Rubus, both commonly referred to Gymnoconia intersticialis or Caemato nitens, occur in North America, one a short-cycled form having the morphology of a Caemato, the other a brachy-form with caemoid aecia and telia of the type of Puccinia (P. Peckiana Howe). Arthur (l. c.) has recently based the genus Kunkelia on the short-cycled form.

The inclusion of the Oregon collections under Kunkelia follows the disposition made of them by Arthur.


On Umbelliferae:


On Rosaceae:


On Rosaceae:

Rubus leucoderms Dougl., Philomath, May 10, 1914, 1830.


Rubus strigosus Michx.—Stream banks, Eastern Oregon, 4,000–5,000 ft. elev., July, 1897, W. C. Cusick, 1729.

**Phragmidium affine** Sydow, Ann. Myc. 2: 29. 1904.

**On Rosaceae:**

- **Potentilla blaschkeana** Turcz.—Philomath, June 20, 1910, 1503; Austin, Grant Co., June, 1913, J. R. Weir, 147; Baker Co., June, 1913, J. R. Weir, 17; Sumpter, Baker Co., June, 1913, J. R. Weir, 3; Hilgard, Union Co., July 10, 1914, 1534.

- **Potentilla glomerata** A. Nels.—Andrews, Harney Co., Aug. 1901, Griffiths & Morris (Griffiths, West Am. Fungi 511b).


- **Potentilla sp.**—Corvallis, June, 1910, 1110, 3149, Aug. 1911, F. D. Bailey, 1071.


**On Rosaceae:**


**On Rosaceae:**

- **Rosa gymnocarpa** Nutt.—North slope Mt. Hood, Aug. 9, 1914, 1478; Bank of Minam River, Union Co., alt. 5,100 ft., Oct. 4, 1897, E. P. Sheldon, 9053.


52. **Phragmidium Occidentale** Arth.; Earle, in Greene, Pl. Baker. 2: 3. 1901.

**On Rosaceae:**


**On Rosaceae:**


_Potentilla Hippiana_ Lehm.—Austin, Grant Co., Aug. 1915, J. R. Weir, 158.


**On Rosaceae:**

_Rosa nutkana_ Presl.—Bridal Veil, Multnomah Co., May 18, 1915, 3348; Edge of woods on Minam River, Union Co., Aug. 11, 1897, E. P. Sheldon, 8667.

_Rosa sp._—Corvallis, July 28, 1914, 3146.

55. **Phragmidium Rosae-californicae** Dietel, Hedwigia 44: 125. 1905.

**On Rosaceae:**


_Rosa pisocarpa_ Gray—Corvallis, April 5, 1914, 1523.


56. **Pileolaria Toxicodendri** (Berk. & Rav.) Arth. N. Am. Flora 7; 147. 1907.


**On Anacardiaceae:**


On Ranunculaceae:


Anemone quinquefolia L.?—North slope Mt. Hood, Aug. 9, 1914, 1621.

58. Puccinia Absinthii (Hedw. f.) DC. Fl. Fr. 6: 56. 1815.


On Carduaceae:

Artemisia dracunculoides Pursh—Sherman, Sherman Co., July 1, 1914, 2671; May 16, 1915, 2672.

Artemisia frigida Willd.—Bend, Crook Co., Sept. 11, 1916, J. R. Weir, 212.


Artemisia rigida (Nutt.) A. Gray—Eastern Oregon, 3,500 ft. altitude, Sept. 1900, W. C. Cusick, 2504; Lost Valley, Wheeler Co., Sept. 9, 1894, J. B. Lieburg, 888.


This species, presumably a brachy-form, though no pycnia have yet been observed, is not to be confused with any other species on this host genus. The only other species recognized in North America is P. confera (cf. 90) which is a micro-form.

59. Puccinia abundans (Pk.) comb. nov.


Puccinia Kreageri Ricker, Jour. Myc. 11: 114. 1905.

On Caprifoliaceae: I.

Symphoricarpos albus (L.) Blake—Head of Applegate Creek, Jackson Co., July 29, 1913, E. P. Meinecke, Cr D (i) 5; Bridal Veil, Multnomah Co., May 18, 1915, 3054, Mary's Peak, Benton Co., May 21, 1915, 3036; Hilgard, Union Co., July 9, 1914, 2546; Hood River, May 14, 1914, 2566, July 21, 1915, 3063; Springbrook, Yamhill

**On Poaceae:** II and III.


_Festuca idahoensis_ Elmer—Hilgard, Union Co., July 10, 1914, 1358, 1362; Redmond, Crook Co., July 2, 1914, 1424, 1430.


The connection between this common western form on _Festuca_ with _Aecidium abundans_ was shown by Arthur in 1910 (Mycologia 4: 27. 1912). In three trials, using telial material on _F. confinis_, collected in Colorado and Utah, infection resulting in pycnia and aecia on _Symphoricarpos racemosus_ was obtained.

60. **Puccinia Acetosae** (Schum.) Koern. Hedwigia 15: 184. 1876.


**On Polygonaceae:**


This species has been recorded previously from North America only from Florida on _R. hastatulus_ (Holway, North Am. Ured. 1: 35. 1906). Specimens on that host referred to this species are in the Arthur herbarium also from S. Carolina and Massachusetts and on _R. acetosella_ from Massachusetts, Florida, New York and Indiana. All the specimens bear uredinia only. It is possible that some or all of the material should be referred to _Uromyces Acetosae_ Schroet., as the two species are indistinguishable in the uredinial stage.


**On Rubiaceae:**


This species possesses aecia and telia only in the life cycle. It has been studied by Bubak (l. c.) who found that primary aecia were followed by secondary aecia. Later Trebaux (Flora 81: 394-404. 1895) repeated this observation and conducted culture work con-
firming Bubak's contention. This species should not be confused with *P. punctata* Lk. (cf. 156) which occurs on the same host from this region.


**On Umbelliferae:**

*Angelica genuflexa* Nutt.—Woodburn, Clackamas Co., Sept. 1885, Thomas Howell.


This species is evidently rare in North America having been reported otherwise only from a single collection from Washington on *A. genuflexa* and one from New York on *A. atropurpurea*. It is a brachy-form though pycnia have not been seen in American collections. This species has smooth teliospores and is easily separable from *Puccinia Ellisii* (cf. 98) on the same hosts from our region, which has verrucose spores.


*Puccinia simplex* Erikss. & Henn. Getreideroste 238. 1896. (Not *P. simplex* Peck. 1881.)


**On Poaceae:** II, III.

*Hordeum montanense* Schribn.—Corvallis, July 26, 1914, 1414.


*Hordeum nodosum* L.—Corvallis, July 26, 1914, 3257.


This, the leaf rust of barley, is evidently very common in Oregon, much more so than the collections listed above would indicate. It is evidently not abundant in America except on the Pacific coast. In the Arthur herbarium, specimens on wild barleys are represented only from Oregon, California and Utah. On the cultivated barley specimens are at hand only from California, Iowa and Wisconsin. It is
evidently spreading into the eastern United States as the writer collected it in August, 1916, at Ithaca and Savanna, New York.

Tranzsche1 has shown that this rust in Russia has its aecia on Ornithogalum umbellatum and O. narbonense (Mycol. Cent. 4: 70. 1914).

On Scrophulariaceae:


The snapdragon rust is very common in Oregon both in gardens and in the greenhouse. For a long time it was known to occur only in California. As snapdragons came to be used more commonly in greenhouse culture the rust has gradually spread through the distribution of cuttings, till at the present time it is known to occur in most of the central and eastern states.

On Carduaceae:

Arnica cordifolia Hook.—Near Aneroid Lake, July 1, 1899, II, E. R. Lake, 1497.

A very distinct species having minutely verrucose teliospores, not thickened at the apex, and is known only from the Rocky mountain and Pacific coast regions.


On Aristolochiaceae:

Asarum caudatum Lindl.—Portland, Aug. 30, 1915, E. Bartholomew, 5977 (Barth. Fungi Columbo 4840).

This micro-form is known from North America on the above host, otherwise only from California, Idaho and Washington.


On Poaceae:


The leaf rust of rye is evidently common throughout the state.
This species has its aecia on species of *Anchusa* and *Lycopsis* in Europe as was first shown by De Bary (Monatsber. k. Akad. d. Wiss. Berlin 211. 1866). No aecia referable to this species have been found in America, but Arthur (Mycologia 1: 236. 1909) obtained the development of pycnia on *Lycopsis arvensis* secured from Europe, following exposure to germinating telia on rye collected in Indiana. This culture indicates that the European and American rusts are identical.


**On Umbelliferae:**


This is one of the most common and conspicuous of rusts, probably widely distributed throughout western Oregon. The type of *P. oregonensis*, the second collection listed, was described as on *Sanicula bipinnata*, which is clearly an error for the above host as was first pointed out by Holway (N. Am. Ured. 14: 93. 1913).

69. **Puccinia Asterum** (Schw.) Kern, Mycologia 9: 224. 1917.


*Puccinia Caricis-Asteris* Arth. Jour. Myc. 8: 54. 1902.


**On Carduaceae:** I.


*Euthamia occidentalis* Nutt.—Mary's River, Benton Co., June 1898, M. Craig.
ON CYPERACEAE: II and III.


Carex canescens L.—Hood River, Aug. 5, 1914, 3005.


Carex festiva Dewey—Newport, Lincoln Co., July 18, 1915, 3279.

Carex Goodenowii J. Gay (C. vulgaris E. Fr.)—Hood River, June 20, 1914, 1405.


Carex praegracilis Boot (C. marcida Boot)—Corvallis, May 9, 1914, 3287.

Carex scoparia Schk.—Corvallis, June 24, 1914, F. D. Bailey, 1386.


Carex straminea Willd.—Hood River, July 24, 1915, 3280.

Carex subfuscus W. Boot.—Corvallis, July 29, 1914, 1444.

Carex sp.—Ashland, Jackson Co., Sept. 10, 1914, 3008; Corvallis, July 29, 1914, 1442; Cottage Grove, Lane Co., July 14, 1914, 1350; Philomath, Jan. 6, 1914, 1180.

