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# THE UREDINALES OR RUSTS OF UTAH

BY

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## PREFACE

The catalogue of the rusts of Utah presented herewith is the result of thirty-four years work in collecting and observation by the author. During this time the writer has collected in every county in the state, excepting Daggett.

The nomenclature used for the rusts has been that of Arthur's "Manual of the Rusts in the United States and Canada" (1934). The names as given in this manual vary in many instances from those given in the rust volume of the North American Flora. Since, however, the student of the rusts will find the manual a compact little book, as authoritative as the N. A. Flora, while the latter was published in parts, some of which are now out of print, the writer thought that the manual would be the work most likely followed.

The stages of each rust are indicated by the Roman numerals following the name—æcial stage I, uredial stage II, and telial stage III. If the rust is autœcious (having all the spore forms on one species of plant), the numerals are separated by commas. If, however, the rust is heterœcious (requiring two hosts of different species for its complete life cycle), a dash follows the I, e.g. I-II, III. When one of the forms is poorly developed, small letters are used instead of capitals.

The "Uredinales or Rusts of Connecticut and the Other New England States" listed 201 species; the "Preliminary List of the Uredinales of Washington" listed 224 species; the "Uredinales of Oregon," 220 species; and "A Preliminary List of the Uredinales of California", 230 species. In both the N. A. Flora and Arthur's Manual, there has been a decided "lumping" tendency. Moreover, the complete life cycle of many of the species listed in the above papers was unknown at the time of publication, and hence the æcial and telial stages were listed as separate species. The present paper lists 185 species, which probably at least equals the number in the above papers if they were revised to conform to the present nomenclature.

Unless otherwise stated, all the rusts listed in this paper were collected by the writer. Specimens from most of the collections have been sent to the Arthur herbarium at Purdue University. The types of the rusts described by the writer are in his own private herbarium.

Acknowledgments are due to the late Dr. Rydberg, to Dr. Aven Nelson, Dr. Paul Standley and others for the determination of host plants; and to Dr. Arthur, Dr. Kern, Dr. Jackson and the late Professor E. W. D. Holway and others for the determination of the rusts, and to Dr. Saville Flowers for the illustrations.

A. O. GARRETT

## KEY TO THE GENERA OF UTAH RUSTS

Telial stage known.

Teliospores sessile (*Melampsoraceæ*)

Teliospores vertically septate

- Uredinia and telia on ferns . . . . . *Hyalospora*
- Uredinia and telia on seed plants . . . . . *Pucciniastrum*

Teliospores one-celled.

- Æcia forming witches brooms on *Abies* and *Picea* . . . *Melampsorella*
- Æcia (if present) not forming witches brooms.

Teliospores arranged in a chain, adhering laterally.

- Telia bursting out from the epidermis, forming a long "horn"  
. . . . . *Cronartium*

Telia forming cushion-like sori.

- Teliospore-wall firm . . . . . *Chrysomyxa*
- Teliospore-wall gelatinous . . . . . *Coleosporium*

- Teliospores somewhat wedge-shaped, compressed laterally into  
crusts . . . . . *Melampsora*

Teliospores pedicellate (*Pucciniaceæ*).

- Teliospores 3-celled, the septa radiately arranged . . . *Nyssospora*
- Teliospores 3- or more celled, the septa horizontal . . . *Phragmidium*
- Teliospores 2-celled.

- Pedicels jointed and the base fascicled . . . . . *Tranzschelia*
- Pedicels neither jointed nor the base fascicled.

Teliospores with two lateral pores in each cell.

- Host plant *Berberis repens* . . . . . *Cumminsiiella*
- Host plant *Ivesia gordonii* . . . . . *Phragmidium horkeliae*

Teliospores with a single (lateral or apical) pore to each cell.

- Pedicels not gelatinous; rusts with or without uredia .  
. . . . . *Puccinia*

- Pedicels gelatinous; rusts of gymnosperm hosts forming "cedar-apples," without uredinia except in one species found in Alaska, Oregon, and Washington . . . *Gymnosporangium*

Telial stage unknown (*Uredinales Imperfecti*).

Æcia with peridia and spores in chains.

- On Angiosperm hosts . . . . . *Æcidium*
- On Gymnosperm hosts . . . . . *Peridermium*

## MELAMPSORACEÆ

1. *HYALOPSORA POLYPODII* (DC) Magn. II, III.

Plate I, A.

On *Cystopteris fragilis* Bernh (*Filix fragilis* [L.] Underw.) **498**. Aug. 27, 1904, Big Cottonwood Canyon, Wasatch Mts., Salt Lake Co. **2190**. July 29, 1911, Abajo Mts., San Juan Co. **3265**. July 28, 1926, near Aspen Grove, Mt. Timpanogos, Wasatch Mts., Utah Co. **3469**. Aug. 18, 1928, Uinta Mts., Uinta Co.

Pycnia and aecia unknown.

Exsic. Fungi Utah. 74.

2. *PUCINIATRUM GALII* (Link) Ed. Fisch. II, III.

On *Galium triflorum* Michx. **2362a**. II, July 28, 1926, below Aspen Grove, Mt. Timpanogos, Utah Co.

Pycnia and aecia unknown.

3. *PUCINIATRUM GOEPPERTIANUM* (Kühn) Kleb. I, III.

*Calyptospora goeppertianum* Kühn.

*Calyptospora columnaris* (Alb. & Schw.) Kühn.

On *Vaccinium caespitosum* Michx. **3468**. Aug. 18, 1928, Mt. Baldy, Uinta Mts., Summit Co. This is the first recorded collection of this species in Utah. It is not uncommon in the Uintas. Its aecial stage is to be looked for on the leaves of *Abies* (not yet collected in Utah).

Uredia not formed.

4. *PUCINIATRUM MYRTILLI* (Schum) Arth. I-II, III.

On *Vaccinium caespitosum* Michx. **562a**. August, 1904, Big Cottonwood Canyon, Salt Lake Co.

On *Vaccinium globulare* Rydb. Collected by Dr. Hedgcock in Uinta Mts.

On *Vaccinium* sp. Collected by Marcus E. Jones, August, 1883, in Strawberry Valley, Wasatch Mts.

The aecia occur on *Tsuga canadensis* (L.) Carr.

5. *PUCINIATRUM PUSTULATUM* (Pers.) Dietel I-II, III.

Plate I, B.

*Pucciniastrum epilobii* Otth.

On *Epilobium adenocaulon* Haussk. **604**. Oct. 1, 1904, Red Butte Canyon, Wasatch Mts., Salt Lake Co. **877**. May 19, 1906, on seedlings, Upper Falls, Provo Canyon, Wasatch Mts., Utah Co. **2057**. July 31, 1909, Fish Creek Canyon, Sevier Co.

On *Epilobium americanum* Haussk. **2988**. Aug. 10, 1921, Manti, Sanpete Co. **3012**. Aug. 27, 1921, Pharaoh's Glen, Parley's Canyon, Wasatch Mts., Salt Lake Co.

On *Epilobium anagallidifolium* Lam. **807**. Aug. 4, 1905, Silver Lake, Big Cottonwood Canyon, Wasatch Mts., Salt Lake Co.

On *Epilobium drummondii* Haussk. **948**. Aug. 25, 1906, Big Cottonwood Canyon, Salt Lake Co.

On *Epilobium stramineum* Rydb. **2363**. July 27, 1918, Witbeck's Ranch, near Vernal, Uinta Co.

On *Epilobium brevistylum* Barbey. **949**. Aug. 25, 1906, near Silver Lake, Big Cottonwood Canyon, Salt Lake Co.

On *Epilobium rubescens* Rydb. **3266**. July 28, 1926, Mt. Timpanogos, Utah Co.

The aecia occur on the underside of the leaves of *Abies*, not yet reported from Utah.

Exsic. Fungi Utah. 95, 111.

6. **PUCCINIASTRUM PYROLÆ** (Pers.) Schroet. II, III.

*Thecapsora pyrolae* Karst.

On *Pyrola secunda* L. **713**. July 5, 1905, Big Cottonwood Canyon, Salt Lake Co. **2255**. Aug. 21, 1911, Abajo Mts., San Juan Co.

On *Pyrola uliginosa* Torr. **608**. Oct. 1, 1904, Red Butte Canyon, Wasatch Mts., Salt Lake Co.

Pycnia and aecia unknown.

7. **MELAMPSORELLA CERASTII** (Pers.) Schroet. I, II, III.

Plate I, C.

*Aecidium coloradense* A. & K.

*Melampsorella elatina* (Alb. & Schw.) Arth.

*Peridermium elatinum* S. & K.

On *Abies concolor* Lindl & Gord. I. **3114**. July 12, 1924, Community Flat, Nature's Icebox Spring, Mt. Timpanogos, Utah Co.

On *Abies lasiocarpa* (Hook.) Nutt. **3524**. Aug. 17, 1930, Mirror Lake, Uinta Mts., Summit Co. In his paper "Some Western Uredineae," Dr. Hedgcock states that the rust on this host is conspicuous in the Manti National Forest.

On *Picea engelmanni* (Parry) Engelm. I. **2661**. July 9, 1920, Coal Creek branch of Cedar Canyon, about 14 miles from Cedar City, Iron Co. The aecia on this host have been known as *Aecidium coloradense* A & K.

On *Cerastium behringianum* Regel. **2174**. July 15, 1911, Gold Basin, La Sal Mts., San Juan Co.

On *Cerastium scopulorum* Greene. **2249**. Aug. 19, 1911, Abajo Mts. near West Mountain, San Juan Co.

On *Stellaria borealis* Bigelow (*Alsine borealis* Britton). **851**. Aug. 21, 1905, Big Cottonwood Canyon, Salt Lake Co.

The aecia on the firs and spruces make conspicuous orange witches-brooms, very common in the Uintas, where they are often mistaken for some kind of "mistletoe".

Exsic. Fungi Utah. 127, 207.

8. **CRONARTIUM COLEOSPORIOIDES** (D. & H.) Arthur I-II, III.

## Plate I, F.

*Cronartium filamentosum* Hedg.*Cronartium harknessii* (J. P. Moore) Meinecke*Peridermium harknessii* J. P. Moore*Peridermium filamentosum* Peck.

On branches of ***Pinus scopulorum*** (Engelm.) Lemmon. I. **2628**. July 1, 1920, Bryce's Canyon, Garfield Co. Very common on and near the south rim.

On ***Castilleja linariaefolia*** Benth. **2236**. III., Aug. 14, 1911, Montezuma Canyon, near Monticello, San Juan Co.

Exsic. Fungi Utah. 202.

9. **CRONARTIUM COMANDRAE** Peck I-II, III.*Peridermium pyriforme* Peck*Cronartium pyriforme* (Peck) Hedg. and Long

On ***Pinus scopulorum*** (Engelm.) Lemmon (*P. ponderosa scopulorum* Engelm.). I, collected by Vernon Christensen, July 15, 1920, headwaters Provo River, Summit Co.

On ***Comandra pallida*** A. DC. III. **1401a**. July 26, 1918, Vernal, Uinta Co. **3025**. Aug. 25, 1931, Spring Hollow, Logan Canyon, Cache Co. **3249**. July 22, 1926, Mt. Timpanogos, Wasatch Mts., Utah Co. On the same host, Mrs. Mary Strong Clemens collected it Aug. 14, 1911, at Holiday Park, Uinta Mts.; and Marcus E. Jones, August, 1883, at Salt Lake City.

10. **CRONARTIUM OCCIDENTALE** Hedg., Bethel and Hunt. I-II, III.

## Plate I, G.

*Peridermium occidentale* Hedg., Bethel and Hunt.

On stems of ***Pinus edulis*** Engelm. F. P. **29419**, I. July 28, 1918, McKee's Ranch, 15 miles northeast of Vernal, Uinta Co. This is the first record of the collection in Utah of the *Peridermium* stage of this rust. Hunt and Bethel collected it August 15, 1918, at Monticello, San Juan Co. **2614a**. I. Bullion Canyon, near Marysvale, Piute Co. **2697**. July 29, 1920, Parowan Main Canyon, Iron Co.

On ***Ribes aureum*** Pursh. **2948**, II, III, September 14, 1918, Santaquin, Utah Co., alt. about 1428 m. The first Utah collection of this *Cronartium* was made at Santaquin, Sept. 19, 1914, by Professor C. P. Taylor on this host. **2704b**. July 30, 1920, Parowan Canyon near Parowan, Iron Co. **2715**. Aug. 3, 1920, Beaver, Beaver Co. **2732**. Aug. 10, 1920, Scipio, Millard Co. **2724**. Aug. 6, 1920, Hinckley, Millard Co. **2759a**. Aug. 22, 1920, Hyrum, Cache Co. **2760**. Aug. 23, 1920, Mendon, Cache Co. **2763**, Aug. 24, 1920, Morgan, Morgan Co. **2982**. Aug. 10, 1921, Manti, San Pete Co. **2991**. Aug. 12, 1921, Marysvale, Piute Co. **2996**. Aug. 14, 1921, Panguitch, Garfield Co. **2997**, Aug. 16, 1921, Mt. Carmel, Kane Co. **2998**. Aug. 17, 1920, Richfield, Sevier Co. **3223**. June 16, 1926. Diamond Fork near Castilla, Utah Co. Also collected by Dr. Walter



P. Cottam Aug. 22, 1925, just east of Carterville near Provo, Utah Co., and by Miss Ruby Harkness Oct. 15, 1920, along Currant Creek, Duchesne Co.

On *Ribes inebrians* Lindl. **2714**. Aug. 3, 1920, Beaver Canyon, Beaver Co.

On *Ribes inerme* Rydb. (*Grossularia inermis* [Rydb] Cov. & Britton). Collected by Bethel and Hunt Aug. 15, 1918, near Monticello, San Juan Co.

On *Ribes leptanthum* A. Gray (*Grossularia leptantha* [A. Gray] Cov. & Britton). **2713**. Aug. 3, 1920, Beaver Canyon, Beaver Co.

On *Ribes odoratum* Wendl. Collected by Dr. E. M. Hall Nov. 10, 1916, at Springdale, Washington Co.

This rust has caused much interest from an economic standpoint because of the exceedingly close resemblance of its uredia and telia to those of white pine blister rust (*Cronartium ribicola*) occurring on the same hosts. However, the favorite host of the pinyon pine blister rust seems to be *Ribes aureum*, while that of the five-leaved pines is *Ribes nigrum*.

#### 11. CHRYSOMYXA ARCTOSTAPHYLLI Dietel III.

*Melampsoropsis arctostaphyli* (Dietel) Arth.

On *Arctostaphylos uva-ursi* (L.) Spreng. Collected by Marcus E. Jones, Aug. 2, 1894, at Fish Lake, Sevier Co.

Pycnia, aecia and uredia unknown—probably wanting.

#### 12. CHRYSOMYXA LEDI (A. & S.) De Bary I-II, III.

*Melampsoropsis ledi* (Alb. & Schw.) Arth.

On *Ledum glandulosum* Nutt. **3457**. Collected by Dr. Walter P. Cottam, July 15, 1928, Granddaddy Lakes, Uinta Mts., Summit Co.

The aecial stage occurs on the leaves of species of *Picea*, not yet found in Utah.

#### 13. CHRYSOMYXA PYROLÆ (D C) Rostr. I-II, III.

Plate I, D.

*Melampsoropsis Pyrolae* (DC) Arthur

On *Pyrola secunda* L. **823**. II, Aug. 10, 1905, Silver Lake, Big Cottonwood Canyon, Salt Lake Co.

On *Pyrola uliginosa* Torr. **683**. II, June 29, 1905, Big Cottonwood Canyon, Salt Lake Co.

Pycnia and aecia on the cones of species of *Picea*, not yet reported from Utah.

Exsic. Fungi Utah. 72, 73.

#### 14. COLEOSPORIUM JONESII (Peck) Arth I-II, III.

*Uredo jonesii* Peck

*Coleosporium ribicola* Arth.

On *Ribes aureum* Pursh. Collected by Bethel and Hunt Aug. 15, 1918, near Monticello, San Juan Co.

On *Ribes cereum* Dougl. **2705**, July 30, 1920, Parowan Canyon, Iron Co. **2638**. July 17, 1920, Maple Canyon above Cedar City, Iron Co. **2716**. Aug. 3, 1920, Beaver Canyon, Beaver Co.

On *Ribes coloradense* Coville, **2252**. Aug. 20, 1911, Innes' Sawmill, Abajo Mts., San Juan Co.

On *Ribes inebrians* Lindl, **2200**. Aug. 2, 1911, Bears' Ears, Elk Mts., San Juan Co. **2253**. Aug. 14, 1911, Montezuma Canyon near Monticello, San Juan Co. **3002**. Aug. 20, 1921, Fish Lake Resort, Sevier Co. **2253**. II, Aug. 20, 1911, Abajo Mts. near Innes' Sawmill, San Juan Co. Also collected by Dr. Seville Flowers Sept. 1, 1925, Rotary Grove, City Creek Canyon, Salt Lake Co.

On *Ribes inerme* Rydb. (*Grossularia inermis* [Rydb.] Coville & Britton). Collected by Bethel and Hunt Aug. 15, 1918, near Monticello, San Juan Co.

On *Ribes viscosissimum* Pursh. **3188**. Aug. 20, 1925, Mt. Timpanogos, Wasatch Mts., Utah Co.

The aecia occur on both sides of the leaves of *Pinus edulis* Engelm., not yet reported from Utah.

#### 15. COLEOSPORIUM OCCIDENTALE Arth. II, III.

On *Senecio uintahensis* (A. Nelson) Greenman. Recorded in N. A. Flora 7:660.1924 as having been collected in Utah.

Aecia unknown.

#### 16. COLEOSPORIUM SOLIDAGINIS (Schd.) Thüm. I-II, III.

On *Aster foliaceus canbyi* A. Gray (*A. canbyi* Vasey). **3306**. II, Aug. 20, 1926, Aspen Grove, Mt. Timpanogos, Utah Co.

The aecia occur on both sides of the leaves of *Pinus spp.*, not yet reported from Utah.

#### 17. MELAMPSORA ABIETIS—CANADENSIS (Farl.) C. A. Ludwig I-II, III.

On *Populus angustifolia* James. II. **2115**, Oct. 9, 1909, Wasatch Resort, Little Cottonwood Canyon, Salt Lake Co.

Referring to this collection, Dr. George B. Cummins of Purdue University wrote as follows: "There seems to me to be no reason to call the thing *M. medusae*, *M. albertensis* or *M. occidentalis* since the spores are too small, lack thickened sidewalls, smooth spots, etc. This leaves only one possibility on *Populus* and that is *M. abietis—canadensis*, supposedly a more easterly species. Agreement with it is fairly good. Actually the rust is of the type found on *Salix*."

#### 18. MELAMPSORA ABIETI-CAPRÆARUM Tubeuf, I-II, III.

*Melampsora humboldtiana* Speg.

On *Abies concolor* Lindl. I. **3355**. July 27, 1927, near Aspen Grove, Mt. Timpanogos, Utah Co.

On *Salix scouleriana* Barr. II. **3293**. Aug. 4, 1926. Mt. Timpanogos, Utah Co.

On *Salix subcoerulea* Piper. II. **3300**. Aug. 17, 1926. Mt. Timpanogos, Utah Co.

19. *MELAMPSORA ALBERTENSIS* Arth. I-II, III.

Plate I, E.

*Caecoma occidentalis* Arth.

On *Pseudotsuga mucronata* (Raf.) Sudw. I. **2685**. July 27, 1920, Coal Creek branch of Cedar Canyon, about fourteen miles from Cedar City, Iron Co. **3139**. July 27, 1925, west of Aspen Grove, Mt. Timpanogos, Wasatch Mts., Utah Co.