In 1901 Arthur (Jour. Myc. 8: 54. 1902) first began culture work showing that aecia which occur commonly on Aster, Solidago and related hosts are genetically connected with uredinia and telia on various species of Carex. The culture work conducted by Arthur is extensive and extends over a period of years from 1901-1914. In this series of culture work aecia have been produced on various species of Aster, Solidago, Erigeron, Leptilon and Euthamia, using telia from Dulichium and from many species of Carex from various parts of North America (Jour. Myc. 8: 54. 1902; 11: 58. 1905; 12: 15. 1906; 14: 13. 1908; Bot. Gaz. 35: 15, 21. 1903; Mycol. 1: 233. 1909; 2: 224. 1910; 4: 15, 16. 1912; 7: 70, 81. 1915). Fraser in 1911 (Mycol. 4: 181. 1912) confirms Arthur's results in part by successfully infecting Aster acuminatus using telial material from Carex irispermia L.
This study has also shown that the species as here considered is a composite form made up of several distinct physiological races.

The species is separable from all other American species of *Puccinia* on *Carex* by the presence of two pores in the upper part of the rather small (12–19 by 16–23 μ) urediniospores and the medium-sized (12–20 by 35–50 μ) teliospores.

The aecia of this species should not be confused with those of *P. stipae* (cf. 166), which occur on the same generic hosts and other Carduaceae in the west. In *P. Asterum* the aecia are cupulate, the peridium conspicuous, the spores globoid, nearly colorless and small (11–15 by 13–18 μ). In *P. stipae* the aecia occur on hypertrophied areas, the individual cups are gall-like and open by a central aperture, the peridium is evanescent, the spores are cinnamon brown, globoid, large (21–26 by 22–29 μ). The aecia of the latter species have not been found in Oregon, but doubtless occur abundantly in the eastern part of the state.


On **Carduaecae**:


*Aster* sp.—Corvallis, Aug. 10, 1911, F. D. Bailey, 1175, May 1, 1915, 3050; Austin, Grant Co., June 1913, J. R. Weir, 102.


*Uromyces atro-fuscus* Dudley & Thompson, Jour. Myc. 10: 55. 1904.

On **Cyperaceae**:

*Carex Douglasii* Boot.—Enterprise, Wallowa Co., July 24, 1897, E. P. Sheldon (from Phan. spec. 8634).

This species possesses amphispores which were first mistaken for the teliospores of a *Uromyces*. It may be distinguished from other *Carex* rusts by the presence of the amphispores together with the normal urediniospores, the latter are 20–26 μ long and thin walled, 1.5–2 μ thick. The aecial connection is unknown. It is known only from the Rocky mountain and Pacific coast regions.


On **Carduaceae**:

*Balsamorrhiza deltoidea* Nutt.—Corvallis, July 29, 1914, 1472; Hermiston, Umatilla Co., May 12, 1915, 2663.

On Cichoriaceae:
  Hieracium cinereum Howell—Hood River, July 22, 1915, 3325.
  Hieracium sp.—Durfur, Wasco Co., June 30, 1914, 1338.
  This very distinct micro-form is known otherwise only from the type collection made at Waitsburg, Wash., May 7, 1900, on H. Scouleri, by R. M. Horner and distributed in E. & E. Fungi Col. 1570.

74. Puccinia Bistortae (Strauss) DC. Fl. Fr. 6: 61. 1815.  
On Polygonaceae:
  This species may be distinguished from other North American Polygonum rusts by the medium-sized teliospores (16–21 by 26–35 μ) with wall of uniform thickness, without hyaline umbo. It is not known elsewhere in North America on the first mentioned host and otherwise only from Washington on P. Newberryi. Aecia are unknown.

On Alliaceae:
  Allium acuminatum Hook.—Hood River Co., June 10, 1917, Leroy Childs.
  This rust may be distinguished from other Allium rusts by the strongly developed stroma in the telial sori, and the tendency to form confluent telia covering large areas on the stems and leaves. The teliospores are large (16–26 by 40–61 μ), thickened to 4–10 μ at the apex.

On Liliaceae:
All of the above specimens were secured from phanerogamic specimens, the first from the herbarium of the Oregon Agr. College, the others from the herbarium of the N. Y. Botanical Garden. The species is an opsis-form.

77. **Puccinia Campanulae** Carm. Smith's English Flora 5: 365. 1826.


**On Campanulaceae:**

*Campanula Scouleri* Hook.—Mary's Peak, Benton Co., Aug. 15, 1914, 2559; Hood River, July 24, 1914, 3023.

A comparison of the above collections with European material shows that the rust is identical and should be referred as above. This is a micro-form unrecorded in America so far as the writer is aware, and known otherwise from North America only from collections made by the writer and others, on *C. rotundifolia* at Fall Creek, Ithaca, New York.


**On Scrophulariaceae:**

*Chelone nemorosa* Doug.—Mt. Hood, Sept. 1, 1901, E. W. D. Holway.

A micro-form known otherwise only from Washington on the same host.


**On Carduaceae:**


The above collection from a greenhouse is the only collection we have seen from Oregon. It is doubtless not infrequent in greenhouses throughout the state. The life history is unknown. This rust is evidently a native of Japan, having been introduced into America and Europe where it has become widespread on cultivated chrysanthemums.


**On Cichoriaceae:**

*Cichorium intybus* L.—Corvallis, Sept. 21, 1914, G. B. Posey, 1931.


On Umbelliferae:


*Cicuta* sp.—Eastern Oregon, June, 1885, T. Howell.

The last-mentioned specimen is from the herbarium of W. G. Farlow. It is marked on *Peucedanum*. The host is clearly *Cicuta* sp.


On Onagraceae:


On Carduaceae:

*Cirsium americanum* (Gray) Robinson—Wren, Benton Co., June 26, 1914, 1332; Corvallis, May 20, 1915, 3242.

*Cirsium edule* Nutt.—Elk City, Lincoln Co., Aug. 20, 1914, 2526.


On Portulacaceae:

*Claytonia lanceolata* Pursh?—Austin, Grant Co., May, 1916, J. R. Weir, 206.


*Aecidium Clematidis* DC. Fl. Fr. 2: 243. 1805.

*Aecidium Aquilegiae* Pers. Icon. pict. IV. 58. 1806.


*Puccinia Agropyri* E. & E. Jour. Myc. 7: 131. 1892.


ON RANUNCULACEAE: I.

Aquilegia formosa Fish.—Myrtle Creek, Douglas Co., June 9, 1914, F. D. Bailey, 2573; Hood River, May 14, 1914, 2505, May 9, 1915, 3040; Bridal Veil, Multnomah Co., May 18, 1915, 3051.

Aquilegia truncata Fisch. & Mey.—Pokégama, Jackson Co., July 9, 1903, E. B. Copeland (Sydow, Ured. 1767), E. B. Copeland, 3711 (Rocky Mt. Herb. 45896).


Clematis hirsutissima Pursh (C. Douglasii Hook.)—Austin, Grant Co., July, 1913, J. R. Weir, 183.


ON POACEAE: II, III.

Agropyron dasystachyum (Hook.) Vasey—Redmond, Crook Co., July 2, 1914, 1432.

Agropyron lanceolatum Scribn. & Sm.—Redmond, Crook Co., July 2, 1914, 1427.

Agropyron spicatum (Pursh) Rydb.—Wren, Benton Co., June 26, 1914, 1320.


Bromus carinatus californicus Shear—Philomath, Jan. 6, 1914, 1148.

Bromus grandis (Shear) Hitchc.—Corvallis, June 4, 1914, 1384.

Bromus hordeaceus L.—Portland, May 21, 1914, 1582.

Bromus hordeaceus leptostachys Beck.—Hood River, May 20, 1914, 1585; Springbrook, Yamhill Co., May 14, 1914, F. D. Bailey, 1594, 1595.


Bromus secalinus L.—Cottage Grove, Lane Co., July 14, 1914, 1352.

Bromus villosus Forsk.—Myrtle Creek, Douglass Co., June 9, 1914, F. D. Bailey, 1406.


Poa ampla Merrill—Hood River, July 22, 1915, 3259.

Puccinella Nuttalliana (Schult.) Hitchc.—Grand Ronde Valley, Union Co., July, 1914.


Sitanion velutinum Piper—Hood River, July 22, 1915, 3255; Hermiston, Umatilla Co., May 12, 1915, 3279.

This common subepidermal species, as here considered, includes nearly if not all the forms having aecia on Ranunculaceous hosts.

Dietel (Oesterr. bot. Zeitschr. 42: 261. 1892) was apparently the first to culture this species. Klebahn (Die Wirtsw. Rostpilze 292. 1904) has presented a summary of Dietel’s work together with that of other European investigators.

In America, Arthur has conducted extensive culture work beginning in 1904, using telial material from various parts of the country, on five different genera of grasses representing ten species, and has successfully cultured them on five genera of Ranunculaceae. His work indicates the presence of a number of well-marked races. (Jour. Myc. 11: 62. 1905, 13: 197. 1907, 14: 15. 1908; Mycologia 1: 246, 248, 249. 1909, 2: 225. 1910, 4: 54. 1912, 7: 73, 82. 1915, 8: 132. 1916.)
This species may be distinguished from other grass rusts having the telia long covered by the epidermis primarily on the urediniospore characters. They are not accompanied by paraphyses, the wall is moderately thin, 1.5-2 μ, pale yellow to cinnamon brown, and the pores are scattered. The telia may or may not be surrounded by stromal hyphae and are rather narrow, 13-24 μ.

86. **Puccinia Clintonii** Peck, Rept. N. Y. State Mus. 28: 61. 1876.

*On Scrophulariaceae:*


87. **Puccinia Cnici** Mart. Fl. Mosq. 226. 1817.

*Puccinia Cirsii-lanceolati* Schroet., Cohn, Krypt. Fl. Schl. 3: 317. 1887.

*On Carduaceae:*


*On Santalaceae:*


This micro-form, found commonly in the Rocky Mt. and Pacific coast states, possesses teliospores having similar morphological characters to those of the heteroecious rust *P. pustulata* (Curt.) Arth., which has aecia on *Comandra* and uredinia and telia on *Andropogon.* A number of such correlations between micro-forms and the telia of heteroecious forms whose aecia occur on the same host have been pointed out by Travelbee (Proc. Ind. Acad. Sci. 1914: 233. 1915) among species occurring in North America. Dietel (in Engler & Prantl, Die Nat. Pflanzenf. 1: 69. 1897) was apparently the first to point out this sort of correlation between *P. mesneriana* Thüm. and *P. coronata* (P. Rhamni).

89. **Puccinia commutata** Sydow, Monog. Ured. 1: 201. 1902.


*On Valerianaceae:*

*Valeriana occidentalis* Heller—Hilgard, Union Co., July 10, 1914, 1541.


**On Carduaceae:**

*Artemisia ludoviciana* Nutt.—Corvallis, Sept. 2, 1914, F. D. Bailey, 2532, Sept. 4, 1914, 2509.

A micro-form in which the teliospores resemble quite closely those of *P. Absinthii* (cf. 58), a brachy-form also common in the west. It is probable that this should be considered a correlated form.


**On Convolvulaceae:**


**On Cichoriaceae:**


**On Carduaceae:**


**On Ranunculaceae:**

*Anemone Drummondii* Wats.—Mt. Hood, 7,000 ft., foot of Eliott Glacier, Sept. 1, 1901, E. W. D. Holway.


**On Cruciferae:**

*Dentaria tenella* Pursh—Corvallis, April 5, 1914, 1288.

A micro-form occurring on the petioles and blades of the basal leaves causing considerable distortion. So far as the writer is aware this species is known from North America only from the above collection.


**On Alliaceae:**

*Hookera pulchella* Salisb. (*Brodiaea congesta* Smith)—Dallas, Polk Co., March 20, 1900, W. N. Suksdorf (Barth. N. Am. Ured. 1541); Corvallis, April 28, 1915, 2611, May 1, 1915, 2669; E. of Wren Station, Benton Co., April 17, 1915, 2618.

The first-mentioned collection bears aecia and a few telia. It is probable that they belong together. The last specimen mentioned consists of aecia only. The others bear telia only. The two stages rarely occur together. This species may be separated from all other species of *Puccinia* occurring on Alliaceae by the very large, broad teliospores (38-45 by 43-58 μ) having smooth walls 5-7 μ thick.


*Puccinia Richardsonii* Sydow, Monog. Ured. 1: 317. 1902.


**On Polemoniaceae:**

*Phlox condensata* (A. Gray) E. Nels.—N. slope Mt. Hood, 7,000 ft., Aug. 7, 1914, III, 1494, 1, 2624.

*Phlox diffusa* Hook.—N. slope Mt. Hood, 7,000 ft., Aug. 7, 1914, 1602, 1603; Sept. 1, 1901, E. W. D. Holway.


*Puccinia Angelicae* E. & E. Bull. Wash. Lab. 1: 3. 1884. (Not *P. Angelicae* Fckl. 1869.)


**On Umbelliferae:**

*Angelica genuflexa* Nutt.—Corvallis, Sept. 7, 1901, E. R. Lake, 1496.

Otherwise known only from Idaho and Washington on the above host, and from California on *A. tomentosa*. It is doubtless a brachyform, though no pycnia have been found. The teliospores are closely and finely verrucose, a character which enables one to distinguish this species easily from *P. Angelicae* (cf. 62).


*Uredo vagans* α *Epilobii-tetragoni* DC. Fl. Fr. 2: 238. 1805.

*Puccinia Gayophyti* Billings, in King, Geol. Expl. 40th Par. 5: 414. 1871.


Puccinia glabella Holw. N. Am. Ured. i: 76. 1907.

On Onagraceae:


Clarkia pulchella Pursh—Hilgard, Union Co., July 10, 1914, 1520.

Epilobium minutum Lindl.—Corvallis, Aug. 15, 1909, II70.


Sphaerostigma Boothii (Doug.) Walp.—Muddy Station, John Day Valley, May 12, 1885, Thomas Howell.

Sphaerostigma dentatum (Cav.) Walp.—Pleasant Creek, near Wimer, Jackson Co., April 23, 1889, E. W. Hammond, 143.

As here considered, this species includes all the long-cycled autecious forms occurring on Onagraceae. The treatment follows the disposition made of them by Bisby in his recent admirable discussion of the Onagaceous rusts (Amer. Jour. Bot. 3: 538. 1916).


Aecidium Tussilaginis Pers. in Gmel. Syst. Nat. 2: 1473. 1791.
ON POACEAE:

Poa ampla Merrill—Hood River, May 14, 1914, 1591.

Poa annua L.—Hood River, July 22, 1915, 3196.

Poa macrantha Vasey—Newport, Lincoln Co., June 20, 1915, 3123.


This rust is especially common in western Oregon particularly on blue grass. Only uredinia are known in the above collections as is the common condition except in those made in the far north or at high elevations.

Nielsen (Bot. Tidsskr. 2: 26. 1877) was the first to show the relation between this rust and Aecidium Tussilaginis Gmel. He succeeded in infecting P. annua, P. trivialis, P. nemoralis, P. fertilis and P. pratensis by sowing aeciospores from Tussilago farfara. He infected the aecial host by sowing with teliospores from P. annua.

Additional observations and culture work have been recorded by various European authors, which have been summarized by Klebahn (Die Wirtsw. Rostp. 290. 1904).


On Carduaceae: I.


On Cyperaceae: III.


In the alpine meadow where the above collections were made the Aecidium was very abundant and in fine condition. A search was
made for overwintered telia on Cyperaceous hosts associated with the
*Senecio* and the only rust found was on very much weathered leaves
which have been determined by comparison of the microscopic struc-
ture as above indicated.

Tranzschel (Beitr. Biol. Ured. III: 4. 1907), working in Russia,
was the first to culture this species. He used telial material on
*Eriophorum angustifolium* to successfully infect *Ligularia sibirica* and
*Senecio paluster*.

In America, Arthur (Mycol. 8: 131. 1916), using aecial material
from New York on *Senecio aureus*, obtained successful infection result-
ing in uredinia and telia on *E. viridi-carinatum*.

102. *Puccinia Eriophyllii* sp. nov.

O. and I. Pycnia and aecia unknown.

II. Uredinia amphigenous and caulicolous, scattered, small,
roundish, 0.3–0.6 mm. across, early naked, pulverulent, pulvinate,
chestnut brown, surrounding epidermis not conspicuous; uredinio-
spores globose, obovoid or oblong, 21–27 by 26–29 μ, wall chestnut
brown, 2–3 μ thick, moderately and finely echinulate, pores 2, approxi-
mately equatorial.

III. Telia amphigenous, scattered, small, round, 0.3–0.6 mm.
across, early naked, compact, pulvinate, blackish brown, ruptured
epidermis not conspicuous; teliospores ellipsoid to oblong, 18–21 by
26–30 μ, apex and base rounded, not constricted, wall chestnut brown,
2–2.5 μ thick, uniform, minutely and obscurely verrucose; pedicel
colorless, deciduous.

On *Carduaceae*:

*Eriophyllum lanatum* (Pursh) Forbes—Wren, Benton Co., June
26, 1914, 1319 (type).

*Eriophyllum leucophyllum* (DC.) Rydberg—Redmond, Crook Co.,
July 1, 1914, 3083.

Distinguished from other species of *Puccinia* on related hosts by
the very small teliospores.

103. *Puccinia Fendleri* (Tracy & Earle) comb. nov.

*Aecidium Fendleri* Tracy & Earle, in Green, Pl. Baker i: 17. 1901.


On *Berberidaceae*: I.

*Berberis aquifolium* Pursh—Corvallis, May 12, 1914, 1276, June 7,
1908, J. C. Bridwell, 3380.

*Berberis nervosa* Pursh—Hilgard, Union Co., July 10, 1914, 2568.

On *Poaceae*:

*Koeleria crisilata* (L.) Pers.—Hilgard, Union Co., July 10, 1914,
1363.
The aecia of this species have often been confused with those of *P. graminis* (cf. 151). Arthur in 1908 (Mycol. 1: 246. 1907), using telial material from *Koeleria cristata* from Colorado, obtained, as a result of infection experiments, the development of aecia on *Berberis aquifolium*.


**On Ranunculaceae:**


A micro-form, differing from *P. Treleaseiana* Pázsch., which occurs in the Rocky Mt. region on *Caltha* sp., in the smooth spores.


**On Gentianaceae:**


**On Polemoniaceae:**


This is a hemi-form distinct from *P. plumbaria* (cf. 150) which is an opsis-form. In *P. Giliae* the telia are early naked and the spores smooth. In *P. plumbaria* the telia are long covered by the cinereous epidermis and the spores are finely and closely verrucose.


**On Poaceae:**


*Hordeum Gussoneanum* Parl.—Corvallis, June 4, 1914, F. D. Bailey, 1385.

Sitania hystrix (Nutt.) J. S. Smith—Redmond, Crook Co., July 1, 1914, 1423, 1429.


This very important wheat rust was first found in the United States, May 21, 1915, at Sacaton, Arizona, by Dr. F. K. Ravn, the eminent Danish cereal pathologist, who at that time was making a tour of investigation of cereal diseases in company with pathologists of the Department of Agriculture (Carleton, Science N. S. 42: 58. 1916). A few weeks later the rust was found by Dr. Ravn and party at Medford and Corvallis and later was detected at Moro, Oregon. There is every evidence that this rust has been present in the western states for some years. Several collections reported above were made in 1914 but were confused with P. Clematidis. The writer is indebted to Dr. H. B. Humphrey for examining most of the collections and for the detection of several specimens belonging here, previously referred to other species.


On Alliaceae:

Allium nevii Wats.?—Austin, Grant Co., Aug. 1915, J. R. Weir, 204.