On *Populus tremuloides* Michx. **3018**. II, Aug. 31, 1921, Spring Hollow, Logan Canyon, Cache Co. **2248**. II, Aug. 19, 1911, Abajo Mts. near West Mountain, San Juan Co. **2218**. II, Aug. 8, 1911, Kaigalia Pasture, Elk Mts., San Juan Co. **3018**. Aug. 31, 1921, Spring Hollow, Elk Mts., San Juan Co. **3139a**. II, July 27, 1925, above Aspen Grove, Mt. Timpanogos, Wasatch Mts., Utah Co.

Exsic. Fungi Utah. 205.

20. *MELAMPSORA BIGELOWII* Thüm. I-II, III.

Plate VI, F.

On *Salix amygdaloides* And. **2322**. July 1, 1926, Provo, Utah Co.

On *Salix exigua* Nutt. (*Salix luteosericea* Rydb.) **2000**. Nov. 21, 1908, near Salt Lake City, **871**. Oct. 7, 1905, City Creek Canyon, Salt Lake Co.

On *Salix caudata* (Nutt.) Heller. **318**. II, Sept. 3, 1903. Red Butte Canyon, Salt Lake Co., **632**, III, same locality as 318.

On *Salix chlorophylla* Andrs. **846**, Aug. 17, 1905, Big Cottonwood Canyon, Salt Lake Co.

On *Salix cordata watsoni* Bebb. **1180**. Sept. 12, 1908, City Creek Canyon, Salt Lake Co.

On *Salix glaucops* Anders. **2263**. August, 1911, San Juan Co.

On *Salix monticola* Bebb. **2187**, July 26, 1911, Monticello, San Juan Co.

On *Salix pachnophora* Rydb. **2250**. Aug. 19, 1911, Spring Creek, Abajo Mts., San Juan Co.

On *Salix* sp. **986**, Sept. 29, 1906, Castilla, Utah Co.

On *Salix subcoerulea* Piper. **3009**. Aug 20, 1921, Fish Lake Resort, Sevier Co.

The aecia occur on *Larix* spp., not reported from Utah.

Exsic Fungi Utah. 71, 178, 206.

21. *MELAMPSORA LINI* Desmaz. I, II, III.

On *Linum lewisii* Pursh. **408**. June 30, 1904, Wasatch Mts. near Salt Lake City.

On *Linum kingii* Wats. **723**, July 6, 1905, Wasatch Mts., Wasatch Co.

Exsic. Fungi Utah. 78.

22. *MELAMPSORA MONTICOLA* Mains II, III.

On *Euphorbia robusta* (Engelm.) Small (*Tithymalus robustus* [Engelm.] Small.) **3511**. July 23, 1930. Near Aspen Grove, Mt. Timpanogos, Wasatch Mts., Utah Co.

Pycnia and aecia unknown.

23. *MELAMPSORA RIBESII-PURPUREÆ* Kleb. I-II, III.

*Caeoma confluens* (Pers) Schroeter.

*Melampsora confluens* H. S. Jackson

On *Ribes aureum* Pursh. I. Collected by George A. Root in Ogden Canyon, Weber Co., June 17, 1921. This is the first recorded collection on this host.

On *Ribes inerme* Rydb. (*Grossularia inermis* [Rydb.] Cov. & Britton). I. **682**. June 29, 1905, Big Cottonwood Canyon, Salt Lake Co. **2694**. June 21, 1920, Gogorza, Summit Co.

On *Ribes leptanthum* A. Gray (*Grossularia leptantha* [A. Gray] Cov. & Britton). **2622**. July 1, 1920, Henry Ranch near Panguitch Lake, Garfield Co.

On *Ribes wolfii* Rothr. **2741**. O, I, Aug. 16, 1920, above Silver Lake, Big Cottonwood Canyon, Salt Lake Co. This collection is recorded in Arthur's "Manual of The Rusts in United States and Canada" as having been collected on *Ribes petiolare* Dougl.

On *Salix bebbiana perrostrata* (Rydb.) Schw. II. **3169**. Aug. 5, 1925, Mt. Timpanogos, Wasatch Mts., Utah Co.

On stems of *Salix caudata* (Nutt.) Heller. **3325**. Diamond Fork Canyon near Castilla, Utah Co. Collected by Kenneth Weight.

On *Salix geyeriana argentea* (Bebb) S. Schneid. **3377**. Collected by Kenneth Weight, Aug. 8, 1927, Stewart's Cascades, Mt. Timpanogos, Wasatch Mts., Utah Co.

On *Salix lutea platyphylla* Ball. **903**. July 17, 1906, Parley's Canyon, Salt Lake Co.

On *Salix monticola* Bebb. **3757**. July 23, 1926, Stewart's Boy Scout Camp, Mt. Timpanogos, Wasatch Mts., Utah Co.

On *Salix scouleriana* Barr. **3426**. Aug. 18, 1927, Mt. Timpanogos, Utah Co. **3009a**. Aug. 31, 1921, Spring Hollow, Logan Canyon, Cache Co. **903**. July 17, 1906, Parley's Canyon, Salt Lake Co.

On *Salix watsonii* (Bebb) Rydb. **2593**. II, June 21, 1920, Gogorza, Summit Co.

Exsic. Fungi Utah. 71.

## PUCCINIACEÆ

24. *TRANZSCHELIA FUSCA* (Pers.) Dietel, III.*Polythelis fusca* (Pers.) Arth.*Puccinia fusca* Wint.

On *Anemone tetonensis* Porter. **3143**. Collected by Dr. Bryant Decker, July 27, 1925, near Emerald Lake, Mt. Timpanogos, Utah Co. Aecia and uredinia not formed.

25. *TRANZSCHELIA THALICTRI* (Chev.) Dietel, III.*Polythelis suffusca* (Holw.) Arth.*Polythelis thalictri* (Chev.) Arthur*Puccinia thalictri* Chev.

On *Thalictrum fendleri* Engelm. **3167**. Aug. 13, 1925, Mt. Timpanogos, Wasatch Mts., Utah Co.

On *Thalictrum sparsiflorum* Turcz. **818**. Aug. 10, 1905, near Lake Solitude, Big Cottonwood Canyon, Salt Lake Co.

Aecia and uredinia not formed.

Exsic. Fungi Utah. 113.

26. *CUMMINSIELLA SANGUINEA* (Peck) Arth. I, II, III.

## Plate I, H.

*Puccinia mirabilissima* Peck*Uropyxis sanguinea* (Peck) Arth.

On *Berberis repens* Lindl. **188**. II, III. May 9, 1903, Wasatch Mts. near Salt Lake City. **2151**. July 29, 1909, Fish Creek Canyon, western Sevier Co.

In Sweden this rust produces aecia. None have been found in nature in this country, and repeated cultural tests have so far failed to produce them.

Exsic. Fungi Utah. 10.

27. *PHRAGMIDIUM ANDERSONI* Shear I, II, III.

On *Dasiphora fruticosa* (L.) Rydb. (*Potentilla fruticosa* L.) **705**. July 3, 1905. South Fork Big Cottonwood Canyon, Salt Lake Co. **2214**. Aug. 7, 1911, Scorup's Summer Camp, San Juan Co. **2289**. Aug. 1, 1926. Trail above Baby Falls, Mt. Timpanogos, Utah Co.

Exsic. Fungi Utah. 208.

28. *PHRAGMIDIUM HORKELLÆ* Garrett III.

## Plate II, A.

*Earlea horkelliae* (Garrett) Arthur

On *Ivesia gordonii* T. & G. (*Horkelia gordonii* [Hook.] T. & G. **932**. Aug. 17, 1906, Mt. Millicent, Big Cottonwood Canyon, Wasatch Mts., Salt Lake Co. **2134**. Aug. 22, 1910, near Lake Blanche, Big Cottonwood Canyon, Salt Lake Co. **2744**. Aug. 16, 1920, east slope from Twin Lakes, Big Cottonwood Canyon, Salt Lake Co.

Known only from Big Cottonwood Canyon, Salt Lake Co.

Pycnia, aecia, and uredia unknown, probably not formed. This rust is almost unique among the *Phragmidiums* in that its teliospores are two-celled.

29. **PHRAGMIDIUM IVESLÆ** Sydow, I, II, III.

*Phragmidium affine* Sydow

On *Potentilla bakeri* Rydb. **726**. July 6, 1905, Hot Pots, Wasatch Co.

On *Potentilla blaschkeana* Turz. **3409**. Aug. 10, 1927, near Charlton, Wasatch Co.

On *Potentilla dichroa* Rydb. **727**. July 6, 1905, Hot Pots, Wasatch Co.

On *Potentilla diversifolia* Lehm. **3125**. Sept. 21, 1924, East Canyon, Summit Co.

On *Potentilla glomerata* A. Nelson. **2345**. II, III, July 24, 1917, Emigration Canyon, Salt Lake Co.

On *Potentilla jucunda* A. Nelson. **3467**. Aug. 17, 1928, Morgan Co.

On *Potentilla pectinisecta* Rydb. **2098**. Oct. 2, 1909, Parley's Canyon, Salt Lake Co.

On *Potentilla pulcherrima* Lehm. **315**. Sept. 3, 1903, Red Butte Canyon, Salt Lake Co. **2759**, II, III, Richmond, Cache Co.

On *Potentilla viridescens* Rydb. **491**. Aug. 20, 1904, Big Cottonwood Canyon, Cache Co.

Exsic. Fungi Utah. 100, 151. Fungi Columb. 1946.

30. **PHRAGMIDIUM JONESII** Dietel, I, II, III.

Plate II, B.

On *Ivesia gordonii* T. & G. **703**. I, III, July 3, 1905, head of Little Cottonwood Canyon, Salt Lake Co. **2135**. III, Aug. 23, 1910, Mill B fork Big Cottonwood Canyon, Salt Lake Co.

Exsic. Fungi Utah. 228.

31. **PHRAGMIDIUM MONTIVAGUM** Arthur I, II, III.

On *Rosa chrysocarpa* Rydb. **3301**. Aug. 17, 1926, near First Falls, Mt. Timpanogos, Wasatch Mts., Utah Co.

On *Rosa fendleri* Crepin. **446**. July 12, 1904, Red Butte Canyon, Salt Lake Co.

On *Rosa macounii* Greene (*R. grosse-serrata* E. Nelson; *R. maxmilianiana* Rydb.) **2077**. Aug. 19, 1909, Big Cottonwood Canyon, Wasatch Mts., Salt Lake Co. **2041**. Red Butte Canyon, Wasatch Mts., Salt Lake Co. **2049**. July 28, 1909, Fish Creek Canyon, Sevier Co.

On *Rosa neomexicana* Cockerell. **2180**. July 24, 1911, Monticello, San Juan Co.

On *Rosa praetincta* Cockerell (*R. aciculata* Rydb.) **2166**. July 12, 1911, La Sal Mts.

On *Rosa puberulenta* Rydb. **3434**. Aug. 18, 1927, Mt. Timpanogos, Wasatch Mts., Utah Co. **2651**. July 19, 1920, Coal Creek Branch, Cedar Canyon, Iron Co. **2720**. Aug. 3, 1920, Beaver Canyon, Beaver Co.

On *Rosa pyrifera* Rydb. **3007**. Aug. 20, 1921, Fish Lake Mts., Sevier Co.

On fruit of *Rosa spaldingi* Crepin. **3361**. July 28, 1927, Mt. Timpanogos, Wasatch Mts., Utah Co.

On *Rosa ultramontana* (S. Wats.) Heller. **3291**. Aug. 1, 1926, Mt. Timpanogos, Wasatch Mts., Utah Co.

Exsic. Fungi Utah. 179, 180.

### 32. PHRAGMIDIUM OCCIDENTALE Arth. I, II, III.

On *Rubus parviflorus* Nutt. **2246**. Aug. 18, 1911, Abajo Mts. below Innes' sawmill. **3302**. Aug. 18, 1926, below Aspen Grove, Mt. Timpanogos, Utah Co. **2318**. Aug. 21, 1916, Daniel's Canyon, Wasatch Co.

Exsic. Fungi Utah. 209.

### 33. PHRAGMIDIUM RUBI-IDÆI (DC) Karst. I, II, III.

*Phragmidium imitans* Arthur

On *Rubus strigosus* Mich. **2684**. July 27, 1920, Coal Creek Branch of Cedar Canyon, about fourteen miles from Cedar City. Dr. Rydberg reported on the host as follows: "It is none of the Rocky Mtn. forms of red raspberry, but may be an escape of the eastern *R. strigosus*."

On *Rubus melanolasius* Foche. **3261**. II, III, July 28, 1926, below Aspen Grove, Mt. Timpanogos, Wasatch Mts., Utah Co.

### 34. NYSSOSPORA ECHINATA (Lev.) Arthur. III.

Plate II, H.

*Triphragmium echinatum* Lev.

On *Ligusticum filicinum* Wats. **509**. Aug. 24, 1904, Big Cottonwood Canyon, Salt Lake Co. **3132**. July 20, 1925, First Falls, Mt. Timpanogos, Wasatch Mts., Utah Co.

Aecia and uredia wanting.

### 35. PUCCINIA ABERRANS Peck. III.

Plate VIII, I.

On *Smelowskia americana* Rydb. **773**. July 28, 1905, Mt. Millicent, Big Cottonwood Canyon, Salt Lake Co. The type of this species was collected in Utah.

Exsic. Fungi Utah. 52.

### 36. PUCCINIA ABSINTHII DC. I, II, III.

Plate VIII, I.

On *Artemisia aromatica* A. Nels. **2995**. Aug. 12, 1921, Marysvale, Piute Co.

On *Artemisia bigelovii* A. Gray. Listed in Arthur's Manual as occurring in Utah on this host.

On *Artemisia cana* Pursh. **3550**. Aug. 28, 1934, Fish Lake, Sevier Co.

On *Artemisia dracunculoides* Pursh. **476**. Aug. 5, 1904, City Creek Canyon, Salt Lake Co.

On *Artemisia nova* A. Nelson. **2030**. July 17, 1909, Emigration Canyon, Salt Lake Co.

On *Artemisia tridentata* Nutt. **223**. June 10, 1903, Wasatch Mts., Salt Lake Co. **721a**, July 5, 1905, Wasatch Mts., Wasatch Co. **2060**. Aug. 2, 1909, Fish Creek Canyon, western Sevier Co. **3446**. June 13, 1928, near Rock Creek Canyon, Utah Co.

On *Tanacetum diversifolium* (*Sphaeromeria diversifolia* [D.C. Eaton] Rydb.) **3011**. Aug. 27, 1921, Pharaoh's Glen, Parley's Canyon, Salt Lake Co. This is the first collection of this rust on this host. Also collected by Orlin Biddulph, August, 1927, Mt. Timpanogos, Utah Co.

Exsic. Fungi Utah. 79, 80, 181.

### 37. PUCCINIA ACROPHILA Peck. III.

On *Synthyris laciniata* (A. Gray) Rydb. **2136**. Aug. 24, 1910, Mountains above Lake Blanche, Big Cottonwood Canyon, Salt Lake Co.

On *Synthyris pinnatifida* Wats. Collected by Mrs. Mary Strong Clemens Aug. 16, 1911, at Mt. Minnie, Little Cottonwood Canyon, Salt Lake Co. The type was collected in Utah on this host by Marcus E. Jones. **3175**. Aug. 13, 1925, Mt. Timpanogos, Wasatch Mts., Utah Co.

### 38. PUCCINIA ADOXÆ Hedw. f. III.

On *Adoxa moschatellina* L. **2239**. August 17, 1911, Abajo Mts., San Juan Co.

Exsic. Fungi Utah. 211.

### 39. PUCCINIA ÆMULANS Syd. I, II, III.

#### Plate VIII, A.

*Puccinia gymnomiæ* (Dietel) Holway.

On stems and leaves of *Viguiera multiflora* (Nutt.) Blake (*Gymnomiæ multiflora* Benth. & Hook.) **230**. I, II, June 27, 1903, Wasatch Mts., near Salt Lake City. **230a**. III, Sept. 3, 1903, Red Butte Canyon, Salt Lake Co. **3295**. II, III. Aug. 16, 1926. Timpanogos Trail, near Aspen Grove, Utah Co.

Exsic. Fungi Utah. 15, 16, 42.

### 40. PUCCINIA ALBULENSIS Magn. III.

On *Veronica wormskjoldii* R. & S. **736**. July 10, 1905, Alta Valley, head of Little Cottonwood Canyon, Salt Lake Co. **855**. Aug. 23, 1905, Big Cottonwood Canyon, Salt Lake Co.

Exsic. Fungi Utah. 94.

### 41. PUCCINIA ANOMALA Rostr. I-II, III.

In his "Uredinales of Oregon" (p. 231) Dr. Jackson states that spe-



cimens of this rust from Utah, on the leaves of the wild barleys, are in the Arthur herbarium.

The aecia are known only from Europe, on species of *Ornithogalum*.

42. **Puccinia ANTIRRHINI** Dietel and Holway. II, III.

On leaves and stems of *Antirrhinum majus* L. (Cult.) **2507**. July 12, 1919, Salt Lake City. This rust occurs both in the greenhouse and on plants growing in the garden.

43. **Puccinia ARENARIÆ** (Schum.) Wint. III.

**Plate IV, J.**

*Puccinia hysteriiformis* Peck.

On leaves, stems and rarely on calyx-lobes of *Arenaria uintahensis* A. Nelson. **211**. June 10, 1933, Wasatch Mts. near Salt Lake City. The type of this rust was collected in Utah on *Arenaria verna* Hort.

Exsic. Fungi Utah. 14; Fungi Columb. 1963.

44. **Puccinia ARISTIDÆ** Tracy. I-II, III.

*Puccinia subnitens* Dietel.

*Puccinia sarcobati* (Peck) Bethel.

*Aecidium biforme* Peck.

On *Atriplex rosea* L. I. **2802**. May 14, 1921, Granger, Salt Lake Co. Also collected July, 1916, by M. R. Porter at Oasis, Millard Co. E. M. Hall collected it May 19, 1919, at St. George, Washington Co.

On *Atriplex* sp. **2804**. I, May 14, 1921, Granger, Salt Lake Co.

On *Beta vulgaris* L. I. Collected by E. M. Hall May 18, 1919, at St. George, Washington Co. Collected May 27, 1919, by Ellsworth Bethel at Salt Lake City.

On *Camelina microcarpa* Andrz. **2799**. I. May 14, 1921, Granger, Salt Lake Co.

On *Capsella bursa-pastoris* Medic. **2803**. I. May 14, 1921, Granger, Salt Lake Co.

On *Chenopodium album* L. I. Collected May 27, 1919, by Ellsworth Bethel at Salt Lake City,

On *Chenopodium murale* L. I. Collected May 6, 1918, by E. M. Hall at St. George, Washington Co.

On *Chenopodium pratericola* Rydb. I. Listed in N. A. Flora **7**. 306. 1920 as having been collected in Utah on this host.

On *Erysimum repandum* L. (*Cheirinia repanda* [L.] Link) I. **2801**. May 14, 1921, Granger, Salt Lake Co.

On *Heliotropium xerophilum* Cockerell. (*H. spathulatum* Rydb.) I. Collected May 17, 1919, by E. M. Hall at St. George, Washington Co.

On *Hutchinsia procumbens* (L) DC. **2794**. I. May 14, 1921, Granger, Salt Lake Co.

On *Lepidium densiflorum* Schrad. **3532**. I, April, 1931, Salt Lake Co.

On *Lepidium montanum* Nutt. Tracy and Galloway collected the rust on this host in Utah in July, 1887, and it was the type of their *Aecidium lepidii*.

On *Lepidium perfoliatum* L. **2796**. I, May 5, 1921, Granger, Salt Lake Co. Also collected on this host by Ellsworth Bethel at Salt Lake City.

On *Lepidium pubecarpum* A. Nelson. **2795**. I, May 5, 1921, Granger, Salt Lake Co.