Puccinia uniporula Orton, Mycol. 4: 201. 1912.
ON GROSSULARIACEAE: I.


Ribes lacustre (Pers.) Poir.—N. slope Mt. Hood, Aug. 7, 1914, 2561.


Ribes sp.—Philomath, April 26, 1914, 2571; Corvallis, April 11, 1915, 3045.

ON CYPERACEAE: II, III.

Carex festiva Dewey—Hilgard, Union Co., July 10, 1914, 1360.

Carex Goodenowii J. Gay—Hilgard, Union Co., July 10, 1914, 1359.

Carex Kelloggii W. Boot—Portland, Aug. 21, 1915, E. Bartholomew 5941 (Barth. Fungi Columb. 4962).

Carex magnifica Dewey—Clatsop Co., Nov. 7, 1913, 1195.


Carex nebraskensis Dewey—Hilgard, Union Co., July 10, 1914, 1361.


Carex sp.—In open meadow along Minum River, Wallowa Co., Aug. 20, 1897, E. P. Sheldon, 8751.

This common form having aecia on Ribes sp. was first cultured by Klebahn in 1892. The species has since been extensively studied by the culture method in both Europe and America (Klebahn, Die Wirtsw. Rostp. 295–302. 1904) under various names.

In America, Arthur began culture work in 1901 and has reported the results of numerous cultures (Jour. Myc. 8: 53. 1902; 10: 71. 1904; 11: 59. 1905; 12: 65. 1906; 13: 196. 1907; 14: 13. 1908; Mycol. 4: 13. 1912; 7: 67. 1915; 7: 78. 1915). The species is doubtless represented by several biological strains and further culture work will need to be conducted in order to determine their limits. Considerable confusion has resulted on account of the variable number and position of the germ pores in the urediniospores.


ON LILIACEAE:

This species, described from a collection on *Zygodenus elegans* made by Professor Holway at Banff, Alberta, has been previously known only from the original collection. The above collections clearly belong here and add a new host. The only other collection of *Puccinia* on *Stenanthium* known to the writer is one obtained by him in January, 1917, on a phanerogamic specimen of *S. gramineum* collected in Georgia by A. W. Curtis, now in the herbarium of the New York Botanical Garden. This has been referred to *P. atropuncta*, a species known only from east of the Rocky mountains on related hosts.


**On Cichoraceae:**


*Ptiloria paniculata* (Nutt.) Green—Sherman, Sherman Co., July 1, 1914, 2535.

112. *Puccinia Helianthi-mollis* (Schw.) comb. nov.


**On Carduaceae:**


113. *Puccinia Hemizoniae* Ell. & Tracy, Jour. Myc. 7: 43. 1891.

**On Carduaceae:**


*Puccinia Tiarellae* B. & C. Grevillea 3: 53. 1874.


**On Saxifragaceae:**

*Heuchera micrantha* Doug.—Hood River, Feb. 1, 1915, 3266; Mary's River, Corvallis, June 5, 1915, 2674; Ashland, Jackson Co., Sept. 10, 1914, 2533.
Leptaxis Menziesii (Pursh) Raf.—Hood River, July 24, 1915, 3318, 3359.
Mitella ovalis Greene—Mary's Peak, Benton Co., May 23, 1915, 3037.
Tellima grandiflora (Pursh) Dougl.—Corvallis, July 15, 1910, 1122, Apr. 8, 1914, 3075; Austin, Grant Co., Aug. 1915, J. R. Weir, 214.

115. Puccinia hieraciata (Schw.) comb. nov.

On Cyperaceae: II, III.
This species shows a distribution from coast to coast and has aecia on Cichoriaceous hosts. Arthur (l. c.) has conducted one successful culture and obtained the development of pycnia and aecia on Agoseris glauca following sowings of teliosporic material on Carex pratensis from Colorado. Other aecia having a similar morphology, including a rare form on Hieracium collected by Schweinitz, on which the present name is based, are properly referred here. No aecial collections have been made in Oregon.


On Cichoriaceae:
Hieracium cinereum Howell—Hood River, July 22, 1915, 3324.
Hieracium scouleri Hook.—Austin, Grant Co., Aug. 1915, J. R. Weir, 156.
This species may occur on the same plants with *Aecidiu1n colum-biene* (cf. 215) which is doubtless the aecial stage of some heteroecious rust not yet determined. Sydow (l. c.) has described *P. sejuncta* based on such a mixture.


*Puccinia Barbareae* Cooke, Grevillea 8: 34. 1879.

The type of *P. Barbareae* was described as on a "Cruciferous plant" from Oregon, Dr. Lyall 61. The data on the type collection at the Kew Herbarium reads "Oregon Boundary Commission, Ft. Coville to Rocky Mts. 1861, Dr. Lyall 61." Since Ft. Coville is in northeastern Washington there would seem to be little chance of this collection having been made within the state of Oregon. However, since it has been recorded from our limits both in the original description and by Holway (N. Am. Ured. i: 45. 1906) it is included here with the above explanation. The species undoubtedly does occur in eastern Oregon as the range includes all the surrounding states.


**On Poaceae:**


Evidently a common rust in western Oregon, otherwise known from North America from a few other collections made on the Pacific coast from California to Vancouver Island, B. C., and from a single locality along the eastern coast in Massachusetts. This species may be easily separated from *P. Rhamni* (cf. 159) in the telial stage by the evenly thickened apices of the teliospores. The urediniospores of the two rusts are similar. Those of the present species are somewhat larger and globoid, 19-24 by 23-27 μ, while in *P. Rhamni* they are globoid or broadly ellipsoid, 16-20 by 18-24 μ.

The aecial connection is unknown. The rust has evidently been introduced from Europe and is able to maintain itself by over-wintering urediniospores.


**On Carduaceae:**

*Hypochoeris radicata* L.—Myrtle Creek, Douglass Co., June 9, 1914, F. D. Bailey, 2543.
120. **Puccinia insperata** sp. nov.

O. Pycnia not seen.

I. Aecia chiefly hypophyllous and petiolicolous; in crowded groups on yellowish spots 2-3 mm. across; cupulate, 0.2-0.5 mm. broad; peridium whitish, margin recurved, lacerate; peridial cells rhombic, 19-27 by 35-45 μ, overlapping, outer wall 1-1.5 μ thick, inner wall 3-4 μ thick, verrucose; aeciospores globoid or broadly ellipsoid, 15-19 by 19-23 μ, wall colorless, 1-1.5 μ thick, finely and closely verrucose.

II. Uredinia amphigenous, scattered, round, 0.2-0.5 mm. across, tardily naked, pulvinate, cinnamon brown, ruptured epidermis conspicuous; urediniospores subglobose or broadly ellipsoid, occasionally obovate, 19-21 by 23-29 μ; wall cinnamon brown, 1.5-2 μ thick, minutely and closely echinulate, pores 2-3, scattered.

III. Telia amphigenous and petiolicolous, scattered, round, 0.2-0.8 mm. across, tardily naked, pulvinate, becoming pulvulent, blackish brown, ruptured epidermis conspicuous; teliospores ellipsoid or broadly obovoid, occasionally somewhat irregular, 16-20 by 23-32 μ, rounded at both ends, scarcely or not at all constricted, wall chestnut brown, 1.5-2 μ thick, uniform, smooth; pedicel colorless, deciduous.

On Cichoriaceae:


A very distinct species separable from the eastern *P. orbicula* Pk. by the smooth teliospores and the presence of a definite peridium in the aecidium. The two collections were made at the same spot. The first shows aecia unaccompanied by pycnia, associated with telia chiefly on the petioles, suggesting strongly an opsis-form. The second collection, however, shows scattered uredinia and telia with a few old aecia.


*Uredo Iridis* DC. Encycl. 8: 224. 1808.

On Iridaceae:


On Umbelliferae:

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**On Umbelliferae:**  

124. **Puccinia luxuriosa** Sydow, Monog. Ured. 1: 812. 1904.  

**On Poaceae:**  
Bethel (Phytopath. 7: 93. 1917) has reported successful cultures of this rust on *Sarcobatus vermiculatus*, amply supported by field observations. Arthur (Mycol. 1: 234. 1909) has infected that host with teliospores of *P. subnitens* (cf. 167) from Nevada. Bethel, however, failed to obtain infection on any of the aecial hosts for that species with teliospores from *Sporobolus airoides* in Colorado. It is possible that the two forms represent biological races of the same species and should be united.


**On Poaceae:**  
No culture work has been reported in America. In Europe the aecia have been found on *Allium, Arum, Convallaria* and various other related hosts. Various names have been given to the different biological forms (Klebahn, Die Wirts. Rostp. 263–272. 1904; Sydow, Monog. Ured. 1: 776–784. 1904). Aecia on *Smilacina, Polygonatum, Maianthemum* and *Uvularia* from the central and eastern United States doubtless belong here in whole or in part.

126. **Puccinia Malvacearum** Bert. Gay’s Hist. de Chile 8: 43. 1852.  

**On Malvaceae:**  


On Cyperaceae:


On Primulaceae:

Dodecatheon latifolium (Hook.) Piper—Hills, N. W. Corvallis, April 5, 1914, 1209, May 1, 1915, 3049, April 13, 1912, F. D. Bailey, 1001; Moist Woods (Corvallis?), April, 1897, Moses Craig.


On Labiatae:

Mentha canadensis L.—Corvallis, Aug. 10, 1910, 1167, Nov. 4, 1911, 1172; Clatskanie, Columbia Co., Oct. 6, 1914, F. D. Bailey, 3099; Portland, Aug. 21, 1915, E. Bartholomew (Barth. Fungi Columb. 4968).

Mentha canadensis lanata Piper—Toledo, Lincoln Co., Sept. 25, 1911, F. D. Bailey, 1162.

Mentha spicata L.—Hood River, Aug. 6, 1914, 1482; Elk City, Lincoln Co., Aug. 20, 1914, 3217; Portland, April, 1914, comm. 3208; The Dalles, Wasco Co., July 1, 1914, 1340.


On Convallariaceae:


This very distinct micro-form is very common in the mountains of the northwestern states on the above host, and on C. borealis in the northern tier of states from New Hampshire to Minnesota and in Canada.


On Labiatae:


On Cyperaceae:

Carex mirata Dem.—Clatsop, Clatsop Co., Nov. 7, 1913, 1196.

Otherwise known only locally from the eastern United States. The aecial stage is unknown.


On Carduaceae:


This micro-form, evidently introduced from Europe, is otherwise
known only from a few collections made in California and single collections from Montana and New Mexico.


**On Labiatae:**
- *Monardella odoratissima* (Benth.) Greene—Hilgard, Union Co., July 10, 1914, 1531.


**On Poaceae:** III.

This species has aecia on *Arabis* as has been shown by Arthur (Mycol. 4: 59. 1912; 7: 75. 1915). No aecial collections have been seen from Oregon but this stage undoubtedly occurs in the eastern part of the state. The collection cited under *P. Holboellii* (cf. 117) was said to have aecia on a part of the original specimen which undoubtedly are to be referred here rather than to *A. Barbareae* DC. as was done by Vize in the original notice of *P. Barbareae.*


**On Hydrophyllaceae:** I.
- *Hydrophyllum albifrons* Heller—Corvallis, April 5, 1914, 1289; Mary's Peak, Benton Co., May 21, 1915, 3029.
- *Hydrophyllum tenuipes* Heller—Corvallis, April, 1910, IIII, 3105; April 15, 1912, F. D. Bailey, 1124.
- *Hydrophyllum* sp.—Horse Creek Cañon, Wallowa Co., May 14, 1897, E. P. Sheldon, 8040.

**On Boraginaceae:** I.
- *Phacelia heterophylla* Pursh—Philomath, April 20, 1912, 1168.
On Poaceae: II, III.

_Elymus glaucus_ Buckl.—Glendale, Douglass Co., July 17, 1914, 1347.

The aecial stage of this rust is very common in western Oregon particularly on _Hydrophyllum_. The uredinal and telial stages are doubtless much more common than the single record above would indicate. The species is very difficult to separate in the uredinal stage from _P. Clematidis_ (cf. 85) and it is probable that some of the collections referred to that species belong here.

Arthur (Mycol. 8: 139. 1916) sowed aecia from _Hydrophyllum capitatum_ on _Agropyron tenerum_ and _Elymus virginicus_. On the former uredinia and telia developed, and on the latter a few uredinia only. This is the only successful culture with this species, though aecia on other Hydrophyllaceae and on Boraginaceae are referred here on morphological grounds.


On Alliaceae:

_Allium Geyeri_ Wats.—Blue Mts., July 5, 1897, W. C. Cusick, 1827.  
The writer is indebted to Professor Holway for the specimen on which this record is based.


On Carduaceae:

_Madia elegans_ Don.—Corvallis, June, 1910, 2619.  
_Madia_ sp.—Hood River, June 20, 1914, 3340.  

This species is very close to, and possibly identical with, _P. Hemizoniae_ (cf. 113).

_Aecidium Bellidis_ Thüm. Fungi Austr. 635. hyponym. 1873.  
_Puccinia Bellidis_ Lagerh. Bol. Soc. Broter. 8: 134. 1890.

On Juncaceae:


No culture work has been conducted in America. Plowright (Jour. Linn. Soc. Lond. 20: 511. 1884) has shown the aecia to be _A. Bellidis_, having cultured the species in both directions. Other European workers have confirmed Plowright’s results (Klebahn, Die Wirtsw. Rostp. 317. 1904).

**On Cyperaceae:**


Arthur (Jour. Myc. 14: 20. 1908) has cultured this species on *Bidens*. Using telia on *S. americanus* from Indiana successful infection resulting in pycnia and aecia was obtained on *B. frondosa* and *B. connata*. Aecia have not been collected west of the Rocky Mt. region. The above collection was issued as *P. canaliculata*, which is now interpreted as occurring only on *Cyperus* having aecia on *Xanthium* and is unknown in Oregon.

141. **Puccinia Ortonii** sp. nov.

0. Pycnia few, imperfectly known.

I. Aecia chiefly hypophylous, gregarious, in roundish or elongated groups 6–8 mm. across, short cupulate, 0.2–0.3 mm. in diameter; peridium yellowish, the margin erose; peridial cells oblong or rhombic, 20–26 by 29–35 μ, slightly overlapping, the outer wall finely striate, 8–10 μ thick, the inner verrucose or slightly tuberculate, 4–6 μ thick; aeciospores globoid or broadly ellipsoid, 18–19 by 19–24 μ, wall colorless, 1–1.5 μ thick, very closely and finely verrucose.

II. Uredinia amphigenous, scattered, round, 0.5–1 mm. across, tardily naked, cinnamon brown, cinereous when covered, ruptured epidermis conspicuous, pulverulent; urediniospores broadly ellipsoid (or when young obovoid), 19–26 by 23–32 μ, wall cinnamon brown, 2–3 μ thick, moderately and very minutely and obscurely echinulate; pores 3–5, scattered.

III. Telia amphigenous, scattered, round, 0.2–1 mm. across, tardily naked, ruptured epidermis conspicuous, chestnut brown, cinereous when covered, pulvinate, somewhat pulverulent; teliospores broadly and somewhat angularly ellipsoid, 18–26 by 30–42 μ, rounded at both ends, slightly or not constricted at the septum, wall chestnut brown, 1.5–2.5 μ thick, uniform, smooth, with hyaline papilla over pore of apical cell which is usually at the apex but occasionally placed laterally, pore of lower cell varying in position from near the pedicel to the septum; pedicel deciduous, colorless.

**On Primulaceae:**

*Dodecatheon Hendersonii leptophylla* Suks.—Lake of the Woods, Cascade Range, Aug. 1892, Moses Craig.

The above collection bears aecia and uredinia only. This species differs from *P. melanoides* (cf. 128) in the presence of uredinia in the life cycle. It is to be regarded as a correlated form with that species.
The species is dedicated to Prof. C. R. Orton who was the first to separate the material from the opsis-form. The following is a list of the specimens from other localities in the Arthur herbarium.

_Dodecatheon alpinum_ Greene—Susanville, California, 5,000 ft., June 30, 1897, II, iii, M. E. Jones; Bluff Lake, San Bernardino Mts., California, 7,400 ft., Sept. 1895, III, Miss Nora Pettibone, 2853; Mt. Eddy, Siskiyou Co., California, Sept. 7, 1903, i, ii, III, E. B. Copeland, (Sydow, Ured. 1774, type).


_Dodecatheon (tetrandrum Suks.)_—Mt. Adams, Washington, 6,000-7,000 ft., Aug. 31, 1886, W. N. Suksdorf (Barth. N. Am. Ured. 554, 1457).


**On Polygonaceae:**

*Oxyria digyna* (L.) Hill—Strawberry Mt., 8,000 ft., Grant Co., Sept. 2, 1913, W. E. Lawrence, 1112.

Evidently a rather rare species represented in the Arthur herbarium otherwise only by single collections from Colorado, Utah, Idaho, Alberta and British Columbia on the above host.

143. **Puccinia Palmeri** D. & H. Erythea 7: 98. 1899. (Not _Aecidium Palmeri_ And. 1891.)


**On Scrophulariaceae:**


This is an opsis-form common in the Rocky Mt. and north Pacific states. Dietel & Holway (l. c.) based their combination on _Aecidium Palmeri_ Anderson. This _Aecidium_, as has been recently determined by Orton, working in this laboratory, is the aecial stage of the heteroecious rust _P. Andropogonis_ Schw. and not the aecia of this species. While the name _P. Palmeri_ D. & H. has been misapplied in this way it seems best to retain it for this species, particularly since the telia described apply to this fungus.

144. **Puccinia Parkerae** Diet. & Holw. Erythea 3: 78. 1895.

**On Saxifragaceae:**

This short-cycled form possesses teliospores which closely resemble the telia of the Carex rusts having aecia on Ribes (cf. P. Grossulariae, 109) as has been pointed out by Holway (N. Am. Ured. 1: 53. 1906). It is not to be confused with the rust having a similar life history in the eastern United States, P. Ribis DC. The latter has verrucose spores, while in the one under discussion the spores are smooth.


On Poaceae:


The aecial form of this distinct heteroecious rust is unknown.


On Cyperaceae:


The above collections are referred somewhat doubtfully to this species as no aecia have been collected in the Pacific northwest.


On Scrophulariaceae:

Penstemon diffusus Doug.—Bridal Veil, Multnomah Co., May 18, 1915, 3267.


On Umbelliferae:


On Poaceae: II and III.

Festuca pacifica Piper—Eight Dollar Mt., Oregon, June 12, 1904, C. V. Piper, 6502, type.

This species is evidently rare, since it is known only from the type locality listed above and from two localities in California. The life history is unknown.


On Polemoniaceae:

Gilia gracilis (Dougl.) Hook.—Mary's Peak, Benton Co., May 21, 1915, 3310; Hood River, May 14, 1914, 1526, 2514, June 9, 1915, 3274.

Phlox speciosa Pursh—Sherman, Sherman Co., July 1, 1914, 2515.


On Poaceae: II, III.


Alopecurus californicus Vasey—Corvallis, Sept. 21, 1914, 1552.

Avena fatua glabra Peterm.—Philomath, Jan. 16, 1914, 1138.

Beckmannia erucaeformis (L.) Host.—Corvallis, Aug. 8, 1915, 3026a.

Dactylis glomerata L.—Cottage Grove, Lane Co., July 14, 1914, 1670; Corvallis, July 6, 1914, 1666; Clatsop, Clatsop Co., Nov. 3, 1913, 1155; Philomath, Jan. 6, 1914, 1084.


Elymus glaucus Buckl.—Philomath, Jan. 1, 1914, 1152; Bend, Crook Co., Sept. 11, 1916, J. R. Weir, 211.