On *Lepidium ramosum* A. Nelson (apetalous form.) **2798**. I, May 14, 1921, Granger, Salt Lake Co.

On *Sarcobatus vermiculatus* (Hook.) Torr. I. Collected by J. L. Garrett, July 7, 1928, near Geneva Resort, Utah Lake, Utah Co.

On *Sisymbrium altissimum* L. (*Norta altissima* [L.] Britton.) **2805**. I, May 14, 1921, Granger, Salt Lake Co.

On *Sophia intermedia* Rydb. **2800**. I, May 14, 1921, Granger, Salt Lake Co.

On *Tropaeolum majus* L. I. Collected by E. M. Hall, May 22, 1919, at St. George, Washington Co.

On *Distichlis strica* (Torr.) Rydb. III. **2797**. May 14, 1921, Granger, Salt Lake Co., (weathered material). **1135**. II, III, Aug. 18, 1908, Poplar Grove addition to Salt Lake City, **3536**. III. July 22, 1931, Wayne Co. near Hanksville.

Exsic. Fungi Utah. 169.

#### 45. PUCCINIA ARNICALIS Peck. II, III.

##### Plate VII, E.

On *Arnica cordifolia* Hook. **304**. II, III. Aug. 17, 1903, North Fork Big Cottonwood Canyon, Salt Lake Co.

On *Arnica foliosa* Nutt. (*A. rhizomata* A. Nels.) **513**. II, III. Aug. 29, 1905, Big Cottonwood Canyon near Brighton, Salt Lake Co.

On *Arnica paniculata* A. Nels. **2266**. July 17, 1913, Brighton, Big Cottonwood Canyon., Salt Lake Co.

On *Arnica subplumosa sylvatica* (Greene) A. Nelson. **933**. Aug. 17, 1906, Big Cottonwood Canyon.

Exsic. Fungi Utah 25, 26, 27. Fungi Colum. 1846.

#### 46. PUCCINIA ASTERIS Duby. III.

##### Plate VIII, D.

*Puccinia magnoecia* Ellis & Everh.

On leaves of *Aster eatoni* (A. Gray) Howell. **477**. Aug. 5, 1904, City Creek Canyon.

Exsic. Fungi Utah. 41, 64, 128, 153.

47. **Puccinia ATROFUSCA** (Dudley and Thompson) Holway. I-II, III.*Puccinia universalis* Arth.*Puccinia martianoffianum* (Thum.) Barth.

On **Artemisia ludoviciana** Nutt. I. **3422**. Aug. 19, 1927, Mt. Timpanogos, Utah Co.

On **Carex eleocharis** Bailey (*C. stenophylla* Wahl.) **2609**. II. Aug. 3, 1909, Fish Creek Canyon, western Sevier Co.

On **Carex festivella** Mackenzie. **2745a**. Brighton, Big Cottonwood Canyon, Salt Lake Co.

On **Carex hoodii** Boott. **3414**. Aug. 19, 1927, Mt. Timpanogos, Utah Co.

On **Carex petasata** Dewey. A collection on this host is listed from Utah in Arthur's "Manual of the Rusts in United States and Canada."

On **Carex sp.** **2016**. July 9, 1909, near entrance to Pharaoh's Glen, Parley's Canyon, Salt Lake Co. **2634**. II, July 15, 1920, Gogorza, Summit Co.

On **Carex stenophylla** Wahl. **2609**. Aug. 3, 1909, Fish Creek Canyon, western Sevier Co.

48. **Puccinia BALSAMORRHIZÆ** Peck. I, II, III.

Plate VII, A. &amp; D.

*Puccinia wyethiae* Peck.

On **Balsamorhiza hirsuta** Nutt. II, iii. Collected May 10, 1915, in Salt Lake Co. by Dr. Wyatt W. Jones.

On **Balsamorhiza macrophylla** Nutt. **456**. July 12, 1904, Red Butte Canyon, Salt Lake Co.

On **Balsamorhiza sagittata** (Pursh) Nutt. **390**. II, June 17, 1904, near Salt Lake City, **461**. III, July 20, 1904, near Salt Lake City. **644**. II, May 14, 1905, on scale-like prophylla, near Salt Lake City.

On leaves and stems of **Wyethia amplexicaulis** Nutt. **205**. May 29, 1903, Wasatch Mts. near Salt Lake City.

On **Wyethia arizonica** A. Gray. Collected by Marcus E. Jones, June 2, 1890 at Sink Valley.

Exsic. Fungi Utah. 11, 61, 62, 63, 154. Fungi Columb. 1870.

49. **Puccinia BISTORTÆ** (Str.) DC. I-II, III.*Puccinia polygoni-vivipari* H. Dietr.

On **Angelica lyalli** S. Wats. **3395**. I, Aug. 8, 1927, Mt. Timpanogos, Utah Co.

On **Polygonum bistortoides** Pursh (*Bistorta bistortoides* [Pursh] Small). **3358**. July 20, 1927. Mt. Timpanogos near Emerald Lake. H. F. Bergman collected this rust on the same host in Logan Canyon, Cache Co., Aug. 17, 1917.

50 *Puccinia blasdalei* D. and H. I, II, III.

On *Allium acuminatum* Hook. **363**. June 3, 1904, Wasatch Mts., near Farmington, Davis Co. Mixed with *Uromyces aemulus* Arth.

51. *Puccinia calochorti* Peck. I, III.

## Plate III, B.

On *Calochortus nuttallii* T. & G. **180**. I, May 2, 1903, Salt Lake City. **194**. III, May 14, 1903, Salt Lake City.

Marcus E. Jones collected the type of this species in Utah. Exsic. Fungi Utah. 90; Fungi Columb. 1953.

52. *Puccinia caricis* Schroet. I-II, III.

*Puccinia urticata* (Link) Kern.

*Puccinia garrettii* Arth.

*Puccinia grossulariae* (Schum) Lagerh.

*Puccinia quadriporula* Arth.

On *Urtica gracilis* Ait. **1008**. I, June 29, 1907, Parley's Canyon, Salt Lake Co. **3547**. I, Aug. 5, 1933, East Canyon, Wasatch Mts., Summit Co.

On *Carex lanuginosa* Michx. **1009**. III, June 29, 1907, Parley's Canyon, Salt Lake Co. **3064**. Sept. 16, 1926, near Wanship, Wasatch Co.

On *Carex nebraskensis* Dewey. **614**. X, (*Puccinia garrettii* Arth.) Oct. 11, 1904, Salt Lake City. **633**. X, III, Apr. 8, 1905, Red Butte Canyon, Salt Lake Co. **2577**. Oct. 11, 1919, Riverton, Salt Lake Co. Amphispores very thin-walled.

On *Carex rostrata* Stokes. **1121**. II, III, Aug. 1, 1908, Gogorza, Summit Co.

On *Carex* sp. **2221**. Aug. 8, 1911, near Kaigalia pasture, Elk Mts., San Juan Co.

Exsic. Fungi Utah. 44, 45, 129, 130, 156, 167, 172, 214. Fungi Columb. 1759.

53. *Puccinia castillelæ* (D. and H.) Arthur. II, III.

*Uredo castillejæ* T. & E.

Reported in original description of *Uredo castillejæ* (Proceedings California Academy 5:731. 1895) as having been collected on *Castilleja affinis* H. & A. However, Professor Jones, the collector, told the writer that the host was *Castilleja minor*, now known as *Castilleja exilis* A. Nelson. The collection was made July 19, 1894, at Junction, Piute Co., according to the label on specimens in Professor Jones' herbarium. (No. 5651.)

54. *Puccinia chrysanthemi* Roze. II, III.

On leaves of *Chrysanthemum* sp. cult. II. Collected by Kenneth Robins, November 1915, at Salt Lake City.

55. **Puccinia Cicutæ** Lasch. I, II, III.

On *Cicuta occidentalis* Greene. Collected by Dr. Wyatt W. Jones, Sept. 7, 1922, at Charleston, Wasatch Co.

56. **Puccinia Circææ** Pers. III.

On *Circaea pacifica* Aschers & Magnus. **2131**. Aug. 19, 1910, Mill D, south fork of Big Cottonwood Canyon, Salt Lake Co.

Exsic. Fungi Utah. 229.

57. **Puccinia Cirsii** Lasch. I, II, III.

*Puccinia inclusa* Syd.

On *Cirsium eatoni* (A. Gray) B. L. Robinson (*Carduus leiocephalus* [Eat.] Heller. **494**. II, Aug. 22, 1904, head of Big Cottonwood Canyon, Salt Lake Co.

On *Cirsium drummondii acaulescens* (A. Gray) Macbr. **3526**. Aug. 5, 1933, near Gogorza, Summit Co.

On leaves and stems of *Cirsium undulatum* (Nutt.) Spreng. (*C. tracyi* Petrak). **376**. June 15, 1904, near Salt Lake City. **2186**. July 24, 1911, San Juan Co.

On *Cirsium pulchellum* (Greene) Woot. & Standl. **2207**. Aug. 8, 1911, White Canyon, San Juan Co.

Exsic. Fungi Utah 69, 93, 132.

58. **Puccinia Onici** H. Mart. I, II, III.

**Plate VII, F.**

*Puccinia cirsii-lanceolati* Schroet.

On *Cirsium lanceolatum* (L.) Hill. **215**. II, June 13, 1903, Salt Lake City. **3336**. III, Dec. 25, 1903, Salt Lake City. **340**. I, Apr., 24, 1904, Salt Lake City.

Exsic. Fungi Utah. 63.

59. **Puccinia Comandræ** Peck. III.

**Plate IV, A.**

On leaves and stems of *Comandra pallida* A. DC. **246**. July 22, 1903, City Creek Canyon, Salt Lake Co.

Exsic. Fungi Utah. 17; Fungi Columb. 1957.

60. **Puccinia Consimilis** Ellis and Everh. I, III.

On *Smelowskia americana* Rydb. **3514**. I, Aug. 17, 1930, Bald Mtn., Summit Co. The first Utah collection of this rare rust.

61. **Puccinia Coronata** Cda. I-II, III.

*Puccinia rhamnii* (Pers.) Wettst.

On leaves of *Shepherdia canadensis* Nutt. (*Lepargyrea canadensis* [L.] Greene.) **2319**. I, (*Aecidium allenii* Clinton), Aug. 21, 1916, Daniels' Canyon, Wasatch Co. Collected by Garrett & Giddings. **2686 ab**.

July 27, 1920, Coal Creek Canyon branch of Cedar Canyon, Iron Co. **3484**. Aug. 22, 1928, Mt. Timpanogos, Utah Co.

On *Calamogrostis scopulorum* Jones. **3485**. Aug. 22, 1928. II, III, Aug. 22, 1928, Mt. Timpanogos, Utah Co. Closely associated in growth with No. 3484 on *Shepherdia*.

Exsic. Fungi Utah. 226.

62. *PUCCINIA CRANDALLII* Pam. and Hume. I-II, III.

Plate III, E.

*Aecidium abundans* Peck.

*Puccinia abundans* (Peck) Jackson.

On *Symphoricarpos rotundifolius* A. Gray. **260**. I (*Aecidium abundans* Peck), Aug. 7, 1903, Wasatch Mts. near Salt Lake City.

On *Symphoricarpos vaccinioides* Rydb. **716**. I, July 5, 1905, Parley's Canyon, Wasatch Mts., Wasatch Co.

On *Festuca confinis* Vasey. **2024**. II, July 17, 1909, Emigration Canyon. **2103**. II, Oct. 2, 1909, Emigration Canyon.

Exsic. Fungi Utah. 19, 176, 184, 185.

63. *PUCCINIA CREPIDIS-MONTANÆ* (Syd.) Magnus. I, II, III.

Listed in Arthur's "Manual of the Rusts in United States and Canada" as occurring in Utah on *Crepis glauca* (Nutt.) T. & G.

64. *PUCCINIA CRESSÆ* Lagerh. I, II, III.

On *Cressa truxillensis* HBR. **660**. I, June 9, 1905, Beck's Hot Springs, Salt Lake Co. **870**. III, Sept. 23, 1905, Beck's Hot Springs.

Exsic. Fungi Utah. 91, 158.

65. *PUCCINIA CRUCIFERARUM* Rudolphi. III.

On *Cardamine cordifolia* A. Gray. **3385**. Aug. 8, 1927, Mt. Timpanogos below Emerald Lake, Utah Co., **3472**. Aug. 20, 1928, above Altamont, American Fork Canyon.

66. *PUCCINIA DOUGLASHII* Ellis and Everh. I, III.

On *Phlox caespitosa* Nutt. **782**. July 29, 1905, Mt. Majestic, Big Cottonwood Canyon, Salt Lake Co.

On *Phlox canescens* T. & G. **2606**. June 25, 1920, Manti, Sanpete Co.

On *Phlox depressa* (E. Nelson) Rydb. **2054**. July 31, 1909, Fish Creek Canyon, western Sevier Co. Type collected May 26, 1891, by Marcus E. Jones at Detroit, Utah, on *Phlox diffusa* Benth.

On *Phlox diffusa* Benth. Listed in Arthur's Manual as occurring in Utah on this species.

On *Phlox* sp. Collected by Marcus E. Jones (No. **1605**), Aug. 22, 1901, at Gold Mountain.

On *Gilia pungens* (Torr.) Benth. **2257**. Aug. 24, 1911, Stage Station, head Dry Valley, San Juan Co.

67. **Puccinia drabæ** Rudolphi. III.

## Plate IV, I.

On leaves, stems and calyx-lobes of **Draba pectinata** (S. Wats.) Rydb. **920**. Aug. 11, 1906, Mt. Minnie, Little Cottonwood Canyon, Salt Lake Co.

Exsic. Fungi Utah. 116.

68. **Puccinia eatoniæ** Arth. I-II, III.

*Aecidium ranunculi* Schw.

*Puccinia myosotidis* (Burr.) Barth.

On **Sphenopolis obtusata** (Michx.) Scribn. **3450**. June 27, 1928, east shore Utah Lake, Utah Co.

69. **Puccinia ellisii** De Toni. I, II, III.

## Plate VI, B.

*Puccinia cynomarathri* Holw.

On **Cynomarathrum nuttallii** Coult. & Rose **259**. III, Aug. 7, 1903, Wasatch Mts. near Salt Lake City. **719**. II, July 5, 1905, Wasatch Mts., Wasatch Co. **3483**. Aug. 22, 1928, "Brachiopod Ledge" near Aspen Grove, Mt. Timpanogos, Wasatch Mts., Utah Co.

Exsic. Fungi Utah 9, 51.

70. **Puccinia eurotiæ** D. Griff. III.

On **Eurotia lanata** (Pursh) Moq. Collected by Dr. Walter P. Cottam 1928, Washington Co., close to Utah-Nevada line.

71. **Puccinia expansa** Link. III.

On **Senecio integerrimus** Nutt. (*S. dispar* A. Nels.) **738**. July 10, 1905, Mt. Millicent, Big Cottonwood Canyon, Salt Lake Co.

Exsic. Fungi Utah. 102.

72. **Puccinia extensicola** Plowright. I-II, III.

## Plate III, F.

*Puccinia peckii* (DeToni) Kellerman.

*Puccinia asterum* Kern

*Puccinia caricis-asteris* Arth.

*Puccinia hieraciata* (Sch.) Jackson.

*Puccinia patruelis* Arth.

A rust of a number of varieties, of which we have in Utah the following:

a. **Puccinia extensicola asteris** (Thum.) Arth.

On **Aster adscendens** Lindl. **3425**. I, Aug. 19, 1927, Mt. Timpanogos, Utah Co.

On **Aster apricus** (A. Gray) Rydb. **938**. I, Aug. 25, 1906, Big Cottonwood Canyon, Salt Lake Co.

On *Aster ciliomarginatus* Rydb. **746**. I, July 11, 1905, Big Cottonwood Canyon.

On *Aster foliaceus frondeus* A. Gray. **939**. I, Aug. 25, 1906, Big Cottonwood Canyon, Salt Lake Co.

On *Aster foliaceus* Lindl. **3518**. I, Aug. 1, 1930, Aspen Grove, Mt. Timpanogos, Utah Co.

On *Aster fremontii* A. Gray. **844**. I, Aug. 17, 1905, Big Cottonwood Canyon.

On *Carex festivella* Mackenz. **827**. III, Aug. 12, 1905, Big Cottonwood Canyon.

b. *Puccinia extensicola hieraciata* (Schw.) Arth.

On *Hieracium scouleri* Hook (*H. griseum*) Rydb. I, July 17, 1934, Lamb's Canyon, Salt Lake Co.

On *Carex hoodii* Boott. **317**. II, Sept. 3, 1903, Red Butte Canyon, Salt Lake Co.

On *Carex* sp. **2168**. July 12, 1911, Gold Basin, La Sal Mts., San Juan Co.

On *Carex lanuginosa* Michx. II, August 5, 1934, Lamb's Canyon, Salt Lake Co.

c. *Puccinia extensicola oenotherae* (Mont.) Arth.

On *Oenothera hookeri* T. & G. **3451**. I. June 27, 1938, east shore Utah Lake, Utah Co.

d. *Puccinia extensicola valerianae* Arth.

On *Valeriana occidentalis* Heller (*V. acutiloba* Rydb.) **3403**. Aug. 12, 1927, Mt. Timpanogos, Wasatch Mts., Utah Co., abundant rust, associated with No. **3402**.

On *Carex festivella* Mackenzie. II. **3526**. Aug. 14, 1930, Trail to Stewarts' Cascades. Abundantly associated with rust on *Valeriana*.

On *Carex hoodii* Boott. **3402**. Same locality as **3403** on *Valeriana*. Exsic. Fungi Utah. 65, 66, 131, 155.

### 73. PUCCINIA FERGUSSONI Berk. and Curtis. III.

Plate VI, G.

On *Viola nephrophylla* Greene. **797**. Aug. 2, 1905 near Silver Lake, Big Cottonwood Canyon, Wasatch Mts., Salt Lake Co.

Exsic. Fungi Utah. 53.

### 74. PUCCINIA GENTIANÆ (Strauss.) Lk. II, III.

On *Gentiana affinis* Griseb. **2307**. Aug. 9, 1916, above Barclay Station, Parley's Canyon, Salt Lake Co. Also collected by Marcus E. Jones (No. 2163) Aug. 15, 1881, at Park City, Summit Co.

On *Gentiana amarella* L. Collected by Marcus E. Jones (No. 5913) Aug. 27, 1894 at Marysville, Piute Co.

Exsic. Fungi Utah. 231.



75. **Puccinia glabella** Holw. II, III.

On *Boisduvalia glabella* (Nutt.) Walp. **3548**. III, Aug. 7, 1933, Dry Lake, Cache Co. Dr. Arthur states that this rust has been collected only twice previously.

76. **Puccinia globosipes** Peck. II, III.

On *Lycium andersoni* A. Gray. **2305**. June 11, 1915, Hat Island, Great Salt Lake. Also collected by Marcus E. Jones at La Verkin, Washington Co.

On *Lycium torreyi* A. Gray. Collected by E. M. Hall, May 17, 1918, at North St. George, Washington Co.

77. **Puccinia glumarum** (Schmidt.) Frick. and Henn. I-II, III.

On *Agropyron smithii* Rydb. **3215**. May 30, 1926, Salt Lake City, Salt Lake Co.

On *Agropyron spicatum* (Pursh) Scribn. & Smith. **3307**. Aug. 20, 1926, Mt. Timpanogos, Wasatch Mts., Utah Co. June 22, 1909, near Beck's Hot Springs, Salt Lake Co.

On *Bromus polyanthus* Scribn. **2015a**. June 15, 1922, Salt Lake Co.

On *Elymus glaucus* Buckl. **1010**. June 29, 1907, Parley's Canyon, Salt Lake Co. Issued in *Fungi Utahenses* (No. 138) as *Puccinia rubigovera* (DC) Wint. **3255**. July 23, 1926, Stewart's Boy Scout Camp, Mt. Timpanogos, Wasatch Mts., Utah Co.

On *Hordeum jubatum* L. **2038**. July 12, 1909, Red Butte Canyon, Salt Lake Co.

On *Hordeum nodosum* L. **1195**. Nov. 14, 1908, Salt Lake City, Salt Lake Co.

On *Hordeum pusillum* Nutt. **2083**. Aug. 26, 1909, Parley's Park, Parley's Canyon, Salt Lake Co.

On *Triticum aestivum* L. Reported by Dr. O'Gara as occurring in wheat fields north and west of Ogden.  
Exsic. *Fungi Utah.* 138, 191, 192.

78. **Puccinia graminis** Pers. I-II, III.

*Puccinia poculiformis* Wettst.

On *Agropyron pauciflorum* (Schwein) Hitchc. (*A. tenerum* Vasey). **1175**. III, Sept. 4, 1908, near Salt Lake City.

On *Agropyron spicatum* S. & S. **3259**. July 23, 1926, Mt. Timpanogos, Utah Co.

On *Agropyron subsecundum* (Link.) Hitchc. (*A. caninum* Auct. Amer.) N. A. Flora (**7.296**. 1920) lists a collection of this rust from Utah on this host.

On *Avena sativa* L. **2012**. II, Oct. 2, 1909, Emigration Canyon, Salt Lake Co.

On *Beckmannia erucaeformis* (L.) Host. **1174**. II, Sept. 4, 1908, and **1911**, III, Oct. 17, 1908, Salt Lake City.

On *Elymus canadensis* L. **2001**. III, Feb. 22, 1909, near Salt Lake City.

On *Elymus condensatus* Presl. **1193**. II, III, Oct. 17, 1908, near Salt Lake City.

On *Elymus glaucus* Buckley, **2691**. III, Aug. 27, 1921, Coal Creek Canyon near Cedar City, Iron Co.

On *Elymus macounii* Vasey. **2576**. Oct. 11, 1919, Riverton, Salt Lake Co.

On *Phleum pratense* L. **3063**. Sept. 16, 1922, west side of Weber River near bridge at Wanship, Summit Co. **3398**, Aug. 10, 1927, near Wallsburg, Wasatch Co. **3294**. Aug. 9, 1926, Mt. Timpanogos, Utah Co. Arthur's Manual of the Rusts in United States and Canada makes the rust on this host var. *Puccinia graminis phlei-pratensis* (Ericks. & Henn.) Stak. & Piem.

On *Sitanion hystrix* (Nutt) J. G. Smith (*S. glaber* J. G. Smith). **1176**. III, Sept. 4, 1908, near Salt Lake City.

On *Triticum aestivum* L. (*T. vulgare* Vill.) **983**. Sept. 29, 1906, near Castilla, Utah Co. **2419**. II, Aug. 3, 1920, Beaver, Beaver Co. Exsic. Fungi Utah. 160, 186.

#### 79. PUCCINIA GRINDELIAE Peck. III.

##### Plate VIII, G.

*Puccinia actinellae* Syd.

*Puccinia aplopappi* Syd.

*Puccinia bigelovii* Ell. & Ev.

*Puccinia confluens* Syd.

*Puccinia erigerontis* Ell. & Ev.

*Puccinia gutierreziae* Ell. & Ev.

*Puccinia lygodesmiae* Ell. & Ev.

*Puccinia solidaginis* Peck.

*Puccinia tuberculans* Ell. & Ev.

*Puccinia variolans* Hark.

On *Aplopappus nelsoni* Blake (*Stenotus latifolius* A. Nels.) Listed in Arthur's "Manual of the Rusts in the United States and Canada" as occurring in Utah on this host.

On *Aplopappus spinulosus* DC. (*Sideranthus spinulosus* [Pursh] Sweet. Listed in Arthur & Holway's "Descriptions of American Uredineae" I, p. 56, as having been collected in Utah on this host.

On *Actinea leptoclada* (*Tetraneuris leptoclada* [A. Gray] Greene). **2201**. Aug. 3, 1911, rim-rock above Armstrong Canyon, near Edwin Natural Bridge, San Juan Co.

On *Actinea scaposa* (*Actinella scaposa* Nutt.) Collected by Marcus E. Jones (*No. 5290*) on this host at Cisco, Grand Co.

On *Actinea acaulis* (*Tetraneuris acaulis* [Pursh] Greene). Listed in Arthur's "Manual of the Rusts in United States and Canada" as occurring in Utah on this host.

On *Chrysothamnus linifolius* Greene. Listed in Arthur's "Manual of the Rusts in United States and Canada" as occurring in Utah on this host.

On *Chrysothamnus puberulus* (Eaton) Greene (*C. marianus* Rydb.) **2605**. June 26, 1920, Manti, San Pete Co.

On *Chrysothamnus speciosus* Nutt. (*C. pulcherrimus* A. Nelson.) **887**. June 23, 1906, Parley's Canyon, Salt Lake Co.

On *Chrysothamnus viscidiflorus* (Hook.) Nutt. **226**. June 27, 1903, Wasatch Mts. near Salt Lake City, Salt Lake Co.

On *Chrysothamnus viscidiflorus pumilus* (Nutt.) Hall & Clements (*C. pumilus* Nutt.) Listed in Arthur's "Manual of the Rusts in United States and Canada" as occurring in Utah on this host.

On *Chrysothamnus viscidiflorus tortifolius* (A. Gray) Greene. Near Wallsburg, Wasatch Co., East Canyon, Summit Co.

On *Erigeron arenarioides* (D. C. Eaton) Rydb. (*Aster arenarioides* D. C. Eaton). **847**. Aug. 20, 1904, Big Cottonwood Canyon, Salt Lake Co.

On *Erigeron macranthus* Nutt. **252**, July 27, 1903, Wasatch Mts., near Salt Lake City, Salt Lake Co.

On *Erigeron salsuginosus* A. Gray. Listed in Arthur's "Manual of the Rusts in United States and Canada" as occurring in Utah on this host.

On *Gutierrezia lucida* Greene. (*G. glomerella* Greene.) **2657**. July 17, 1920, Maple Creek branch of Coal Creek Canyon, near Cedar City, Iron Co. **2682**. July 23, 1920, Hurricane, Washington Co.

On *Gutierrezia microcephala* (DC) A. Gray (*G. filifolia* Greene.) **2188**. July 28, 1911, near Monticello, San Juan Co.

On *Gutierrezia sarothrae* (Pursh) Berk & Rav. (*G. euthamiae* T. & G.) **474**. Aug. 5, 1904, City Creek Canyon, Salt Lake Co.

On *Chrysopsis horrida* Rydb. **2676**. July 22, 1920, Zion Canyon, Washington Co.

On *Chrysopsis villosa* (Pursh) Nutt. (*C. bakeri* Greene.) **2223**. Aug. 9, 1911, Dry Wash, San Juan Co.

On *Solidago garrettii* Rydb. Aug. 19, 1934, near Snyderville, Summit Co.

On *Solidago nana* Nutt. (*S. pulcherrima* A. Nelson.) **223**. July 2, 1903, City Creek Canyon, Salt Lake Co. These specimens differ from the type of *Puccinia solidaginis* Peck in their thin walls and the rounded apex.)

On *Solidago petradoria* Blake. (*Petradoria pumila* Greene.) **227**. June 27, 1903, Wasatch Mts. near Salt Lake City, Salt Lake Co. This collection, like No. 233, has thinner walls and more rounded apex than the type of *P. solidaginis* Peck.

On *Solidago trinervata* Greene. **441**. July 12, 1904, Red Butte Canyon, Salt Lake Co. Dr. Arthur successfully sowed germinated spores from this host (collected April 22, 1905 from the same locality as 441) on *S. canadensis*.)

On *Tetradymia canescens* DC. Collected by Marcus E. Jones July, 1886, at Rockford.

On *Tetradymia comosa* A. Gray. Collected by Marcus E. Jones May 16, 1915, at Temple Wash.

On *Tetradymia nuttallii* T. & G. **2990**. Aug. 10, 1921, Manti, San Pete Co.

*Puccinia grindeliae* Peck is a rust with at least forty-four synonyms. The rust on *Chrysothamnus* has been known as *P. tuberculans* Ktze.: on *Erigeron* as *P. erigerontis* E. & E. and as *P. confluens* Syd.; on *Gutierrezia* as *P. gutierreziae* E. & E. and on *Solidago* as *P. solidaginis* Peck; on *Tetradymia* as *P. variolans* Hark.

Exsic. Fungi Utah. 18, 43, 47, 89, 141, 143, 210, 213, 215. F. Columb. 1975.

#### 80. PUCCINIA HARKNESSII Vize. I, II, III.

On *Ptiloria tenuifolia* (Torr.) Raf. (*Stephanomeria minor* Nutt.) **2050**. July 29, 1909, Clear Creek Canyon, western Sevier Co.

On *Ptiloria* sp. Collected by Marcus E. Jones. (No. 5241) at Springdale, Washington Co.

#### 81. PUCCINIA HELIANTHELLÆ (Peck) Arth. II, III.

##### Plate VIII, H.

On *Helianthella quinquenervis* (Hook.) A. Gray. **2153**. July 7, 1911, La Sal Mts. near Gold Basin, San Juan Co.

On *Helianthella uniflora* T. & G. **712**. II, July 5, 1905, Big Cottonwood Canyon, Salt Lake Co. **781**. III, July 29, 1905, Big Cottonwood Canyon.

Exsic. Fungi Utah. 55, 56, 232.

#### 82. PUCCINIA HELIANTHI Schw. I, II, III.

##### Plate VIII, C.

*Puccinia helianthi-mollis* H. S. Jackson.

On *Helianthus annuus* A. Gray. **2675**. July 22, 1920, Zion's Canyon, Washington Co.

On *Helianthus lenticularis* Doug. (*H. annuus* A. Gray in part.) **982**. Sept. 29, 1906, near Castilla, Utah Co. **1150**. II, Aug. 25, 1908, Beck's Hot Springs, near Salt Lake City.

On *Helianthus nuttallii* T. & G. (*Helianthus fascicularis* Greene.) **3448**. I, II, June 27, 1928, shore of Utah Lake, Utah Co.

Exsic. Fungi Utah 107, 161.

83. *PUCCINIA HEUCHERÆ* (Schw.) Dietel. III.

Plate IV, C., G. &amp; H.

*Puccinia curtipes* Howe.*Puccinia lithophragmae* Holway.*Puccinia saxifragae* Schlecht.*Puccinia pallido-maculata* Ell. & Ev.

On *Heuchera rubescens* Torr. **837**. Aug. 15, 1905, head of Big Cottonwood Canyon, Salt Lake Co. **1062**. Sept. 28, 1907, American Fork Canyon, Utah Co.

On *Heuchera utahensis* Rydb. **209**. June 10, 1903, Wasatch Mts. near Salt Lake City.

On *Mitella pentandra* Hook. **271**. Aug. 13, 1903, Big Cottonwood Canyon, Salt Lake Co.

On *Mitella stenopetala* Piper. (*Ozomelis stenopetala* Rydb.) **521**. Sept. 2, 1904, Big Cottonwood Canyon, Salt Lake Co.

On *Saxifraga arguta* D. Don. (*Micranthes arguta* [D. Don] Small). **303**. Aug. 17, 1903, Big Cottonwood Canyon, Salt Lake Co.

On *Saxifraga debilis* Engelm. **2240**. Aug. 18, 1911, Abajo Mts., San Juan Co.

On *Tellima parviflora* Hook. (*Lithophragma parviflora* [Hook.] Nutt.) **189**. May 9, 1903, Wasatch Mts. near Salt Lake City. Type collection of *P. lithophragmae* Holway. Type in the Holway herbarium, University of Minnesota.

Exsic. Fungi Utah. 34, 39, 40, 58, 103, 134, 137, 212.

84. *PUCCINIA HIERACII* (Schum.) Mart. I, II, III.

Plate VII, C., &amp; VIII, F.

*Puccinia crepidis-acuminatae* Syd.*Puccinia rugosa* Billings.*Puccinia taraxaci* Plowr.*Puccinia troximontis* Peck.

On *Agoseris gracilens* (A. Gray) Greene. **931**. Aug. 16, 1906, near Lake Solitude, Big Cottonwood Canyon, Salt Lake Co. 9000 ft.

On *Agoseris gracilens greenei* (A. Gray) Blake (*Agoseris greenei* [A. Gray] Rydb.) **814**. Aug. 9, 1905, Big Cottonwood Canyon, Salt Lake Co., 9300 ft.

On *Agoseris heterophylla* (Nutt.) Greene. **650**. June 1905, Wasatch Mts., Salt Lake Co.

On *Agoseris taraxicifolia* (Nutt.) D. Dietr. (*A. leontodon* Rydb.) **191**. II, May 9, 1903, Salt Lake Co.

On *Crepis glauca* (Nutt.) T. & G. **1185**. III, Sept. 26, 1908, Beck's Hot Springs, Salt Lake Co.

On *Crepis acuminata* Nutt. **386**. II, June 17, 1904, Wasatch Mts. near Salt Lake City. **674**. III, June 22, 1905, Mill Creek Canyon, Salt Lake Co.

On *Crepis intermedia* A. Gray. **2208**. July 31, 1911, Elk Mts. near Bear's Ears, San Juan Co.

On *Crepis occidentalis* Nutt. **183**. II, May 2, 1903, Salt Lake City; **380**. III. June 15, 1904, Salt Lake City.

On *Crepis runcinata* (James) T. & G. **2400**. Aug. 10, 1927, near Charleston, Wasatch Co.

On *Crepis scopulorum* Coville. **661**. II, III, June 9, 1905, Wasatch Mts. near Salt Lake City.

On *Hieracium scouleri* Hook (*H. griseum* Rydb.). **519**, Aug. 30, 1904, near Lake Solitude, Big Cottonwood Canyon, Salt Lake Co. **2636**. July 15, 1920, Gogorza, Summit Co.

On *Microseris nutans* (Geyer) Schultz (*Ptilocalais tenuifolia* Osterhout; *P. graciloba* Greene). **689**. June 29, 1905, Big Cottonwood Canyon, Salt Lake Co., 8300 ft. **2596**. June 21, 1920, Gogorza, Summit Co.

On *Microseris nutans major* (A. Gray) Nelson & Macbr. (*Ptilocalais major* [A. Gray] Greene). **182**. II, III, May 2, 1903, Salt Lake City.

On *Taraxacum erythrospermum* Andrz. Listed in Arthur's "Manual of the Rusts in United States and Canada" as having been collected in Utah on this host.

On *Taraxacum officinale* Weber. **213**. II, June 12, 1903, Salt Lake City. **331**. III, Oct. 4, 1903, Salt Lake City.

The rust on *Crepis* has formerly been known as *Puccinia crepidis-acuminatae* Sydow; on *Taraxacum* as *Puccinia taraxaci* Plowright, and on *Agoseris* and *Microseris* as *Puccinia troximontis* Peck. Since *Puccinia hieracii* is described as having all spore forms, and since aecia have not been found in North America, the writer seriously questions the judgment of combining all these under one specific name.

The type of *Puccinia troximontis* was collected in Utah by Marcus E. Jones on *Troximon cuspidatum*.

Exsic. Fungi Utah. 20, 46, 70, 85, 115, 133, 157, 171, 236. Fungi Columb. 1959.

#### 85. PUCGINIA HOLBOELLII (Hornem.) Rostr. III.

On *Arabis microphylla* Nutt. **3286**. Aug. 3, 1926, Mt. Timpanogos, Utah Co.

On *Arabis retrofracta* Graham. **169**. April 25, 1903, Salt Lake City.

On *Draba helleriana* Greene. **2158a**. July 9, 1911, Gold Basin, La Sal Mts., San Juan Co.

On *Draba spectabilis* Greene. **2176**. July 17, 1911, Gold Basin, La Sal Mts., San Juan Co.

#### 86. PUCGINIA HYDROCOTYLIS (Link) Cooke. I, II, III.

On *Hydrocotyle prolifera* Kellogg. Collected by Dr. Walter P. Cotnam June, 1928, at St. George, Washington Co.

87. **Puccinia hydrophylli** Peck & Clinton. III.

On **Hydrophyllum capitatum** Dougl. **181**, May 2, 1903, Salt Lake City.

On **Hydrophyllum occidentale watsoni** A. Gray (*H. watsoni* [A. Gray] Rydb.). **344**. May 21, 1904, Red Butte Canyon, Salt Lake Co.

Exsic. Fungi Utah. 30, 81. Fungi Columb. 1855.

88. **Puccinia intermixta** Peck. I, III.

On leaves and stems of **Iva axillaris** Pursh. **1087**. May 23, 1908, near mouth of Parley's Canyon, Salt Lake Co. **2072**. Aug. 6, 1909, Manti, Sanpete Co.

Exsic. Fungi Utah. 163.

89. **Puccinia interveniens** (Peck) Bethel. I-III.

*Aecidium roestelioides* Ellis & Ever.

On **Sidalcea candida** A. Gray. Listed in Arthur's "Manual of the Rusts in United States and Canada" as occurring in Utah in this host.

On **Sidalcea neomexicana** A. Gray. **3505**. I, Aug. 19, 1929, near Soldier Summit, Utah Co.

On **Sidalcea oregana** (Nutt.) A. Gray (*S. nervata* A. Nelson). **2092a**. I, Aug. 26, 1909, near Gogorza, Summit Co.

On **Stipa columbiana** Macoun. (*S. minor* Scrib.). III. Listed in N. A. Flora as occurring in Utah on this host.

90. **Puccinia jonesii** Peck. I, III.

## Plate VI, D.

On **Aulospermum longipes** (Wats.) Coult. & Rose: **3019**, I, collected by Miss LaRue Larsen, May 27, 1924, Salt Lake City.

Marcus E. Jones collected this rust (Jones 7781) in I on *Cymopterus lapidosus* Jones (now considered to be identical with *Aulospermum longipes*), May 12, 1908, at Theodore, benches of the Uintas, Wasatch Co.

On **Leptotaenia multifida eatoni** (C. & R.) Jones. (*L. eatoni* C. & R.). **185**. I, May 2, 1903, Salt Lake City. **364**., I, III, June 3, 1904, Farmington, Davis Co.: **395**, I, III, June 22 1904, Wasatch Mts. near Salt Lake City; **717**, I, III, July 5, 1905, Wasatch Co. Common and conspicuous on this host, and occurring on all chlorophyll-bearing parts.

On **Lomatium platycarpum** (Torr.) Coult. & Rose (*Cogswellia simplex* [Nutt.] Jones). **178**, I, April 25, 1903, Salt Lake City; **195**, III, May 15, 1903, same locality as **178**.

Marcus E. Jones collected the rust in I on this host (Jones 1695) in 1880. This collection is labeled *Aecidium sublineatum* Pk. sp. nov. in Jones' herbarium.

On **Lomatium sp.** **2650**, July 17, 1920, Maple Canyon branch of Cedar Canyon, Iron Co. **2702**, July 29, 1920, Parowan Main Canyon, Iron Co.

Type collected in Utah by Marcus E. Jones.

Exsic. Fungi Utah. 5, 6, 7, 8. Fungi Columb. 1966, 1967, 2063.

91. **Puccinia koeleriae** Arth. I-II, III.

On **Koeleria cristata** (L.) Pers. (*K. gracilis* Pers.). **2231**. Aug. 14, 1911, near Monticello, San Juan Co.

92. **Puccinia leveillei** Mont. III.

Plate V, D.

*Puccinia geranii-sylvatici* Karst.

On leaf-blades and petioles of **Geranium fremontii** Torr. **650**. June 6, 1905, Red Butte Canyon, Salt Lake Co.