Festuca elatior L.—Wren, Benton Co., June 26, 1914, 1324; Cottage Grove, Lane Co., July 14, 1914, 1348; Corvallis, July 29, 1915, 3190.

Festuca megalura Nutt.—Corvallis, June 24, 1914, 1390, Aug. 13, 1914, 3191.

Festuca myuras L.—Cottage Grove, Lane Co., July 14, 1914, 1351.


Hierachlae macrophylla Thurb.—Glendale, Douglass Co., July 17, 1914, 1411 (type of Uredo quinqueporula).


Lolium subulatum Vis.—Corvallis, March 22, 1915, 3277.


Since the classic researches of DeBary, who first demonstrated heteroecism in rusts by showing that this species has aecia on Berberis, this rust has received more attention on the part of investigators than any other species. (Klebahn, Die Wirtsw. Rostp. 205-235. 1904.)

In Oregon the rust is apparently not as important on wheat and other grains as it is in the spring wheat districts east of the Rocky mountains. No aecial collections have been made.

A number of unrecorded hosts appear in the above list. Since the publication of *Uredo quinqueporula* by Arthur and Fromme (l. c.), telia have been found on a duplicate specimen which determines that that species is properly referred here. The number of pores in the uredospores of that collection is unusual for this rust, the usual number being 4, and in the absence of telia was considered of sufficient importance to separate it as a distinct species.


**ON Polygonaceae:**


This specimen is referred to the above species on account of the hyaline umbo covering the pore of the apical cell in the teliospore. The species is described from material on *Polygonum alpinum* from Europe with which our material closely agrees. A collection on that host from Idaho is also to be referred here. The rust is unlike any other recorded on *Rumex*. The only other collection recorded on this host from North America is the one on which *P. uniformis* Pammel & Hume from Wyoming was based, which Holway (N. Am. Ured. x: 36. 1906) considers to be on *Polygonum* sp. and refers to *P. Bistortae*.


**ON Polygonaceae:**


Portland, Aug. 21, 1915, E. Bartholomew (Barth. Fungi Columb. 4861).


No collections of aecia referable to this species have been made west of the Rocky mountains. Tranzschel (Centr. f. Bakt. II, 11: 106. 1903) was the first to show that this species has aecia on Geranium. Arthur working with American material has confirmed Tranzschel's results (Jour. Myc. 11: 59. 1905; 12: 18. 1906).

154. **Puccinia porphyrogenita** Curt.; DeToni in Sacc. Syll. 7: 703. 1888.

*Puccinia porphyrogenita* Curt. in Thüm. Myc. Univ. 545 (hyponym). 1876.


(Not *P. acuminata* Fckl. 1869.)

**On Cornaceae:**


**On Poaceae:**


This species is distinguishable from other forms on *Elymus* by the large urediniospores, 26-32 by 32-48 µ. The aecial connection is unknown.

156. **Puccinia punctata** Link, Ges. Nat. Freunde Berlin Mag. 7: 30. 1816.

**On Rubiaceae:**

*Galium aparine* L.—Hood River, July 24, 1915, 3225; Ashland, Jackson Co., Sept. 10, 1914, 3239; Corvallis, May 1, 1915, 3148.


*Galium* sp.—Philomath, April 20, 1914, F. D. Bailey, 2570; Corvallis, April 8, 1914, 1524; Dufur, Wasco Co., June 30, 1914, 1335.

On **POACEAE**:


The above collections show uredinia only. The aecial connection is unknown.

158. **PUCCINIA RECEDENS** Syd. Monog. Ured. 1: 146. 1902

On **CARDUACEAE**:


*Senecio* sp.—Hilgard, Union Co., July 10, 1914, 1542.


*Puccinia coronata* Corda, Icones 1: 6. 1837.

On **RHAMNACEAE**:

*Rhamnus purshiana* DC.—Corvallis, July 5, 1911, F. D. Bailey, 1135; May 9, 1914, 1827; May 12, 1914, 1277; July 5, 1914, H. P. Barss, 1940; Hood River, May 14, 1914, 1278; Clatskanie, Columbia Co., May 20, 1914, F. D. Bailey, 1281; Cottage Grove, Lane Co., May 1, 1915, C. E. Stewart, 3058.

On **POACEAE**:


*Agrostis alba maritima* Meyer—Philomath, Jan. 6, 1914, 1149, 1150.


*Agrostis microphylla* Steud.—Wren, Benton Co., June 26, 1914, 1314; Cottage Grove, Lane Co., July 14, 1914, 1353; Corvallis, July 6, 1914, F. D. Bailey, 1436.


*Calamagrostis canadensis* (Michx.) Beauv.—Clatskanie, Columbia Co., May 20, 1914, F. D. Bailey, 1580.
Calamagrostis hyperborea Lange—Clatsop, Clatsop Co., Nov. 7, 1911, 1109.

Festuca elatior L.—Elk City, Lincoln Co., Aug. 20, 1914, 1380.


This coronate-spored grass rust is evidently very common throughout western Oregon on native grasses. It is, however, not common in the Willamette valley on oats. All of the collections on that host are from near the sea coast.

DeBary (Monat. Akad. Wiss. 211. 1866) was the first to conduct cultures indicating the genetic connection with aecia on Frangula and Rhamnus in Europe. Since that time many European investigators have conducted culture experiments (Klebahm, Die Wirtsw. Rostp. 254-262. 1904).


The only culture made with Pacific coast material was made in 1916 in this laboratory under the writer's direction, using telial material on Agrostis exarata sent to the writer from Corvallis by G. B. Posey. This was used to inoculate Rhamnus Purshiana, with
On the development of pycnia and aecia. This host is the only one on which aecia have been collected in Oregon, and they are very abundant, as the number of collections indicates.

160. _Puccinia Romanzoffiae_ sp. nov.

O. Pycnia not seen.

III. Telia chiefly hypophyllous and petiolicolous, crowded on confluent groups, 0.5–1 mm. across or covering extensive areas on the petioles, early naked, pulverulent, chestnut brown, ruptured epidermis noticeable; teliospores somewhat irregularly ellipsoid or oblong, 19–24 μ by 34–42 μ, rounded above and below, not or scarcely constricted; wall chestnut brown, 2–3 μ thick, marked by large sparsely distributed irregular tubercles, thickened at apex by a low sub-hyaline umbo to 4–5 μ, pore of lower cell at septum similarly thickened; pedicel colorless, short deciduous.

**ON HYDROPHYLLACEAE:**


This species is distinguished from other species on this family of hosts by the character of the markings of the teliospore. In _P. Hydrophylli_ Pk. the teliospores are closely and finely verrucose while in _P. Phaceliae_ Syd. & Holw. they are smooth. The character of the teliospores in the latter species suggests a correlation with _P. montanensis_ (cf. 136) which has aecia on _Phacelia_ and other members of the family Hydrophyllaceae.


**ON RUBIACEAE:**


The teliospores of this micro-form are very similar in shape and size to those of the ovis-form _P. ambigua_ (cf. 61) and the eu-form _P. punctata_ (cf. 156). These three species on _Galium_ doubtless represent a series of correlated forms.

162. _Puccinia rugosa_ Billings, King's Rep. 40th Par. 914. 1871.

(Not _P. rugosa_ Speg. 1886.)


**ON CICHORIACEAE:**

_Agoseris laciniata_ (Nutt.) Green—Corvallis, July 10, 1915, 3215.


On Saxifragaceae:

*Saxifraga Marshallii* Greene—Hood River, May 16, 1915, 3268; Mary’s River, E. of Wren, Benton Co., April 17, 1915, 2617.

*Saxifraga odontoloma* Piper—Corvallis, May 1, 1915, 3269.


On Malvaceae:


On Malvaceae:


This collection was distributed as *P. Sphaeralceae* E. & E. in Sydow’s Uredineen 1782.


On Poaceae: II and III.


This species has aecia on various genera of Carduaceae including *Aster, Solidago, Grindelia* and *Senecio*, as has been shown by Arthur (Jour. Myc. 11: 63. 1905; Mycol. 4: 19. 1912, 7: 72. 1915). No aecial collections have been made in Oregon, though that stage is doubtless not uncommon in the eastern part of the state (cf. 69).


On Chenopodiaceae: I.


On Poaceae: III.


This remarkable species has aecia on a large number of hosts in the Polygonaceae, Chenopodiaceae, Amaranthaceae, Cruciferae, etc. as was first shown by Arthur (Bot. Gaz. 35: 19. 1903; Jour. Myc. 11: 54. 1905, 12: 16. 1906, 13: 197. 1907, 14: 15. 1908; Mycol.
Bethel (Phytopath. 7: 92–94. 1917) has also conducted very extensive cultures and proven the genetic connection with aecia on many hosts.

In 1915, Arthur (Mycol. 8: 135. 1916), using telial material sent by the writer collected by Mr. C. C. Cate at LaGrand, Ore., obtained the development of aecia on Chenopodium album. This is the only culture made with material from the Pacific coast.

The aecia on Sarcobatus are included here on the strength of culture work conducted by Arthur, in which he obtained aecia on that host using telial material on Distichlis from Nevada. The matter is complicated by the fact that Bethel (l. c.) finds that the aecia on this host in Colorado go to P. luxuriosa (cf. 124) and P. subnitens cannot be made to infect Sarcobatus. It is possible that the two species represent closely related biological forms.


On Caprifoliaceae:


This micro-form is exceedingly abundant in western Oregon. This species is morphologically correlated with the telial stage of P. abundans (cf. 59), which has aecia on the same host, as has been pointed out by Travelbee (Proc. Ind. Acad. Sci. 1914: 233. 1915).


On Cichoriaceae:


(Not P. circinans Fckl. 1869 or Dietel 1897.)
ON SCROPHULARIACEAE:
  Pentstemon sp.—Canyon City, Grant Co., Aug. 26, 1914, W. E. Lawrence, 3185.


ON RANUNCULACEAE:
  Trautvetteria grandis Nutt.—S. W. slope Mt. Hood, July 23, 1915, 3251.
  This interesting micro-form, known only from a few collections from the mountains of the northwestern states, has also been reported from Japan.