On leaves and stems of **Geranium richardsonii** Fisch. & Traut. **908**. Aug. 1, 1906, near Silver Lake, Big Cottonwood Canyon, Salt Lake Co.

Exsic. Fungi Utah. 88, 101.

93. **Puccinia ligustici** Ell. and Everh. III.

On seedlings of **Carum gairdneri** Gray. **190**. May 9, 1903, Wasatch Mts. near Salt Lake City.

On **Carum garrettii** A. Nelson. **658a**. June 9, 1905. Wasatch Mts. near Salt Lake City.

On **Ligusticum filicinum** S. Wats. **805**. Aug. 4, 1905, near Silver Lake in Big Cottonwood Canyon, Salt Lake Co. **3485a**. Aug. 9, 1928, near Emerald Lake, Mt. Timpanogos, Utah Co.

Exsic. Fungi Utah. 57, 233.

94. **Puccinia lobata** Berk. and Curt. III.

On **Sida hederacea** (Dougl.) Torr. **1167**. Sept. 1, 1908, Beck's Hot Springs near Salt Lake City.

Exsic. Fungi Utah. 164.

95. **Puccinia luxuriosa** Sydow. I-II, III.

On **Sporobolus airoides** Torr. Collected by Ellsworth Bethel, Nov. 15, 1917, at Marysvale, Piute Co.

The aecial form is found on *Sarcobatus vermiculatus* (Hook.) Torr.

96. **Puccinia malvacearum** Bertero. III.

Plate V, G.

On leaves, stems and calyx-lobes of **Malva rotundifolia** L. **198**. May 15, 1903, Liberty Park, Salt Lake City. **1065**. Sept. 28, 1907, American Fork, Utah Co.

On leaves and stems of **Althea rosea** Cav. **367**. June 5, 1904, Salt Lake City.

Exsic. Fungi Utah. 106, 165.



97. **Puccinia Marlæ-Wilsoni** G. W. Clinton. I, III.

*Puccinia claytoniata* (Schw.) Pk.

On **Limnia alsinoides** (Sims) Haw. (*Montia siberica* [L.] Howell).  
**866.** III, Aug. 26, 1905, Big Cottonwood Canyon, Salt Lake Co. **911.**  
 I, Aug. 3, 1906, Big Cottonwood Canyon below Brighton, Salt Lake Co.  
 Exsic. Fungi Utah. 67.

98. **Puccinia menthæ** Pers. I, II, III.**Plate VI, E.**

*Puccinia monardellæ* Dudl. & Thomps.

On **Madronella rubella** Greene (*Madronella oblongifolia* Rydb.).  
**2113.** Oct. 10, 1909, near Wasatch Resort, Little Cottonwood Canyon,  
 Salt Lake Co. **2707.** July 30, 1920, Fish Lake Mtn., Iron Co.

On **Mentha canadensis** L. **2121.** Oct. 16, 1909, Idlewild, Ogden  
 Canyon, Weber Co.

On **Mentha glabrior** (Hook) Rydb. (*M. borealis* Michx.) III. **2529.**  
 Mt. Timpanogos, Wasatch Mts., Utah Co., Aug. 18, 1930.

On **Mentha penardi** (Briq.) Rydb. **2229.** II, Aug. 14, 1911, Monti-  
 cello, San Juan Co.

On **Mentha spicata** L. **2602.** II, July 28, 1920, Cedar City, Iron  
 Co. **2756.** II, Aug. 20, 1920, 1920, Providence, Cache Co. **2758.** II, Aug.  
 20, 1920, Millville, Cache Co.

On **Monarda menthaefolia** Benth. **2230.** II, Aug. 18, 1911, Monte-  
 zuma Canyon near Monticello, San Juan Co.

Exsic. Fungi Utah. 187, 216, 217.

99. **Puccinia mertenslæ** Peck. III.

On **Lappula floribunda** (Lehm.) Greene. **737.** July 10, 1905, near  
 Lake Phoebe, Big Cottonwood Canyon, Salt Lake Co. **3383.** Aug. 8,  
 1927, below Emerald Lake, Mt. Timpanogos, Utah Co.

On **Mertensia arizonica** Greene. **695.** June 30, 1905, Big Cotton-  
 wood Canyon, Salt Lake Co.

On **Mertensia ciliata** (Torr.) Don. **763.** July 22, 1905, Big Cot-  
 tonwood Canyon, Salt Lake Co.

On **Mertensia foliosa** A. Nels. Collected May 7, 1918, by Dr. J. F.  
 Brenckle at Red Butte, near Ft. Douglas, Salt Lake Co.

On **Mertensia leonardi** Rydb. **3462.** Aug. 21, 1928, Mt. Timpanogos,  
 Utah Co.

Exsic. Fungi Utah. 166.

100. **Puccinia micrantha** D. Griff. I-II, III.

On **Ribes leptanthum** A. Gray (*Grossularia leptantha* [A. Gray]  
 Cov. & Britt. **2717.** I, Aug. 3, 1920, Beaver Canyon, about 14 miles from  
 Beaver, Beaver Co.

II and III occur on *Oryzopsis micrantha* (Trin. & Rupr.) Thurber, not yet reported for Utah.

101. **Puccinia millefolii** Eckl. III.

Plate VIII, J.

*Puccinia conferta* Dietel and Holway.

On **Artemisia hookeriana** Besser. **2047**. July 28, 1909, Fish Creek Canyon, western Sevier Co.

Exsic. Fungi Utah. 183.

102. **Puccinia minusensis** Thüm. I, II, III.

Plate VIII, B.

*Puccinia hemispherica* Ellis & Everh. I, II, III.

On leaves and stems of **Lactuca pulchella** DC. **1007**. June 29, 1907, near Salt Lake City.

Exsic. Fungi Utah. 22, 136.

103. **Puccinia monoica** (Peck.) Arth. I-II, III.

Plate III, A.

*Aecidium monoica* Peck.

*Puccinia parryi* (Peck) Barth.

On **Arabis drummondii** A. Gray. **760**. July 22, 1905, Big Cottonwood Canyon, Salt Lake Co.

On **Arabis retrofracta** Graham. **2151**. July 7, 1911, Gold Basin, La Sal Mts., San Juan Co.

On **Schoenocrambe linifolia** (Nutt.) Greene. Listed on this host for Utah in Arthur's "Manual of the Rusts in United States and Canada."

On **Sophia leptostylis** Rydb. **733**. July 8, 1905, Big Cottonwood Canyon, Salt Lake Co.

On **Trisetum spicatum** (L.) Richter. **847**. III, Aug. 21, 1905, Big Cottonwood Canyon, Salt Lake Co.

Exsic. Fungi Utah. 75, 194.

104. **Puccinia montanensis** Ellis. I-II, III.

On **Agropyron pauciflorum** (Schwein.) Hitchc. (*A. tenerum* Vasey). **2510**. II, July 22, 1919, Orangeville, Emery Co.

On **Elymus canadensis** L. **2517**. II, July 22, 1919, Orangeville, Emery Co.

On **Elymus condensatus** Presl. **2111**. Oct. 2, 1909, Emigration Canyon, Salt Lake Co.

On **Elymus glaucus** Buckley. **2302**. III, Oct. 10, 1915, Red Butte Canyon, Salt Lake Co.

On **Hordeum jubatum** L. **2518**. II, July 22, 1919, Orangeville, Emery Co.

On **Sitanion hystrix** (Nutt.) J. G. Smith (*S. rigidum* J. G. Smith).  
**2205.** Aug. 5, 1911, Armstrong Canyon above Edwin Natural Bridge,  
 San Juan Co.

The aecia occur on *Berberis fendleri*.

Exsic. Fungi Utah. 234.

105. **Puccinia MUTABILIS** Ell. and Gall. I, II, III.

On **Allium acuminatum** Hook. May 7, 1908, Parley's Canyon, Wasatch  
 Mts., near Salt Lake Co.

106. **Puccinia OBTECTA** Peck. I-II, III.

On **Scirpus americanus** Pursh. **3449.** June 27, 1928, East Shore,  
 Utah Lake, Utah Co.

The aecia occur on several species of *Bidens*.

107. **Puccinia OBTEGENS** (Link) Tul. I, II, III.

*Puccinia suaveolens* (Pers.) Rostr. II, III.

On **Cirsium arvense** (L.) Scop. **2506.** July 9, 1919, Provo, Utah Co.

108. **Puccinia OENOTHERÆ** Vize. I, II, III.

**Plate II, D.**

*Puccinia heteranthae* E. & E.

*Puccinia zauschneriae* Syd.

a. **Puccinia oenotherae typica** Vize.

On **Oenothera utahensis** (Small) Garrett (*Sphaerostigma utahense*  
 Small). **2394,** June 11, 1916, Carrington Island, Great Salt Lake, Tooele  
 Co.

On **Zauschneria garrettii** A. Nels. **760.** I, June 22, 1905, Mill Creek  
 Canyon, Salt Lake Co. **1049.** III, Aug. 28, 1907, Parley's Canyon, Salt  
 Lake Co. One-celled and three-celled spores were not uncommon in this  
 collection. The plants attacked by the aecia become quite slender.

b. **Puccinia oenotherae heteranthae** (E. & E.) Arth.

On **Oenothera heterantha** Nutt. (*Taraxia subacaulis* [Pursh] Rydb.)  
**688.** I, II, III (*Puccinia heteranthae* Ellis & Everh.) June 29, 1905, Big  
 Cottonwood Canyon, Salt Lake Co. **3538.** June 20, 1933, near Gogorza,  
 Summit Co.

Exsic. Fungi Utah. 92, 145, 162, 173.

109. **Puccinia ORTONII** H. S. Jackson. I, II, III.

On **Dodecatheon alpinum** (A. Gray) Greene. **3471.** Aug. 20, 1928,  
 Uinta Mts., Summit Co.

110. **Puccinia OUDEMANSII** Tranz. III.

*Puccinia utahensis* Garrett.

*Puccinia clementis* Garrett.

On *Parrya platycarpa* Rydb. Collected Aug. 10, 1911, by Mrs. Mary Strong Clemens, on Bald Mtn., Uinta Mts., Summit Co. Described by the author as *P. clementis*.

On *Thlaspi glaucum* A. Nelson. **779**. July 29, 1905, Big Cottonwood Canyon, Salt Lake Co. Type collection of *P. utahensis*.

Exsic. Fungi Utah. 144.

111. **Puccinia oxyriæ** Fekl. II, III.

On *Oxyria digyna* (L.) Camptd. **499**. Aug. 24, 1904, Big Cottonwood Canyon, Salt Lake Co. **2360**. Aug. 22, 1928. Mt. Timpanogos, Utah Co.

112. **Puccinia Parnassiae** Arth. III.

Plate IV, K.

On *Parnassia fimbriata* Banks. **288**. Aug. 15, 1903, Big Cottonwood Canyon, Salt Lake Co. **3447**. June 13, 1928, near Bridal Veil Falls, Provo Canyon, Utah Co.

Exsic. Fungi Utah. 24.

113. **Puccinia Pattersoniana** Arth. I-II, III.

Plate III, D.

On *Brodiaea douglasii* S. Wats. I, **2597**. June 21, 1920, Gogorza, Parley's Canyon, Summit Co.

On *Agropyron spicatum* (Pursh) Scibn. & Smith. **2699**. June 21, 1920, Gogorza, Summit Co.

On *Elymus condensatus* Presl. **1142**. II, III. Aug. 21, 1908, Parley's Canyon, Salt Lake Co.

From field observations, the author called attention to the probable connection between the rusts on these two hosts. This led to Dr. Main's carrying out a successful correlation study. Later, the author successfully cultured the rust on *Elymus condensatus*, sowing the aecia from *Brodiaea*.

Exsic. Fungi Utah. 189.

114. **Puccinia pentstemonis** Peck. III.

On *Pentstemon procerus* Dougl. Collected by Marcus E. Jones at Panguitch Lake, Garfield Co.

115. **Puccinia pimpinellæ** H. Mart. I, II, III.

Plate VI, C.

*Puccinia osmorrhizæ* (Peck) Cooke & Peck.

On *Osmorhiza divaricata* Nutt. (*Washingtonia divaricata* Britton.). **237**. III, July 2, 1903, City Creek Canyon, Salt Lake Co. **657**, I, and **658**, II, same locality as **237**.

On *Osmorhiza obtusa* (Coulter & Rose) Fernald. (*Washingtonia obtusa* Coult. & Rose.) **2037**. I, II, III, Aug. 19, 1909, near Silver Lake, Big Cottonwood Canyon, Salt Lake Co. **3200**. Aug. 20, 1925, Boy Scout Camp, Mt. Timpanogos, Wasatch Mts., Utah Co.

On *Osmorhiza occidentalis* Nutt. (*Washingtonia occidentalis* [Nutt.] Coult. & Rose; *Glycosma occidentalis* Nutt.) **2042**. III, July 21, 1900, Red Butte Canyon, Salt Lake Co. **3021**. III, Spring Hollow, Logan Canyon, Cache Co.

Exsic. Fungi Utah. 21, 32, 33, 188, 235.

116. **Puccinia piperi** Ricker. II, III.

On *Festuca elatior* L. **892**. July 12, 1906, Red Butte Canyon, Salt Lake Co. In a letter to the writer, Ellsworth Bethel stated that he had connected this rust with an aecium on *Ranunculus hebecarpus* H. & A. N. A. Flora says "pycnia and aecia unknown."

117. **Puccinia plumbaria** Pk. I, III.

**Plate VI, H.**

On *Gilia nuttallii* A. Gray. **268**. I, Aug. 13, 1903, Big Cottonwood Canyon near Lake Catherine, Salt Lake Co. **510**, I, III, Aug. 27, 1904, Big Cottonwood Canyon, Salt Lake Co.

On *Microsteris micrantha* (Kellogg) Greene. **187**. III, May 2, 1903, Salt Lake City. **2061**. III, Aug. 2, 1909, Fish Creek Canyon, western Sevier Co.

On *Phlox longifolia* Nutt. **168**. I, Apr. 25, 1903, Salt Lake City. **212**. III, June 12, 1903, Salt Lake City.

Type collected in Utah by Marcus E. Jones.

Exsic. Fungi Utah. 1, 2, 3, 37, 38. Fungi Columb. 1970, 1861.

118. **Puccinia poae-sudeticae** (Westend) Jorstad. II, III.

**Plate III, C.**

*Puccinia poarum* Auths. not Nielson.

On *Alopecurus aristulus* Michx. **2185**. July 24, 1911, San Juan Co.

On *Catabrosa aquatica* (L.) Beauv. **447**. July 12, 1904, Red Butte Canyon, Salt Lake Co. **3004**. Fish Lake Resort, Sevier Co.

On *Poa crocata* Michx. **2241**. Aug. 17, 1911, Abajo Mts., San Juan Co.

On *Poa fendleriana* (Steud.) Vasey. **2012**. June 22, 1909, Beck's Hot Springs, Salt Lake Co.

On *Poa longipedunculata* Scribn. **2260**. August, 1911, San Juan Co.

On *Poa pratensis* L. **971**. Sept. 12, 1906, Salt Lake City.

On *Poa reflexa* V. & S. **293**. Aug. 16, 1903, Big Cottonwood Canyon, Salt Lake Co.

Aecia unknown.

Exsic. Fungi Utah. 83, 103, 104.

119. **Puccinia polygoni-amphibii** Pers. I-II, III.

On *Persicaria hartwrightii* (A. Gray) Greene. Listed in N. A. Flora (7, 381, 1920) as occurring in Utah on this host.

On *Persicaria psychrophila* Greene. **3062**. II, III, Sept. 16, 1922, west bank of Weber River, near bridge east of Wanship, Summit Co.

The aecia occur on species of *Geranium*.

120. **Puccinia poromera** Holway. III.

Plate VI, A.

On *Angelica dilatata* A. Nels. **255**. July 15, 1903, near Upper Falls Provo Canyon, Utah Co. **449**. July 12, 1904, Red Butte Canyon, Salt Lake Co.

Exsic. Fungi Utah. 190.

121. **Puccinia pseudocymopteri** Holway. I, II, III.

On *Pseudocymopteris anisatus* C. & R. Listed in Holway's N. A. Uredineae (1:91. 191) as occurring in Utah on this host.

On *Pseudocymopteris montanus* (A. Gray) C. & R. **2161**. I, July 12, 1911, near Gold Basin, La Sal Mts., San Juan Co. **2244**. I, III, Aug. 18, 1911, Abajo Mts., San Juan Co.

On *Pseudocymopterus tidestromii* C. & R. **2150**. I, July 5, 1911, La Sal Mts. above Gold Basin, San Juan Co.

Exsic. Fungi Utah. 219.

122. **Puccinia punctata** Link. I, II, III.

On *Galium triflorum* Michx. 974. Sept. 13, 1906, Parley's Canyon, Salt Lake Co.

Exsic. Fungi Utah. 114.

123. **Puccinia ranunculi** A. Blytt. III.

Plate IV, F.

On *Ranunculus eschscholtzii* Schlecht. **273**. Aug. 13, 1903, near Lake Mary, Big Cottonwood Canyon, Salt Lake Co.

On *Ranunculus micropetalus* (Greene) Rydb. **3303**. Aug. 18, 1926, Mt. Timpanogos, Utah Co.

On *Ranunculus stenolobus* Rydb. **918**. Aug. 11, 1906, Big Cottonwood Canyon.

Exsic. Fungi Utah. 109.

124. **Puccinia rubigo-vera** (DC.) Wint. I-II, III.

Plate III, J.

*Puccinia agropyri* E. & E.

*Puccinia apocrypta* Ellis & Tracy

*Puccinia clematidis* Lagerh.

*Puccinia alternans* Arth.

*Puccinia obliterated* Arth.

*Puccinia cinerea* Arth.

*Aecidium occidentale* Arth.

*Aecidium clematidis* DC.

a. *Puccinia rubigo-vera agropyri* (Ericks.) Arth.

On *Aquilegia coerulea albiflora* A. Gray. **3390**. I, Aug. 8, 1927, near Aspen Grove, Mt. Timpanogos, Utah Co.

On *Aquilegia flavescens* Wats. **3113**. I, July 12, 1924, above Aspen Grove, Mt. Timpanogos, Utah Co.

On *Clematis hirsutissima* Pursh (*C. douglasii* Hook.) I, (*Aecidium occidentale* Arth.), **3344**. I, July 18, 1927, Aspen Grove campus, Mt. Timpanogos, Utah Co. Abundant.

On *Clematis ligusticifolia* Nutt. **2053**. I, (*Aecidium Clematidis* DC.), July 29, 1909, Clear Creek Canyon, western Sevier Co. **2613**. June 27, 1920, mouth of Bullion Canyon, near Marysvale, Piute Co.

On *Delphinium occidentale* S. Wats. **3340**. I, July 22, 1927, Mt. Timpanogos, Utah Co.

On *Ranunculus cymbalaria* Pursh (*Halerpestes cymbalaria* [Pursh] Greene). **984**. I, Sept. 29, 1906, Thistle Junction, Utah Co. **2613a**. I, June 28, 1920, Marysvale, Piute Co.

On *Thalictrum fendleri* Engelm. **450**. I, July 12, 1904, Red Butte Canyon. **2374**. I, July 28, 1926, Aspen Grove, Mt. Timpanogos, Utah Co.

On *Thalictrum sparsiflorum* Turcz. **936**. I, Aug. 25, 1906, Big Cottonwood Canyon, Salt Lake Co.

On *Agropyron repens* Beauv. **316**. Sept. 3, 1903, Red Butte Canyon, Salt Lake Co.

On *Agropyron subsecundum* Link. (*A. caninum* Auct. Amer.) **937**. II, III, Aug. 25, 1906, Big Cottonwood Canyon, Salt Lake Co. **3395a**. Aug. 9, 1927, Mt. Timpanogos, Utah Co.

On *Agropyron smithii* Rydb. **1166**. II, III, Sept. 1, 1908, Beck's Hot Springs, Salt Lake Co.

On *Agropyron smithii palmeri* (S. & S.) Heller. (*A. palmeri* Rydb.) **2184**. July 24, 1911, Monticello, San Juan Co.

On *Agropyron spicatum* (Pursh) Scrib. & Smith. **3273**. July 28, 1926, Aspen Grove, Mt. Timpanogos, Utah Co. **1160**. Aug. 28, 1908, Red Butte Canyon, Salt Lake Co.

On *Agropyron pauciflorum* (Schwein.) Hitchc. (*A. tenerum* Vasey). **2204**. Aug. 4, 1911, White Canyon, San Juan Co. **3313**. July 20, 1925, Mt. Timpanogos, Wasatch Mts., Utah Co.

On *Bromus porteri* (Coult.) Nash. **1137**, II, Aug. 21, 1908, Parley's Canyon, Salt Lake Co.

On *Bromus richardsonii* Link. Listed in Arthur's "Manual of the Rusts in United States and Canada" as occurring in Utah on this host.

On *Bromus* sp. **2292a**. July 12, 1915, near Silver Lake, Big Cottonwood Canyon.

On *Bromus sterilis* L. **1135**. II, Aug. 21, 1908, Parley's Canyon, Salt Lake Co.

On *Elymus canadensis* L. **1144**. II, Aug. 21, 1908, near Salt Lake City.

On *Elymus condensatus* Presl. **2512**. July 18, 1919. Price, Carbon Co.

On *Elymus triticoides* Buckl. Listed in Arthur's Manual of the Rusts in United States and Canada" as occurring in Utah on this host.

On *Poa fendleriana* (Steud.) Vasey. **2673**. II. Wiley Camp, Zion National Park, Washington Co.

On *Poa wheeleri* Vasey. **2213**. July 30, 1911, Jack Spring, San Juan Co.

On *Puccinellia nuttalliana* (Schult.) Hitchc. (*P. airoides* [Nutt.] Wats. & Coulter.) Collected by Ellsworth Bethel Nov. 15, 1917, at Marysville, Piute Co.

On *Sitanion hystrix* (Nutt.) J. G. Smith. **2710**, II, Aug. 3, 1920, Beaver Canyon, near Beaver, Beaver Co.

On *Sitanion jubatum* Smith. **2671**. II, July 22, 1920, Zion National Park, Washington Co.

b. *Puccinia rubigo-vera apocrypta* (Ellis & Tr.) Arth.

On *Hydrophyllum capitatum* Dougl. **393**. I, (*Aecidium hydrophyllii* A. Gray). **648**. I. June 6, 1905, Peck, June 22, 1904, Wasatch Mts. near Salt Lake City. **877**. I, May 19, 1906, Upper Falls, Provo Canyon, Utah Co.

On leaf-blades, petioles and cotyledons of *Hydrophyllum occidentale watsoni* A. Gray (*H. watsoni* [A. Gray] Rydb.) Red Butte Canyon, Salt Lake Co.

On *Lappula coerulescens* Rydb. A single leaf with an immature aecium was collected on this host by one of the writer's pupils in May, 1913. The leaf was sent to Dr. Arthur, who referred it to this species.

On *Phacelia alpina* Rydb. **861**. I, (*Aecidium phaceliae* Peck), Aug. 24, 1905, Silver Lake, Big Cottonwood Canyon, Salt Lake Co. **2385**. I, Aug. 1, 1926, Timpanogos Trail, Mt. Timpanogos, Utah Co.

On *Phacelia heterophylla* Pursh. **394**. I, June 22, 1904, Wasatch Mts. near Salt Lake City.

The type of *Aecidium phaceliae* came from Utah.

On *Agropyron pauciflorum* (Schwein.) Hitchc. (*Agropyron tenerum* Vasey.) **2663**. II, III, July 19, 1920, Coal Creek branch of Cedar Canyon, Iron Co.

On *Elymus glaucus* Buckl. **3251a**. July 23, 1926, Mt. Timpanogos, Wasatch Mts., Utah Co.

c. *Puccinia rubigo-vera tritici* (Ericss. & Henn.) Carl.

*Puccinia triticina* Ericks.

On *Triticum aestivum* L. (*Triticum vulgare* Vill.)—(leaf-rust of wheat). "Found everywhere that wheat is grown." Aecia on *Thalictrum* sp. not yet found in America.



Exsic. Fungi Utah, 31, 35, 36, 49, 50, 76, 77, 86, 92, 110, 126, 145, 152, 156, 162, 173, 176, 182, 218, 230. Fungi Columb. 1851.

125. **Puccinia rydbergii** Garrett. III.

On *Sedum debile* Wats. **1110**. Aug. 6, 1908, Bingham Canyon, Quirrh Mts., Salt Lake Co.

On *Sedum stenopetalum* Pursh. **2152**. July 7, 1911, mountains above Gold Basin, La Sal Mts., San Juan Co. Type collection.

Exsic. Fungi Utah. 220.

126. **Puccinia scaber** (Ellis and Everh.) Barth. II, III.

*Puccinia substerilis* E. & E.

On *Oryzopsis hymenoides* (Roehm. & Schultz) (*Eriocoma cuspidata* Nutt.) **2332**. X, (*Uredo eriocomae* Ellis), Sept. 23, 1916, mouth of Red Butte Canyon, Salt Lake Co. **2670**, X, July 22, 1920, Zion National Park, Washington Co.

On *Stipa columbiana* Macoun (*S. minor* [Vasey] Scribn.). **2095**. Aug. 26, 1909, near Gogorza, Parley's Canyon, Summit Co.

On *Stipa lettermanni* Vasey. **2687**. Coal Creek branch of Cedar Canyon, about 15 miles from Cedar City, Iron Co. **2771**. Sept. 12, 1920, East Canyon, Summit Co. **3127**. July 22, 1921, Aspen Grove, Mt. Timpanogos, Utah Co. The aecial stage of this rust is unknown.

Exsic. Fungi Utah. 240.

127. **Puccinia scandica** Johans. III.

On *Epilobium alpinum* L. **508**. Aug. 27, 1904, Big Cottonwood Canyon, Salt Lake Co.

On *Epilobium clavatum* Trelease. **853**. Aug. 23, 1905, Big Cottonwood Canyon, Salt Lake Co. **3281**. Aug. 1, 1926, near Emerald Lake, Mt. Timpanogos, Utah Co.

On *Epilobium hornemanni* Reichenb. **840a**. Aug. 15, 1905, Big Cottonwood Canyon, Salt Lake Co.

Exsic. Fungi Utah. 84, 140.

128. **Puccinia schedonnardi** Kellerm. and Swingle. I-II, III.

Plate III, I.

*Puccinia hibisciata* (Schw.) Kellerm.

*Puccinia tosta* Arth.

*Puccinia muhlenbergiae* A. & H.

On *Muhlenbergia filiformis* (Thurb.) Rydb. (*Sporobolus filiformis* (Thurb.) Rydb. **984a**. Sept. 24, 1906, Thistle Junction, Utah Co.

On *Muhlenbergia montana* (Nutt.) Hitchc. (*M. gracilis* [HBK] Trin.) **2228**. Aug. 11, 1911, head of Dry Wash, near Abajo Mts., San Juan Co.

On *Muhlenbergia racemosa* (Michx.) B. S. P. **2117**. Oct. 9, 1909, Little Cottonwood Canyon, Salt Lake Co.

On *Muhlenbergia squarrosa* (Trin.) Rydb. (*Muhlenbergia richardsonis* [Trin.] Rydb.) **2232**. Aug. 14, 1911, Montezuma Canyon near Monticello, San Juan Co.

On *Sporobolus asperifolius* (Nees & Meyen) Thurb. **486**. II, (*Puccinia tosta* Arth.) Aug. 18, 1904, Liberty Park, Salt Lake City. **597**. III, Sept. 17, 1904, Liberty Park.

Aecia on various species of *Malvaceae*, not yet reported from Utah. Exsic. Fungi Utah. 59, 60.

129. **Puccinia sessilis** Schneid. I-II, III.

*Aecidium majanthae* Schum.

*Puccinia majanthae* Arth. & Holw.

On *Smilacina amplexicaulis* Nutt. **3337**. I. July 19, 1927, Mt. Timpanogos, Wasatch Mts., Utah Co. This is a new host for this rust. Since the infection was sparse, the inference is that the alternate host was at some distance from the *Smilacina* plants. The telial form is found on species of *Phalaris*.

130. **Puccinia sherardiana** Körn. III.

On *Sphaeralcea arizonica* Heller. **2222a**. Aug. 9, 1911, mouth of Dry Wash, San Juan Co. **2680a**. July 23, 1920, Hurricane, Washington Co.

On *Sphaeralcea coccinea* (Nutt.) Rydb. **2983**. Aug. 10, 1921, Manti, Sanpete Co.

On *Sphaeralcea coccinea dissecta* (Nutt.) Garrett. **2181**. July 24, 1911, near Monticello, San Juan Co.

On *Sphaeralcea elata* (Baker f.) Rydb. **3443**. May 19, 1928, near Provo, Utah Co.

On *Sphaeralcea grossulariaefolia* (Hook. & Arn.) Rydb. **1064**. Sept. 28, 1907, American Fork, Utah Co.

On *Sphaeralcea marginata* York. **2195**. July 29, 1911, Allen Canyon, Elk Mts., San Juan Co.

On *Sphaeralcea munroana* (Dougl.) Spach. **1116**. Aug. 11, 1908, Gogorga, Summit Co.

On *Sphaeralcea pedata* Torr. **2680**. July 21, 1920, Zion's Canyon, Washington Co.

On *Sphaeralcea subrhomboidea* Rydb. **2753**. Aug. 19, 1920, Logan, Cache Co.

Exsic. Fungi Utah. 168, 222.

131. **Puccinia sieverslæ** Arth. III.

On *Sieversia turbinata* (Rydb.) Greene. Collected by L. N. Goodding (No. 1377) at Fish Lake, Sevier Co., June 17, 1902.

132. **Puccinia splendens** Vize. I, II, III.

On *Hymenoclea monogyra* T. & G. **3531**. April 30, 1931. Collected by Glenn Graff, Virgin, Washington Co.

133. *PUCCINIA STIPÆ* Arth. I-II, III.

On *Crepis glauca* (Nutt.) T. & G. I, (*Aecidium crepidicola* E. & G.). Given by A. G. Johnson as occurring in Utah in his paper, "The Unattached Aecial Forms of Plant Rusts in North America" (No. 88, p. 406). Also collected by L. N. Goodding June 9, 1902, at Juab, Juab Co.

On *Stipa comata* Trin. & Rupr. **2203**. Aug. 4, 1911, White Canyon, San Juan Co.

On *Stipa columbiana* Macoun (*S. minor* [Vasey] Scribn.). **2084**. Aug. 20, 1909, near Gogorza, Summit Co.

Exsic. Fungi Utah. 193, 237.

134. *PUCCINIA SUBCIRCINATA* Ellis and Everh. I, III.

Plate VIII, E.

On *Senecio crassulus* A. Gray. **917**. I, III, Aug. 11, 1906, near Lake Minnie, Little Cottonwood Canyon, Salt Lake Co.

On *Senecio cymbalarioides* Nutt. **3419**. I, Aug. 19, 1927, Mt. Timpanogos, Utah Co.

On *Senecio integerrimus* Nutt. (*S. dispar* A. Nelson.) **184**. III, May 2, 1903, near Salt Lake City.

On *Senecio triangularis* Hook. **299**. I, III, Aug. 17, 1903, Big Cottonwood Canyon, Salt Lake Co.

Exsic. Fungi Utah. 29, 106, 238.

135. *PUCCINIA SUBDECORA* Syd. and Holw. I, II, III.

On *Brickellia grandiflora* Nutt. (*Coleosanthus grandiflorus* [Hook.] Kuntze). **672**. June 22, 1905, Mill Creek Canyon, Salt Lake Co.

Exsic. Fungi Utah. 239.

136. *PUCCINIA SUKSDORFII* Ellis and Everh. III.

On *Agoseris elata* (Nutt.) Greene. **1001**. June 22, 1907, Wasatch Mts. near Salt Lake City.

Exsic. Fungi Utah. 170.

137. *PUCCINIA SWERTIÆ* Winter. I, III.

On *Swertia scopulina* Greene (*S. fritillaria* Rydb.) **2292**. July 13, 1925, shores of Silver Lake, Big Cottonwood Canyon, Salt Lake Co.

Exsic. Fungi Utah. 241.

138. *PUCCINIA TARDISSIMA* Garrett. II, III.

On *Arenaria* sp. **2116**. Oct. 9, 1909, near Wasatch Resort, Little Cottonwood Canyon, Salt Lake Co. Type collection.

Exsic. Fungi Utah. 242.

139. *PUCCINIA THLASPEOS* Schubert. III.

On *Thlaspi coloradensis* Rydb. **734**. July 3, 1905, near Lake Phoebe, Big Cottonwood Canyon, Salt Lake Co.

On *Thlapsi glaucum* A. Nelson. **681**. July 7, 1905, near Silver Lake, Big Cottonwood Canyon, Salt Lake Co.

Exsic. Fungi Utah. 142.

140. **Puccinia TRELEASIANA** Paz. III.

Plate IV, B.

On *Caltha leptosepala* DC. **283**. Aug. 14, 1903, near Lake Catherine, Big Cottonwood Canyon, Salt Lake Co.

Exsic. Fungi Utah. 23. Fungi Columb. 1868.

141. **Puccinia TUMIDIPES** Peck. I, II, III.

On *Lycium pallidum* Miers. **2196**. July 31, 1911, Hammond Canyon, Elk Mts., San Juan Co. Also collected by Dr. P. A. Rydberg Aug. 26, 1911, Cottonwood Creek, near Bluff, San Juan Co., and by Dr. E. M. Hall Nov. 9, 1916 at Big Plains, Washington Co.

Exsic. Fungi Utah. 223.

**Puccinia TURRITA** Arth. III.

On *Saxifraga austro-montana* Wiegand. **2173**. July 15, 1911, La Sal Mts., San Juan Co.

Exsic. Fungi Utah. 221.

142. **Puccinia VAGANS** (DC.) Arth. I, II, III.

*Puccinia epilobii-tetragoni* Wint.

*Puccinia gayophyti* Billings

a. **Puccinia vagans epilobii-tetragoni** DC.

On *Epilobium paniculatum* Nutt. **234**. II, III, July 2, 1903, City Creek Canyon, Salt Lake Co. **730**. II, III, July 6, 1905, Wasatch Co. **916**. I, III, Big Cottonwood Canyon, Salt Lake Co.

On *Gayophytum pumilum* Wats. **691**. I, III, June 29, 1905, Big Cottonwood Canyon, Salt Lake Co.

b. **Puccinia vagans gayophyti** (Billings) Arth.

On *Gayophytum caesium* Nutt. **275**. III, Aug. 13, 1903, Big Cottonwood Canyon, Salt Lake Co. **2062**. Aug. 2, 1909, Fish Creek Canyon, Sevier Co.

On *Gayophytum diffusum* T. & G. Listed in Arthur's "Manual of the Rusts in United States and Canada", p. 313, as occurring in Utah on this host.

On *Gayophytum intermedium* Rydb. **489**. III, Aug. 21, 1904, Big Cottonwood Canyon, Salt Lake Co.

On *Gayophytum lasiospermum* Greene. **452**. July 12, 1904, Red Butte Canyon, Salt Lake Co.

On *Gayophytum ramossissimum* T. & G. **714**. I, III, July 8, 1905, Wasatch Mts., Wasatch Co.

Exsic. Fungi Utah. 49, 50, 86, 1110. Fungi Columb. 1851.

143. *PUCCINIA VERATRI* Duby. I-II, III.

On *Epilobium alpinum* L. **274**. I, Aug. 13, 1903, head of Big Cottonwood Canyon, Salt Lake Co.

On *Epilobium clavatum* Trelease. **921**. I, Aug. 11, 1906, Little Cottonwood Canyon above Alta, Salt Lake Co. **2382**. Aug. 1, 1926, Mt. Timpanogos Trail, Utah Co.

On *Epilobium drummondii latiusculum* Rydb. **852**. I, Aug. 23, 1905, Big Cottonwood Canyon, Salt Lake Co.

On *Epilobium hornemanni* Richards. **3387**. I, Aug. 8, 1927, Mt. Timpanogos, Utah Co. **2139**. I, Aug. 24, 1910, Big Cottonwood Canyon, Salt Lake Co.

On *Epilobium rubescens* Rydb. **685**. I, June 29, 1905, Big Cottonwood Canyon, Salt Lake Co.

On *Epilobium stramineum* Rydb. **913**. I, Aug. 2, 1906, Big Cottonwood Canyon below Silver Lake, Salt Lake Co.

On *Veratrum speciosum* Rydb. **291**. II, III, Aug. 16, 1903, Big Cottonwood Canyon, Salt Lake Co.

Exsic. Fungi Utah. 82, 135, 159.

144. *PUCCINIA VIOLÆ* (Schum.) DC. I, II, III.

On *Viola adunca* J. E. Smith. **478**. Aug. 5, 1904, City Creek Canyon, Salt Lake Co. **2154**. July 8, 1911, La Sal Mts. near Gold Basin, San Juan Co. **3024**. July 22, 1915, Spring Hollow, Logan Canyon, Cache Co.

On *Viola canadensis* L. **2245**. Aug. 18, 1911, Abajo Mts., San Juan Co.

Exsic. Fungi Utah. 48, 54, 243.

145. *PUCCINIA XANTHIIFOLLÆ* Ellis and Everh. II, III.

On leaves of *Iva xanthiifolia* Nutt. **2114**. Oct. 9, 1909, near Wasatch Resort, Little Cottonwood Canyon, Salt Lake Co.

146. *UROMYCES ÆMULUS* Arth. I, II, III.

On *Allium acuminatum* Hook. **363**. June 3, 1904, Farmington Canyon, Davis Co. Mixed with *Puccinia blaisdalei* H. & O.

147. *UROMYCES CARYOPHYLLINUS* (Schränk) Wint. I, II, III.

On *Dianthus caryophyllus* L., cult. **2127**. March 26, 1910, Salt Lake City in greenhouses.

The aecia occur on *Euphorbia gerardiana*, known only from Europe.

148. *UROMYCES COLORADENSIS CAMPESTER* Arth. I, III.

*Uromyces porosus* (Peck) Jackson

*Uromyces albus* Diet. & Holw.

*Aecidium porosum* Peck

On *Vicia oregana* Nutt. **434**. III, July 7, 1904, City Creek Canyon, Salt Lake Co.

On *Vicia trifida* Schw. **201**. I, (*Aecidium porosum* Peck), May 23, 1903, near Salt Lake City. **201a**. III, same date and locality as **201**. One two-celled teliospore was found in this collection.

Ex. Fungi Utah. 122, 246. Fungi Columb. 1894.

149. **UROMYCES COORDINATUS** Arth. I, III.

On *Euphorba robusta* (Engelm.) Small, (*Tithymalus robustus* [Engelm.] Small). Listed in Arthur's "Manual of the Rusts in the United States and Canada" as occurring in Utah on this host.

150. **UROMYCES FABÆ** (Pers.) de Bary. I, II, III.

**Plate V, A.**

On *Lathyrus coreaceus* White. **464**. July 20, 1904, Wasatch Mts. near Salt Lake City, Salt Lake Co.

On *Lathyrus oroleucus* Hook. Listed in Arthur's "Manual" as occurring in Utah on this host.