ON POACEAE:
  Triticum aestivalum L.—Hood River, June 20, 1914, 1399.


ON CARDUACEAE: I.
  Artemisia sp.—White Pine, Baker Co., June, 1913, J. R. Weir, 120.

ON CYPERACEAE: II, III.


On Urticaceae: I.

Urtica Lyallii S. Wats.—Philomath, April 26, 1914; 1829, May 10, 1914, 2569; Corvallis, May 1, 1915, 3052.

On Cyperaceae: II, III.


Carex rostrata Stokes (C. utriculata Boott.)—Clatskanie, Columbia Co., May 20, 1914, F. D. Bailey, 3010; Redmond, Crook Co., July 1, 1914, 1433.

Carex sp.—Hood River, May 14, 1914, 3021.

The connection of this Carex rust with aecia on Urtica was first shown by Magnus in 1872 (Vehr. Bot. var. Prov. Brandb. 14: 11. 1872). Many other European investigators have confirmed Magnus results (Klebahn, Die Wirtsw. Rostp. 293. 1904).

In America Arthur has conducted numerous successful culture experiments with this species (Bot. Gaz. 29: 270. 1900; 35: 16. 1903; Jour. Myc. 8: 52. 1902; 12: 15. 1906; 14: 14. 1908; Mycol. 2: 223. 1910; 4: 17. 1912). Kellerman has also conducted successful culture experiments (Jour. Myc. 9: 9. 1903). None of the culture work, however, has been conducted with Pacific coast material.


On Onagraceae: I.

Epilobium sp.—Parkdale, Hood River Co., May 14, 1914, 1511.

On Liliaceae: II, III.


The aecial collection is referred here with some confidence. It was made in the immediate vicinity of Veratrum plants showing fresh
uredinia. Theaecia were somewhat old and no uredinia were found on other *Epilobium* plants in the vicinity. Tranzschel (Ann. Myc. 7: 182. 1909) established the connection of aecia on *Epilobium* with *P. Veratri*, obtaining his clue from the close morphological resemblance of the teliospores of this species to those of *P. Epilobii* DC. Bisby (Am. Jour. Bot. 3: 527–561. 1916) has pointed out the morphological similarity of this species with *Uromyces plumbarious* (cf. 201), *P. Epilobii, P. Epilobii-tetragoni* (cf. 99) and *P. Epilobii-Fleischeri*.

176. **Puccinia Violae** (Schum.) DC. Fl. Fr. 6: 62. 1815.


**On Violaceae:**


Viola nephrophylla Greene—Hilgard, Union Co., July 10, 1914, 2557.

Viola rugulosa Greene—Horse Creek Canyon, Wallowa Co., June 4, 1897, E. P. Sheldon, 8258.

Viola sp.—N. slope Mt. Hood, Aug. 7, 1914, 2553.


**On Scrophulariaceae:**

Synthyris rotundifolia Gray—Philomath, April 20, 1912, 1146; Corvallis, April 8, 1914, 1286.


**On Rosaceae:**


This is not an uncommon disease of the prune, though apparently doing little damage. It is less common on the peach. No aecial collections have been made in the northwest.
Tranzschel (Trans. Bot. Acad. St. Petersb. 11: 67–69, 1905) was the first to culture this species showing that aecia occur on *Anemone*.

In America Arthur (Jour. Myc. 12: 19, 1906; 13: 199, 1907) has shown that the aecia on *Hepatica* common in the eastern United States are genetically connected.


**ON ALLIACEAE:**


**ON CARDBACEAE:**


**ON PLUMBAGINACEAE:**


This species differs from *U. Limonii* in the shorter, broader teliospores and the short mostly deciduous pedicel. The first collection mentioned bears aecia accompanied by uredinia, the second, uredinia and telia only. The rust is abundant on a cliff near the seashore. So far as we are aware this is the first record of this species in America.

**182. UROMYCES BECKMANNIAE** sp. nov.

O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous, scattered, elliptical, 0.5–0.8 mm. long, soon naked, pulverulent, cinnamon brown, ruptured epidermis noticeable; paraphyses none; urediniospores globose or broadly ellipsoidal, 19–24 by 23–30 μ, wall colorless or pale yellow, 2–2.5 μ thick, finely verrucose-echinulate, pores 8–10, scattered.

III. Telia amphigenous and culmicolous, scattered or crowded, obovate, 0.4–0.7 mm. across, often confluent to form crusts or lines, tardily naked, blackish brown; teliospores obovoid or ellipsoidal, angular, 20–26 by 29–40 μ, apex rounded or angular, narrowed below; wall chestnut brown, 1–2 μ thick, smooth, but showing distinct longitudinal ridges, apex thickened, 3–6 μ, pedicel colorless or slightly tinted next to the spore, equalling the spore or usually deciduous.
On Poaceae:


Evidently the most common rust in Oregon on this host. It differs from *U. Hordei*, which is in general a southern form not known on the Pacific coast, in the larger teliospores which show distinct longitudinal ridges. From *U. Jacksonii* (cf. 192) this species differs in the thickened apices of the teliospores. No clue is available as to the aecial host. The rust is difficult to separate from *Puccinia Rhamni* (cf. 159) in the uredinal stage.


On Alliaceae:

*Brodiaea* sp.—Corvallis, May 4, 1912, F. D. Bailey, 3304, April 25, 1915, 2625.

This opsis-form is evidently common in western Oregon. The rust is usually found attacking the tips of the leaves early in the spring. Aecia usually predominate, the telia being inconspicuous and easily overlooked.

184. **Uromyces carneus** (Nees) Hariot, Jour. de Bot. 7: 376. 1893.


On Leguminosae:

*Astragalus* sp.—Austin, Grant Co., Aug. 1915, J. R. Weir, 168.

185. **Uromyces Caryophyllina** (Schrank.) Wint. in Rab. Krypt. Fl. 1: 149. 1881.


On Caryophyllaceae:


On Leguminosae:


*Lathyrus sulphureus* Brewer—Corvallis, May 9, 1914, 3226; Ashland, Jackson Co., Sept. 10, 1914, 3320.


*Vicia americana* Muhl.—N. slope Mt. Hood, Aug. 7, 1914, 1489, Aug. 9, 1914, 1485; Corvallis, Sept. 21, 1914, 1545.

*Vicia linearis* (Nutt.) Greene—Mary’s Peak, Benton Co., June 20, 1910, 1501; Philomath, June 20, 1910, 1502; Newberg, Yamhill Co., April 13, 1914, 1525; Springbrook, Yamhill Co., June 25, 1914, F. D. Bailey, 3238.


*Vicia* sp.—Dothan, Douglass Co., Sept. 8, 1914, G. B. Posey, 1550.

187. UROMYCES FALLENS (Desmaz.) Kern, Phytopath. 1: 6. 1911.

*Uredo fallens* Desmaz. Pl. Crypt. 1325. 1843.


On Leguminosae:


On Liliaceae:

*Erythronium parviflorum* (Wats.) Goodding—Corvallis, April 13, 1912, F. D. Bailey, 1114.

A short-cycle form not uncommon in the Rocky Mt. and Pacific coast regions.


**On Liliiaceae:**


**On Hypericaceae:**

*Hypericum Scouleri* Hook.—Corvallis, June 24, 1914, F. D. Bailey, 1628, July 29, 1914, 1476; Hood River, June 20, 1914, 3372.

This species has not been previously reported west of the Mississippi valley.


**On Polygonaceae:**


*Eriogonum microthecum* Nutt.—Redmond, Crook Co., July 2, 1914, 2537.


On Poaceae:

*Agrostis Hallii* Vasey—Corvallis, Sept. 4, 1914, 1576.

*Deschampsia caespitosa* (L.) Beauv.—Toledo, Lincoln Co., July 19, 1915, 3194.
*Deschampsia elongata* (Hook.) Munro—Orengo, Washington Co., June 13, 1914, 1396; Corvallis, July 6, 1914, 2658, type, July 29, 1914, 1438; Glendale, Douglass Co., Aug. 17, 1914, 1408.


In addition to the above collections this species is now recognized on *Agrostis pallens* from California and *Muhlenbergia Lemmoni* from Arizona and New Mexico. Collections have also been made on *Deschampsia elongata* in Washington and on *Hordeum nodosum* in Washington and California.


*Puccinia Junci* Desmaz. Pl. Crypt. 81. 1825.

On Carduaceae: I.

*Arnica cordifolia* Hook.—Austin, Grant Co., Aug. 1915, J. R. Weir, 190.

On Juncaceae: II, III.


This species develops its aecia on various Carduaceae. In Europe cultures have been conducted by various authors, according to Klebahn (Die Wirtsw. Rostp. 329. 1904), showing that the aecia occur on *Pulicaria dysenterica* (*Inula dysenterica*).

In America Arthur (Mycol. 4: 22. 1912, 7: 77. 1915) has shown by culture experiments that aecia occur on *Carduus* and *Ambrosia*. The aecia on *Arnica* are referred here on morphological grounds.


(Not *P. Junci* Desmaz. 1825.)


ON JUNCACEAE:


Juncus Mertensianus Bong.—Big Creek, Waldport, Lincoln Co., Aug. 23, 1915, F. D. Bailey, 3381.


This species has not been connected with any aecial form. From field observations made by the writer in Oregon it seems probable that the aecia are to be looked for on Aster.


ON LEGUMINOSAE:


ON LEGUMINOSAE:


The aecia of this species in Europe have been shown by Schroeter (Krypt. Fl. Schl. 34: 306. 1887) and by Trebaux (Ann. Myc. 10: 74. 1912) to occur on various species of Euphorbia.
No aecia in America have been found which can be referred to this species. There is, however, no evidence at present available for believing the American species different from the European.


**On Poaceae**:

*Muhlenbergia comata* (Thurnb.) Benth.—Wallowa Valley, Wallowa Co., July 28, 1900, Wm. C. Cusick.