On *Lathyrus utahensis* Jones. **466**. I, II, July 20, 1904, Wasatch Mts. near Salt Lake City, Salt Lake Co. **977**. III, Sept. 13, 1906, Parley's Canyon, Salt Lake Co. **2690**. July 17, 1920, Maple Creek branch of Coal Creek Canyon, near Cedar City, Iron Co.

Exsic. Fungi Utah. 123, 124, 125.

151. **UROMYCES GLYCYRRHIZÆ** (Rabenh.) Magn. I, III.

On *Glycyrrhiza lepidota* Nutt. **200**, II, May 19, 1903, Salt Lake City. **724**, II, July 6, 1905, Hot Pots, Wasatch Co. **686**. III, Aug. 31, 1905, Salt Lake City. **2056**. II, III, July 31, Fish Creek Canyon, Sevier Co. **2356**. II, July 26, 1918, Vernal, Uinta Co. **2613**. II, July 18, 1919, Price, Carbon Co. **2620**. II, June 28, 1920, Bullion Canyon near Marysville.

Exsic. Fungi Utah. 98, 99.

152. **UROMYCES HEDYSARI-OBSCURI** (DC) Wint. I, II, III.

**Plate V, B.**

On *Hedysarum pabulare* A. Nels. **2334**. I, June 13, 1928, near mouth of Rock Canyon, near Provo, Utah Co.

On *Hedysarum utahense* Rydb. **2099**. Oct. 2, 1909, Emigration Canyon, Salt Lake Co. **2122**. Oct. 16, 1909, Ogden Canyon near Idlewild, Weber Co. **2271**. June 25, 1913, Mountain Dell, Summit Co.

Exsic. Fungi Utah. 197.

153. **UROMYCES HETERODERMUS** Syd. III

**Plate III, H.**

On *Erythronium grandiflorum parviflorum* S. Wats. **698**. July 7, 1905, near Brighton, Big Cottonwood Canyon, Salt Lake Co. Type

collection. **2587**. May 16, 1920, City Creek Canyon, Salt Lake Co. A collection from Utah on *E. grandiflorum* Pursh is listed in Arthur's Manual.

Ex. Fungi Utah. 118.

154. **UROMYCES HORDEINUS** Arthur. I-II, III.

Listed in Arthur's "Manual of Rusts of North America and Canada" as occurring in Utah on *Hordeum nodosum* L.

Aecia on *Nothoscordium bivalve* Britt., not occurring in Utah.

155. **UROMYCES HYALINUS** Peck. I, III.

*Uromyces sophorae* Peck.

Collected by Marcus E. Jones in southeastern Utah.

156. **UROMYCES INTRICATUS** Cooke. I, II, III.

Plate V, C.

*Uromyces eriogoni* Ell. & Hark.

On *Eriogonum biumbellatum* Rydb. **3001**. Aug. 20, 1921, Fish Lake Resort, Sevier Co.

On *Eriogonum campanulatum* Nutt. **900**. I, II, III, July 17, 1906, Parley's Canyon, Salt Lake Co.

On *Eriogonum croceum* Small. **2198**. II, July 31, 1911, San Juan Co.

On *Eriogonum heracleoides* Nutt. **206**. I, May 30, 1903, City Creek Canyon, Salt Lake Co. **239**. II, July 2, 1903, City Creek Canyon. **321**. III, Sept. 3, 1903, Red Butte Canyon, Salt Lake Co.

On *Eriogonum medium* Rydb. **2366a**. Aug. 9, 1928, Mt. Timpanogos, Wasatch Mts., Utah Co.

On *Eriogonum microthecum* Nutt. **2646**. July 17, 1920, Maple Canyon branch of Coal Creek Canyon, near Cedar City, Iron Co.

On *Eriogonum racemosum* Nutt. **224**. I, June 22, 1903, City Creek Canyon. **972**. II, Sept. 13, 1906, Parley's Canyon. **2674a**. July 22, 1920, Zion National Park, Washington Co.

On *Eriogonum ramosissimum* Eastw. Collected by Dr. P. A. Rydberg at Bluff, San Juan Co., August, 1911.

On *Eriogonum umbellatum majus* Benth. **2018**. II, July 11, 1909, Emigration Canyon, Salt Lake Co.

Exsic. Fungi Utah. 12, 13, 120, 147, 174, 196.

157. **UROMYCES JUNCI-EFFUSI** Sydow. II, III.

Plate III, G.

On *Juncus longstylis* S. Wats. **1115**. Aug. 11, 1908, Gogorza, Summit Co.

On *Juncus saximontanus* A. Nelson. **311**. Sept. 3, 1903, Red Butte Canyon, Salt Lake Co.

*Aecia* unknown.

Exsic. Fungi Utah. 149, 198.

158. **UROMYCES LYCOCTONI** (Kalchb.) Tretter. I, ii, III.

*Uromyces aconiti-lycoctoni* Wint.

*Uromyces bifrons* (DC.) Barth.

On ***Aconitum columbianum*** Nutt. **314**. I, III, Sept. 3, 1903, Red Butte Canyon, Salt Lake Co. **3171**. Aug. 13, 1925, Mt. Timpanogos, Wasatch Mts., Utah Co.

Exsic. Fungi Columb. 1892.

159. **UROMYCES MINOR** Schroet. I, III.

*Pucciniola oblonga* Arth.; not *Uromyces oblongus* Vize

On ***Trifolium kingii*** S. Wats. **2670**. July 22, 1920. Zion Canyon, Washington Co.

On ***Trifolium oliganthum*** Steud. (*T. pauciflorum* Nutt.) Listed in Arthur's "Manual of the Rusts in United States and Canada" as occurring in Utah on this host.

On ***Trifolium parryi*** A. Gray. **2172a**. July 15, 1911, La Sal Mts., San Juan Co.

On ***Trifolium scariosum*** A. Nelson. **2172**. July 15, 1911, La Sal Mts., San Juan Co.

On ***Trifolium* sp.** **2686**. July 27, 1920, Coal Creek branch of Cedar Canyon, Iron Co. **2706**. July 30, 1920, First left-hand Fork of Parowan Canyon, Iron Co.

Exsic. Fungi Utah. 224, 225.

160. **UROMYCES MYSTICUS** Arth. II, III.

On ***Hordeum jubatum*** L. In the original description of this species, Dr. Arthur states that the type was collected at Provo, Utah Co., by S. M. Tracy (No. 712.)

On ***Hordeum nodosum*** L. Listed on this host for Utah in Arthur's "Manual of the Rusts in United States and Canada."

*Aecia* unknown.

161. **UROMYCES OCCIDENTALIS** Dietel. I, II, III.

**Plate V, E.**

*Uromyces substriatus* Sydow

On ***Euphorbia robusta*** (Engelm.) Small. **722**. I, July 6, 1905, Wasatch Mts., Wasatch Co. **3276**. July 28, 1926, Mt. Timpanogos, Utah Co.

On ***Lupinus parviflorus*** Nutt. **2063**. Aug. 2, 1909, Fish Creek Canyon, western Sevier Co.

On ***Lupinus pulcherrimus*** Rydb. **968**. Sept. 6, 1906, City Creek Canyon, Salt Lake Co.



On *Lupinus sericeus* Pursh var. *flexuosus* Lindl. **3251**. July 23, 1926, Mt. Timpanogos, Wasatch Mts., Utah Co. Collected by James Kartschner.

On *Lupinus* sp. **3102**. Oct. 6, 1923, East Canyon, Summit Co. **3103**. Oct. 6, 1933, Gogorza, Parley's Canyon, Summit Co. **3104**. Oct. 6, 1923, 19½ miles up Parley's Canyon, Salt Lake Co. **2993**. Aug. 12, 1921, Marysvale, Piute Co.

On July 16, 1918, the writer found *Euphorbia robusta* above Cimarron, Colorado, abundantly infected with aecia. In the immediate vicinity was found *Lupinus greenei* A. Nelson, with uredinia just beginning to form. Dr. Arthur's attention was called to this association of the two rusts, and he said that very possibly the rust on *Euphorbia* was the aecial host of the *Lupinus* rust—that cultures had been made on a number of suspected hosts without results. At the time the writer was in the field with Ellsworth Bethel, who was informed of this apparent connection. Bethel later cultured and confirmed the connection.

Exsic. Fungi Utah. 96, 119, 199.

162. **UROMYCES PLUMBARIUS** Peck. I, II, III.

Plate II, C.

On *Oenothera caespitosa* Nutt. (*Pachylophus caespitosus* Raiman). **899**. I, II, July 17, 1906, Parley's Canyon, Salt Lake Co. **973**. II, III, Sept. 13, 1906, Parley's Canyon.

On *Oenothera marginata* Nutt. (*Pachylophus marginatus* [Nutt.] Rydb.) **1197**. I, II, III, Nov. 21, 1908, near Salt Lake City, **2048**. I, II, III, July 28, 1909, Fish Creek Canyon, western Sevier Co.

On *Oenothera montana* Nutt. (*Pachylophus montanus* [Nutt.] A. Nelson.) **2177**. July 19, 1911, La Sal, Grand Co.

Exsic. Fungi Utah. 117, 150, 200.

163. **UROMYCES POLYGONI** (Pers.) Fckl. I, II, III.

On *Polygonum aviculare* L. **1184**. Sept. 26, 1908, Salt Lake City.

Exsic. Fungi Utah. 245.

164. **UROMYCES PROBUS** Arth. I, II, III.

On *Sisyrinchium douglasii* A. Dietr. (*S. grandiflorum* Dougl.) Collected by Marcus E. Jones April 1, 1887, at Tooele, Tooele Co.

165. **UROMYCES PROEMINENS** (DC) Pass. I, II, III.

*Uromyces euphorbiae* C. & P.

On *Euphorbia dentata* Michx. **1177**. I, III, Sept. 4, 1908, Salt Lake City.

On *Euphorbia fendleri* T. & G. **2211**. Aug. 6, 1911, White Canyon, Natural Bridge National Park, San Juan Co.

On *Euphorbia greenei* Millsp. **2402**. July 30, 1918, Duchesne, Duchesne Co. **2646a**. July 18, 1920, Cedar City, Iron Co. **2609**. July 18, 1909, Price, Carbon Co.

On *Euphorbia rugulosa* Engelm. (*Chamaesyce rugulosa* [Engelm.] Rydb.) **2708**. Aug. 3, 1920, Beaver Canyon, Beaver Co.

On *Euphorbia serpyllifolia* Pers. **729**. I, III, July 6, 1905, Little Snake Creek Canyon, Wasatch Mts., Wasatch Co.

Exsic. Fungi Utah. 148, 175, 247.

166. *UROMYCES PSORALEÆ TYPICA* (Peck) Arthur. I, III.

On *Psoralea micrantha* A. Gray. **2144**. July 1, 1911, Moab, Grand Co. **3540**. I, June 23, 1931, near Ogden, Weber Co.

On *Psoralea purshii* Vail. Listed in Arthur's "Manual of the Rusts in United States and Canada" as occurring in Utah on this host.

Type collected in Utah by Marcus E. Jones.

Exsic. Fungi Utah. 248.

167. *UROMYCES PUNCTATUS* Schroet. I, II, III.

(*U. astragali* [Opiz.] Schroet.)

On *Astragalus argophyllus* Nutt. **2089**. Aug. 26, 1909, Gogorza, Parley's Canyon, Summit Co. **2179**. July 24, 1911, Monticello, San Juan Co. **2297**. July 22, 1915, Logan Canyon, Cache Co.

On *Astragalus atratus aretus* Sheldon. **2146**. July 1, 1911, Moab, Grand Co.

On *Astragalus decumbens* Gray. **1111**. Aug. 6, 1908, Bingham Canyon, Oquirrh Mts., Salt Lake Co.

On *Astragalus diphysus* A. Gray. **2088**. Aug. 26, 1909, Parley's Park, Parley's Canyon, Summit Co.

On *Astragalus humistratus* A. Gray **2660**, July 19, 1920, Cedar Canyon, Iron Co.

On *Astragalus impensus* (Sheld.) Woot. & Standl. (*Kentrophyta impensa* [Sheld.] Rydb.) **2647**. July 17, 1920, Maple Canyon branch of Cedar Canyon, Iron Co.

On *Astragalus microlobus* A. Gray. **2237a**. Aug. 11, 1911, Montezuma Canyon near Monticello, San Juan Co.

On *Astragalus purshii* Dougl. **2046**. July 28, 1909, Fish Creek Canyon, western Sevier Co.

On *Astragalus sonoreae* A. Gray. **2660a**. July 19, 1920, Cedar Canyon, Iron Co.

On *Astragalus* sp. **2659**. July 19, 1920, Coal Creek branch of Cedar Canyon, Iron Co.

On *Astragalus utahensis* T. & G. **996**. June 22, 1907, Wasatch Mts. near Salt Lake City.

On *Astragalus wardii* A. Gray. **2045**. July 28, 1909, Fish Creek Canyon, western Sevier Co.

Aecia on species of *Euphorbia*, not yet found in America.

Fungi Utah. 146; 195; 249.

168. **UROMYCES RICKERIANUS** Arth. I, II, III.*Uromyces fuscatus* Arth.

On **Rumex paucifolius** Nutt. **2632**. III, July 15, 1920, Gogorza, Parley's Canyon, Summit Co. **3035**, I, June 15, 1922, same locality as No. 2632.

Exsic. Fungi Utah. 244.

169. **UROMYCES SHEARIANUS** Arth. I-III.

On **Atriplex confertifolia** (Torr.) S. Wats. I. Collected by Dr. Seville Flowers, Sept. 18, 1927 at Price, Carbon Co.

170. **UROMYCES SILENES** (Schlecht.) Fckl. I, II, III.

On **Arenaria glabrescens** (Wats.) Howell. **2648**. July 17, 1920, Maple Canyon branch of Coal Creek Canyon, near Cedar City, Iron Co.

171. **UROMYCES STRIATUS-MEDICAGINIS** (Pass.) Arth. I-II, III.*Uromyces medicaginis* Pass

On **Medicago sativa** L. **2766**. Sept. 4, 1920. Salt Lake City.  
Aecia occur in Europe on species of *Euphorbia*, not yet found in America.

172. **UROMYCES SUKSDORFII** Diet. and Holw. I, II, III.*Uromyces lychnidis* T. & E.

On **Lychnis drummondii** (Hook.) Wats. (*Wahlbergella drummondii* [Hook.] Rydb.) Collected by Marcus E. Jones near Tate Mine above Marysvale.

173. **UROMYCES TRANZSCHELII** Sydow. III.

On **Euphorbia robusta** (Engelm.) Small. (*Tithymalus robustus* [Engelm.] Small). **706**. July 3, 1905, Little Cottonwood Canyon, Salt Lake Co. **722**. July 6, 1905, Wasatch Mts., Wasatch Co. **2055**. Fish Creek Canyon, western Sevier Co.

Aecia and uredinia not formed.

Exsic. Fungi Utah. 97.

174. **UROMYCES TRIFOLII** (Hedw. f.) Lev. I, II, III.

Plate V, F.

*Uromyces fallens* (Desmaz) Kerna. **Uromyces trifolii trifolii-repentis** (Liro) Arth.

On **Trifolium repens** L. **479**. Aug. 5, 1904, City Creek Canyon, Salt Lake Co.

b. **Uromyces trifolii fallens** (Desmaz.) Arth.

On **Trifolium pratense** L. Collected by Dr. Wyatt W. Jones at Provo, Utah Co., Oct. 23, 1918.

Exsic. Fungi Utah. 121.

175. *UROMYCES ZYGADENI* Peck. I, II, III.

On *Zigadenus falcatus* Rydb. Listed in N. A. Flora (7: 241. 1912) as having been collected in Utah on this host.

On *Zigadenus paniculatus* Watson. 179. I, April 25, 1903, near Salt Lake City. 197. III, May 15, 1903, near Salt Lake City. Marcus E. Jones collected the type of this rust in City Creek Canyon, Salt Lake Co., on this host. 2507. I, May 17, 1930, Parley's Canyon above Barclay, Salt Lake Co.

Exsic. Fungi Utah. 250.

176. *GYMNOSPORANGIUM BETHELI* Kern. I-III.

## Plate II, F.

On leaves of *Crataegus rivularis* Nutt. I, 3016, Aug. 31, 1921, Spring Hollow, Logan Canyon, Cache Co. Also reported by Dr. O'Gara on the same host from Parley's Canyon, Salt Lake Co.

On *Juniperus scopulorum* Sarg. III. 3020, Aug. 31, 1921, Spring Hollow, Logan Canyon, Cache Co.

Collected by Professor Ellsworth Bethel, November 11, 1917, at Gilluly Station (Tucker P. O.), Utah Co. Even at the late date on which this collection was made, a few telial horns still persisted.

Exsic. Fungi Utahenses. 227.

177. *GYMNOSPORIUM CLAVARLEFORME* (Jacq.) DC. I-III.

## Plate II, E.

On *Amelanchier florida* Lindl. 3000, I, Aug. 20, 1921, Fish Lake Resort, Sevier Co.

On *Amelanchier pumila* Nutt. 2247. I, (*Roestelia lacerata* [Sow.] Fr.), Aug. 19, 1911, Abajo Mts. near West Mountain, San Juan Co. This is the first recorded collection of this species in Utah.

On leaves of *Amelanchier* sp. 3373. I, Aug. 3, 1927, near Aspen Grove, Mt. Timpanogos, Utah Co.

Exsic. Fungi Utah. 203.

178. *GYMNOSPORANGIUM INCONSPICUUM* Kern. I-III.*Roestelia harknessianoides* Kern

On fruit of *Amelanchier alnifolia* Nutt. 2225. I, Aug. 11, 1911, Dry Wash near Abajo Mts., San Juan Co. Almost every fruit was affected. This same stage of the rust was collected by Dr. Charles Piper Smith in Dry Canyon, Cache Co., and by Mrs. Mary Strong Clemens at the mouth of the Weber River.

On fruit of *Amelanchier jonesiana* C. K. Schneider. 2701. I, July 29, 1920, Parowan Main Canyon near Parowan, Iron Co.

On fruit of *Amelanchier prunifolia* Greene. 2692. I, July 22, 1920, Zion National Park, Washington Co.

On fruit of *Amelanchier utahensis* Koehne. I, **2226**, Aug. 11, 1911, head of dry wash near Abajo Mts., San Juan Co. **2674**, July 22, 1920, Zion National Park near Wiley Camp, Washington Co. **2725**, Aug. 7, 1920, Fillmore, Millard Co.

On *Juniperus utahensis* (Engelm.) Lemmon. III. **2641**, July 17, 1920, Maple Canyon branch of Cedar Canyon, above five miles from Cedar City, Iron Co. The entire tree was covered with brown smears at and near the tips of the branchlets. **2700**, July 29, 1920, Parowan Main Canyon, opposite Second Left-hand Fork.

179. *GYMNOPORANGIUM JUNIPERINUM* (L) Mart. I-III.

On *Sorbus scopulina* Greene. **3433**, I, Aug. 19, 1927, near Aspen Grove, Mt. Timpanogos, Wasatch Mts., Utah Co. Rust determined by Dr. Arthur. This is the first record of a collection of the aecial stage of this rust in Utah.

On *Juniperus siberica* Burgsd. **2615**, III, June 28, 1928, Bullion Canyon, near Marysvale, Piute Co.

180. *GYMNOSPORANGIUM JUVENESCENS* Kern. I-III.

On leaves of *Amelanchier florida* Lindl. **3014**, I, Aug. 27, 1921, above Pharaoh's Glen, Parley's Canyon, Salt Lake Co.

On leaves of *Amelanchier jonesiana* C. K. Schneider. **2661a**, I, July 19, 1920, Coal Creek Canyon near Cedar City, Iron Co.

On leaves of *Amelanchier oreophila* A. Nels. **2618**, I, June 28, 1920, Bullion Canyon, near Marysvale, Piute Co.