198. **Uromyces oblonga** Vize, Grev. **5**: **110**. 1877.

**On Leguminosae**:

*Trifolium albopurpureum* T. & G.—Corvallis, E. R. Lake, **3229**.


*Trifolium eriocephalum* Nutt.—Corvallis, July, 1910, 1089.


*Trifolium oliganthum* Steud.—Corvallis, May 11, 1914, F. D. Bailey, 2513.


This opsis-form is very common on native *Trifolium* sp. The original collection by Harkness was reported as occurring on "Bur cloves" now considered an error for *Trifolium*.

199. **Uromyces occidentalis** Diet. Hedwigia Beibl. **42**: **98**. 1903.
   *Nigredo occidentalis* Arth. N. Am. Flora **7**: **252**. 1912.

**On Leguminosae**:


ON CYPERACEAE:


This species is morphologically indistinguishable from P. Asterum (cf. 69) in all spore stages except in the possession of one-celled teliospores. Like that species the aecia occur on Aster and Solidago. The genetic connection was established by Arthur in repeated experiments (Jour. Myc. 10: 16. 1904; Mycol. 4: 21. 1912, 7: 75. 1915, 7: 83. 1915). Fraser (Mycol. 4: 181. 1912) has confirmed Arthur's results in part.

The above collection is the only one so far known from the Pacific coast.


ON ONAGRACEAE:

Pachylophus marginatus (Nutt.) Rydb.—Snake River, E. Oregon, June 3, 1901, W. C. Cusick (Phan. spec. 2542).

Pachylophus montanus (Nutt.) A. Nels.—Crooked River, Crook Co., July 3, 1901, W. C. Cusick (Phan. spec. 2033).

This species is correlated in morphological characters with P. Epilobii-tetragoni (cf. 99).


ON Polygonaceae:


203. Uromyces porosus (Peck) comb. nov.


Uromyces coloradensis Ellis & Ev. Erythea i: 204. 1893.


ON LEGUMINOSAE:


The two collections were made at the same spot on different dates. The first consists of aecia only and the second of telia only.


Uredo proeminnen DC. Fl. Fr. 2: 235. 1805.
**On Euphorbiaceae:**

*Euphorbia glyptosperma* Engelm.—Wasco Co., July 23, 1885, W. N. Suksdorf (from Phan. spec. in N. Y. Bot. Gard.).

*Euphorbia oreganensis* Millsp.—Horse Creek Canyon, Wallowa Co., May 20, 1897, E. P. Sheldon, 8115.


*Nigredo punctata* Arth. N. Am. Flora **7:** 253. 1912.

**On Leguminosae:**

*Astragalus Purshii* Dougl.—Austin, Grant Co., Aug. 1915, J. R. Weir, 236.

The aecia of this species have been shown by European authors to occur on *Euphorbia cyparissias*. No aecial collections have been made in America.

206. **Uromyces Scirpi** (Cast.) Burrill, Bot. Gaz. **9:** 188. 1884.


**On Cyperaceae:**

*Scirpus paludosus* A. Nels.—Waldport, Lincoln Co., Aug. 23, 1915, F. D. Bailey, 3323.

This species was first shown by Dietel (Hedwigia **29:** 149. 1890) to have its aecia on *Sium latifolium* and *Hippuris vulgaris*. Other investigators have added other Umbelliferous hosts to the list.

In America Arthur (Jour. Myc. **13:** 199. 1907; **14:** 17. 1908; Mycol. **1:** 237. 1909) has shown that *Cicuta maculata* is an aecial host. Fraser (Mycol. **4:** 178. 1912) has confirmed Arthur's work. Aecia on other hosts are properly referred here on morphological grounds. The species can doubtless be separated into a number of biological forms when more extensive culture work has been conducted.


*Aecidium compositarum* Silphii Burrill; DeToni in Sacc. Syll. Fung. **7:** 798. 1888.

**Uromyces Junct-tenuis** Sydow, Monog. Ured. **2:** 289. 1910.

*Nigredo Silphii* Arth. N. Am. Flora **7:** 239. 1912.

**On Juncaceae:**


Arthur (Jour. Myc. **13:** 202. 1907; **14:** 17. 1908) has shown that this common species has its aecia on *Silphium*. Using telial material on *J. tenuis* from Indiana, West Virginia and Nebraska, five successful
infections of *Silphium perfoliatum* were obtained, all of which resulted in the development of pycnia and aecia. The aecia on *Silphium* have been collected, so far as known to the writer, only in the Mississippi Valley from Ohio to Wisconsin, Kansas and Missouri, on three species of *Silphium*. The range of the telial collections referred here, however, is much greater including nearly the entire United States and Canada except the south Pacific slope. It seems probable that some plants other than *Silphium*, at present unrecognized, also serve as aecial hosts for this species.


On *Carduaceae*:

*Solidago* sp.—Dufur, Wasco Co., June 30, 1914, 1336.

This is the only micro-Uromyces occurring in both Europe and America. This species shows a morphological correlation with *P. Asteris* (cf. 70).


On *Portulaceae*:

*Calyptridium roseum* Wats.?—Crater Lake, Klamath Co., 7,000 ft., Sept. 22, 1913, E. P. Mcineke, CrPkD (2) 11.

*Spraguea multiceps* Howell—Strawberry Mt., Grant Co., Sept. 2, 1913, W. E. Lawrence, 1177.


On *Leguminosae*:

*Lupinus* sp.—Austin, Grant Co., Aug. 1915, J. R. Weir, 150.


*Puccinia Trifolii* Hedw. f.; DC. Fl. Fr. 2: 225. 1805.


On *Leguminosae*:


On Berberidaceae:
   Berberis aquifolium Pursh—Sauvies Island, Multnomah Co., Apr.,
   1882, Joseph Howell; Siskiyou, Jackson Co., May 31, 1894, E. W. D.
   Holway (Barth. N. Am. Ured. 1400); Corvallis, March 26, 1908,
   C. C. Cate, 3382, April 13, 1908, F. L. Griffin, 3383, March 14, 1913,
   1137; Philomath, Jan. 1, 1914, 1153; Tualatin, Washington Co.,
   March 25, 1915, F. D. Bailey, 2616; Grant's Pass, Josephine Co.,
   Berberis pumila Greene, Pokegama, Klamath Co., July 9, 1903,
   E. B. Copeland (Sydow, Ured. 1777; Baker, Pacific Coast Fungi
   3708).

Form Genera

213. Aecidium Allenii Clinton in Peck, Rep. N. Y. State Mus. 24:
   93. 1872.

On Elaeagnaceae:
   Leparygrea canadensis (L.) Greene—Strawberry Mt., Grant Co.,
   Sept. 2, 1913, W. E. Lawrence, 1113; Sumpter, Baker Co., June, 1913,
   J. R. Weir, 6; Gold Center, July, 1914, H. F. Wilson, 1842.

   Aecidium Tonellae D. & H. Erythea 3: 77. 1895.

On Scrophulariaceae:
   Collinsia parviflora Lindl.—Philomath, April 20, 1912, 1169.
   This species is evidently an heteroecious form known otherwise
   only from Washington on the above host and on C. Rattoni and C.
   tenella.

   It is apparently distinct from P. Collinsiae P. Henn. (Hedwigia
   37: 269. 1898) as stated by Hennings. The aecia of the latter,
   judging from the description, arise from a limited mycelium. There
   is no evidence of telia in any of the collections of A. Collinsiae ex-
   amined. P. Collinsiae has evidently been collected but once and
   material is not available for examination.


On Cichoriaceae:
   Hieracium albiflorum Hook.—Hood River, road to Lost Lake,
   May 16, 1915, 3245.
   Hieracium sp.—Bridal Veil, Multnomah Co., May 18, 1915, 3291.
   The aecia arise from a distributed mycelium and are not followed
   by any other stage. Puccinia Hieracii may however occur on the
same plants and even on the same leaves. Sydow (Ann. Myc. 1: 326. 1903) described *P. sejuncta* on such a mixture.

**Aecidium Batesianum** Barth. in E. & E. Fungi Col. 1901. 1904.  
**On Ranunculaceae:**  
*Delphinium depauperatum* Nutt.—Mary's Peak, Benton Co., May 21, 1915; 3216.  
*Delphinium* sp.—Corvallis, April 11, 1915, 2615; Redmond, Crook Co., May 15, 1915, 3327.  
This species is possibly identical with aecia on other Ranunculaceous hosts referred to *P. Clematidis* (cf. 85). For purposes of this list it is retained as a separate form as no cultures have been conducted.

**Aecidium Alaskanum** Trelease, Harr. Alaska Exp. 5: 37. 1904.  
**On Orchidaceae:**  
This unconnected *Aecidium* is doubtless heteroecious since no other stages have been found following the aecia on any of the collections examined. The species is known otherwise only from Alaska and in the mountains of British Columbia, Montana and California.

**On Pinaceae:**  
This species forms large witches' brooms.

**On Pinaceae:**  
*Abies nobilis* Lindl.—Larch Mt., Multnomah Co., Aug., 1910, 3293.

220. **Uredo Phoradendri** sp. nov.  
O. Pycnia not seen.  
II. Uredinia amphigenous, gregarious, not crowded, spots not conspicuous, punctate; rounded or slightly elongated, 0.4–0.8 mm. across, tardily naked, somewhat pulverulent, bright orange, dehiscent by an elongate or irregular fissure of the epidermis, ruptured epidermis conspicuous and persistent; peridium membranous, at first hemispherical, remaining closely adherent to the ruptured epidermis,
made up of colorless isodianemic cells, 14–19 μ across, sometimes somewhat rhomboidal, smooth, wall 1–1.5 μ thick; urediniospores ellipsoidal or obovoid, 17–33 by 26–32 μ, wall colorless, 1.5–2.5 μ thick, very closely and minutely echinulate, pores very indistinct, 10–12, scattered.

III. Telia unknown.

ON LORANTHACEAE:

*Phoradendron villosum* Nutt.—Corvallis, Sept. 21, 1915, C. E. Owens, 3377 type.

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