On leaves of *Amelanchier polycarpa* Greene. **2645**, I, July 17, 1920, Maple Creek branch of Coal Creek Canyon, near Cedar City, Iron Co.

On *Amelanchier utahensis* Koehne. **2643**, I, July 16, 1920, Coal Creek Canyon, near Cedar City, Iron Co.

On *Juniperus scopulorum* Sargent. **2642**, III, July 19, 1920, Cedar Canyon near Cedar City, Iron Co. **2698a**, III, July 29, 1920, Parowan Main Canyon near Parowan, Iron Co. **2640**, III, July 17, 1920, Maple Canyon branch Cedar Canyon, about five miles from Cedar City, Iron Co.

Also collected by Professor Ellsworth Bethel on the above host November 17, 1917, in Bullion Canyon near Marysvale, Piute Co. This *Gymnosporangium* forms large witches-brooms on the trees of *Juniperus scopulorum*. The leaves in the fasciations become slender and sharp-pointed like those of the young growth.

181. *GYMNOSPORANGIUM KERNIANIUM* Bethel. I-III.

Aecia on *Amelanchier* spp. and *Pyrus communis* L. (Not yet collected in Utah).

On *Juniperus utahensis* (Engelm.) Lemmon. **2361**, III, July 27, 1918, Witbeck's Ranch near Vernal, Uinta Co. Also collected by Professor Ellsworth Bethel, Nov. 17, 1917, on the same host in Bullion Canyon, three miles from Marysvale, Piute Co. Bethel's collection consists of only the "witches' brooms" made by the rust. These fasciations can be

distinguished from those made by *G. juvenescens* by the fact that the leaf-scales are altered only by becoming smaller instead of reverting to the sharp-pointed juvenile conditions distinctive of *G. juvenescens*.

182. *GYMNOSPORANGIUM NELSONI* Arth. I-III.

Plate II, G.

*Gymnosporangium durum* Kern

On leaves of *Amelanchier alnifolia* Nutt.; **2071**, I, Aug. 2, 1909, Fish Creek Canyon, western Sevier Co.; **2088a**, Aug. 26, 1909, Gogorza, Summit Co.; **2294**, July 22, 1915, Logan Canyon, Cache Co. **3304**. Aug. 19, 1926, Aspen Grove, Mt. Timpanogos, Utah Co.

On *Amelanchier mormonica* C. K. Schneider. **2718**, Aug. 3, 1920. Beaver Canyon, Beaver Co.

On leaves of *Amelanchier oreophila* A. Nels. **3264**, I, July 28, 1926. Mt. Timpanogos, Utah Co.

On leaves of *Amelanchier polycarpa* Greene. **2718a**. I, Aug. 3, 1920, Beaver Canyon, Beaver Co. **3017**. I, Aug. 31, 1921, Spring Hollow, Logan Canyon, Cache Co.

On leaves of *Amelanchier utahensis* Koehne. **3431**, Aug. 18, 1927, Mt. Timpanogos, Utah Co.

On *Peraphyllum ramosissimum* Nutt. I. Collected Sept. 11, 1894, by Professor Marcus E. Jones (No. 6029) at Asays, Garfield Co., at an altitude of 2250 m.

On *Juniperus scopulorum* Sarg.: **2133a**, III, Aug. 19, 1910, Mill D. Flat, Big Cottonwood Canyon; **2298**, I, July 22, 1915, Logan Canyon, Cache Co. (very abundant). **2600**, III, June 23, 1920, Santaquin, Utah Co. **3305**. III, Aspen Grove, Mt. Timpanogos, Utah Co. **2686a**. III, July 27, 1920, Coal Creek branch of Cedar Canyon, Iron Co. **2698**. July 29, 1920, Parowan Main Canyon, near Parowan, Iron Co.

On *Juniperus utahensis* (Engelm.) Lemmon. **2511**, III, July 18, 1919, Price, Carbon Co. **2607**, III, June 25, 1920, Manti, San Pete Co. **2627**, III, July 1, 1920, head of Mammoth Creek, Garfield Co. **2639**, III, July 17, 1920, Maple Canyon near Cedar City, Iron Co. **2727a**. III, Aug. 7, 1920, Fillmore, Millard Co.

Exsic. Fungi Utahenses. 177.

183. *GYMNOSPORANGIUM SPECIOSUM* Peck. I-III.

*Gymnosporangium gracilens* (Peck) Kern & Bethel

*Aecidium gracilens* Peck

On *Philadelphus occidentalis* A. Nelson. **2227**. I, (*Aecidium gracilens* Pk.), Aug. 11, 1911, Dry Wash south of Abajo Mts., San Juan Co. This is the first recorded collection of the aecial stage of this rust in Utah. **2669**. I, July 22, 1920, Zion's Canyon, Washington Co.

On *Juniperus utahensis* (Engelm.) Lemmon. **2360**. III, July 27, 1918, Witbeck's Ranch near Vernal, Uinta Co.

Exsic. Fungi Utah. 204.

**UREDINALES IMPERFECTI (Unattached Form-Genera).**184. **ÆCIDIUM INSULSUM** Arth.

On **Collinsia parviflora** Dougl. Collected May 29, 1917, at Plain City, Utah, near the Hot Springs north of Ogden, Weber County, Utah, by Wyatt W. Jones. A specimen was deposited in Arthur herbarium.

No clue is available to the telial form of this rust.

185. **PERIDERMIMUM EPHEDRÆ** Cooke.

On **Ephedra nevadensis** S. Wats. Collected Aug. 2, 1930, by A. M. Woodbury near Mt. Carmel, Washington Co. First collection in Utah, and the northernmost collection of this rust ever made. There is no clue to its alternate form.

## PLATE I

A. *Hyalopsora polypodii* on *Cystopteris fragilis*. 1. Sori on stems and leaves  $\times 1$ ; 2. Urediospores  $\times 600$ .

B. *Pucciniastrum pustulatum* on *Epilobium anagallidifolium*. 1. Sori on leaves  $\times 1$ ; 2. A single subepidermal uredosorus with ostiole  $\times 10$ ; 3. Urediospores  $\times 600$ ; 4. Cross section through the upper portion of a leaf showing the confluent subepidermal telial sorus  $\times 600$  (after Arthur); 5. Confluent telial sorus viewed from above and through the epidermis  $\times 6$ .

C. *Melampsorella cerastii*. A. 1-5 Aecial stage on *Abies concolor*. 1. Aecia on leaves; 2. A side view of a leaf showing peridia in various stages  $\times 5$ ; 3. A single peridium  $\times 20$ ; 4. A peridium after dehiscence  $\times 20$ ; 5. Aeciospores  $\times 600$ . 6-7. Uredinial stage on *Cerastium behringianum*; 6. Urediosori on a leaf  $\times 2$ ; 7. Urediospores  $\times 600$ .

D. *Chrysomyxa pyrolae* on *Pyrola secunda*. 1. Sori on leaves (Note: The uredinal and telial sori are often mixed, both spore forms sometimes occurring in the same sorus.)  $\times 1$ ; 2. Urediospores  $\times 600$ ; 3. Teliospores  $\times 600$ .

E. *Melampsora albertensis*. 1. Aecia on leaf of *Pseudotsuga mucronata*  $\times 2$ ; 2. Aeciospores  $\times 600$ ; 3. Urediospores  $\times 600$  (after Arthur). Note: The uredinial stage occurs on species of *Populus*.

F. *Cronartium coleosporioides*. 1. Aecial stage showing peridia on a branch of *Pinus scopulorum*  $\times 1$ ; 2. A single peridium  $\times 10$ ; 3. A peridium after dehiscence  $\times 10$ ; 4. Aeciospores  $\times 600$ .

G. *Cronartium occidentale* on *Ribes aureum*. 1. Uredinial and telial sori on leaf  $\times 1$ ; 2. Portion of a leaf showing uredinial sori with central ostioles and telial columns growing from the old uredinial sori  $\times 30$ ; 3. A portion of the telial column showing the confluent teliospores  $\times 600$ ; 4. Urediospores  $\times 600$ .

H. *Cumminsiiella sanguinea* on *Berberis repens*. 1. Uredinial and telial sori on a leaf  $\times 1$ ; 2. A single uredinial sorus from the side  $\times 75$ ; 3. Urediospores  $\times 600$ ; 4. Teliospores  $\times 600$ .



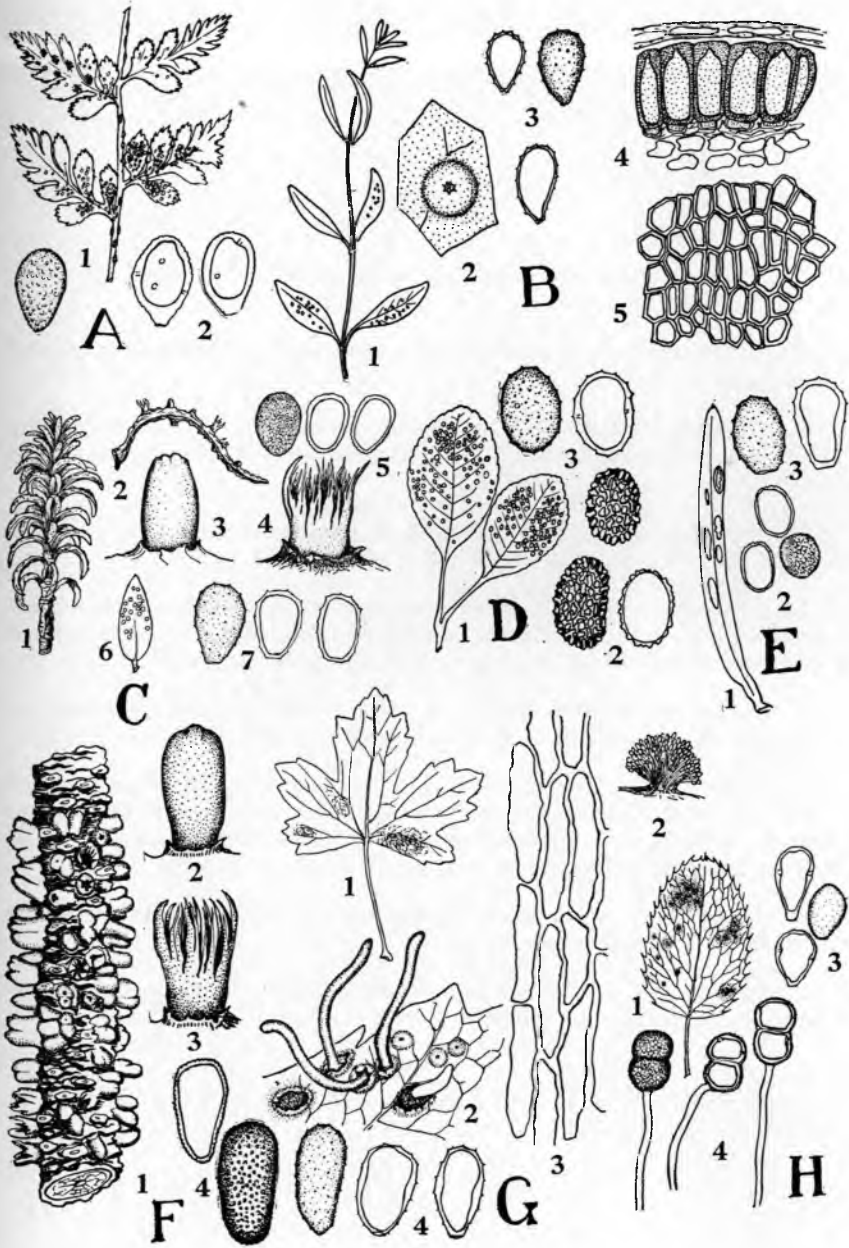


PLATE I

## PLATE II

A. *Phragmidium horkeliae*. on *Ivesia gordonii*. 1. Sori on leaves  $\times 1$ ; 2. Teliospores  $\times 600$ .

B. *Phragmidium jonesii* on *Ivesia gordonii*. 1. Teliospores  $\times 600$ ; 2. Urediospores  $\times 600$ .

C. *Uromyces plumbarius* on *Oenothera caespitosa*. 1. Sori on leaf  $\times 1$ ; 2. A single telial sorus  $\times 20$ ; 3. Urediospores  $\times 600$ ; 4. Teliospores  $\times 600$ .

D. *Puccinia oenotherae* on *Oenothera utahensis*. 1. Sori on stem and leaves  $\times 1$ ; 2. Teliospores  $\times 600$ ; 3. Urediospores  $\times 600$ .

E. *Gymnosporangium clavariaeforme* on *Amelanchier alnifolia*. 1. Aecia on leaf  $\times 1$ ; 2. A cluster of aecial peridia  $\times 10$ ; 3. Aecial peridia after dehiscence  $\times 10$ ; 4. A single peridium  $\times 20$ ; 5. Aeciospores  $\times 600$ .

F. *Gymnosporangium betheli* on *Crataegus rivularis*. 1. Aecia on leaf  $\times 1$ ; 2. Aecia on fruit  $\times 1$ ; 3. Aeciospores  $\times 600$ .

G. *Gymnosporangium nelsoni*. 1-3 on *Amelanchier alnifolia*; 1. Aecia on leaves  $\times 1$ ; 2. Cluster of peridia  $\times 10$ ; 3. Aeciospores  $\times 600$ . 4-6 on *Juniperus utahensis*; 4. Galls on branches  $\times 1$ ; 5. Gelatinous sori growing from the galls during wet weather  $\times 1$ ; 6. Teliospores  $\times 600$ .

H. *Nyssospora echinata* on *Ligusticum filicinum*. 1. Sori on stems and leaves  $\times 1$ ; Teliospores  $\times 600$ .

I. Aeciospores of *Puccinia poarum* germinating on the cuticle of *Poa trivialis* and entering the stomata  $\times 475$ . (After Plowright.)

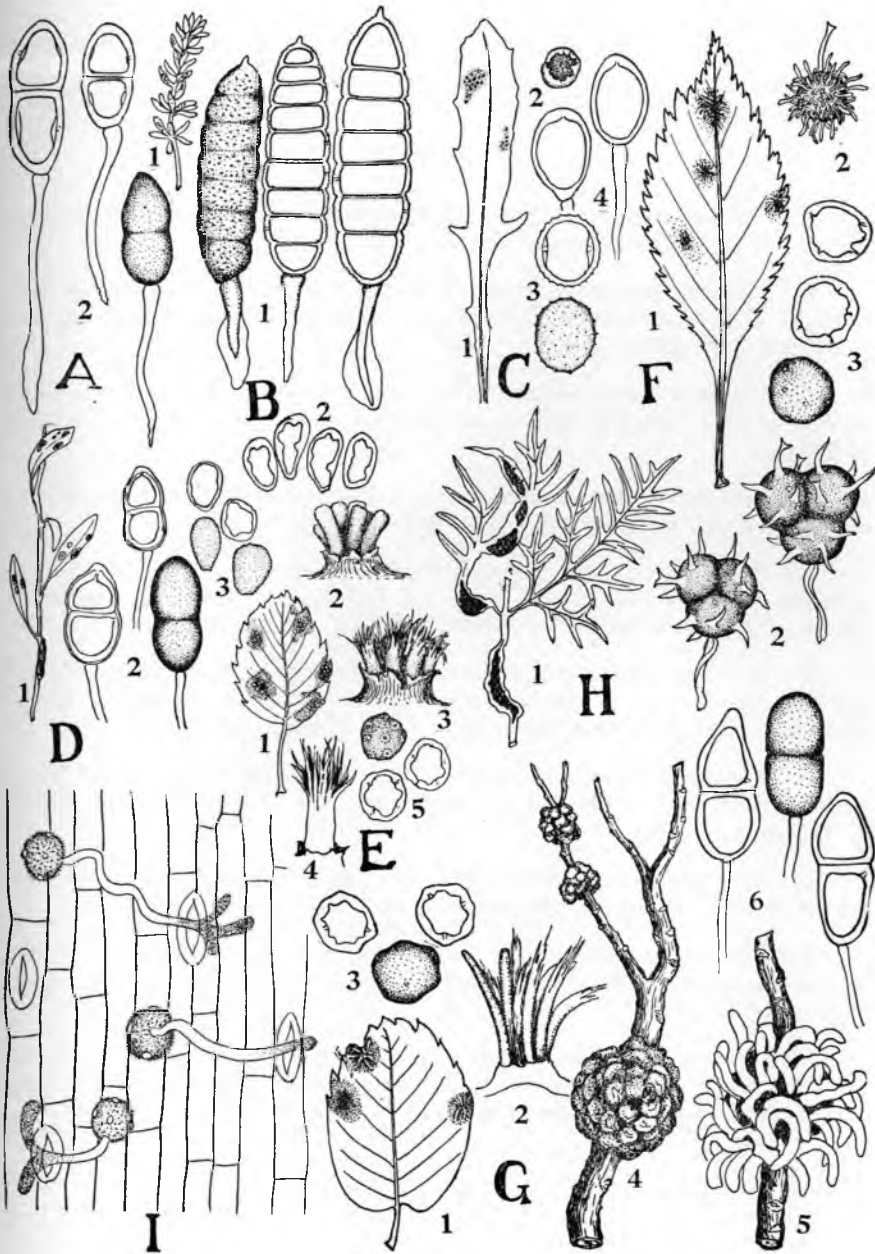


PLATE II

## PLATE III

A. *Puccinia monoica* (Peck) Arth. 1. Telia on *Trisetum subspicatum* Beauv.  $\times 1$ . 2. Teliospores  $\times 600$ .

B. *Puccinia calochorti* Peck. 1. Portion of leaf of *Calochortus nuttallii* T. & G. showing telia above and aecia below  $\times 1$ . 2. Aeciospores  $\times 600$ ; 2. teliospores  $\times 600$ .

C. *Puccinia poae-sudeticae* (Westend.) Jorstad. 1. Portion of leaf of *Poa reflexa* Vasey & Scribn. showing urediosori  $\times 1$ . 2. Urediospores  $\times 600$ .

D. *Puccinia pattersoniana* Arth. 1. Portion of leaf of *Elymus condensatus* Presl. showing telia  $\times 1$ . 2 Teliospores  $\times 600$ .

E. *Puccinia crandallii* Pam. & Hume. 1. Portion of leaf of *Festuca confinis* Vasey showing telia  $\times 1$ . 2. Teliospores  $\times 600$ . 3. Aecia on leaves of *Symphoricarpos vaccinioides* Rydb.  $\times 1$ . 4. Aeciospores  $\times 600$ .

F. *Puccinia extensicola* Plowr. 1. Leaf of *Aster adscendens* Lindl. showing aecia  $\times 1$ . 2. Aeciospores  $\times 600$ . 3. Portion of leaf of *Carex festivella* Mackenzie showing telia  $\times 1$ . 4. Teliospores  $\times 600$ .

G. *Uromyces junci-effusi* Syd. Portion of *Juncus longistylis* Torr showing telia  $\times 1$ . Enlarged sorus of same  $\times 5$ . 3. Urediospores  $\times 600$ . 4. Teliospores  $\times 600$ .

H. *Uromyces heterodermus* Syd. Leaf of *Erythronium grandiflorum parviflorum* S. Wats. showing telia  $\times 1$ . 2 Teliospores  $\times 600$ .

I. *Puccinia schedonnardi* Kellerm. & Sw. 1. Teliospores  $\times 600$ . 2. Urediospores  $\times 600$ . Both taken from *Sporobolus asperifolius* (Nees & Meyen) Thurb.

J. *Puccinia rubigo-vera* (DC.) Wint. 1. Portion of leaf of *Hordeum pusillum* Nutt. showing telia  $\times 1$ . 2. Teliospores  $\times 600$ . 3. Leaf of *Clematis ligusticifolia* Nutt. showing aecia  $\times 1$ . 4. Aeciospores  $\times 600$ .

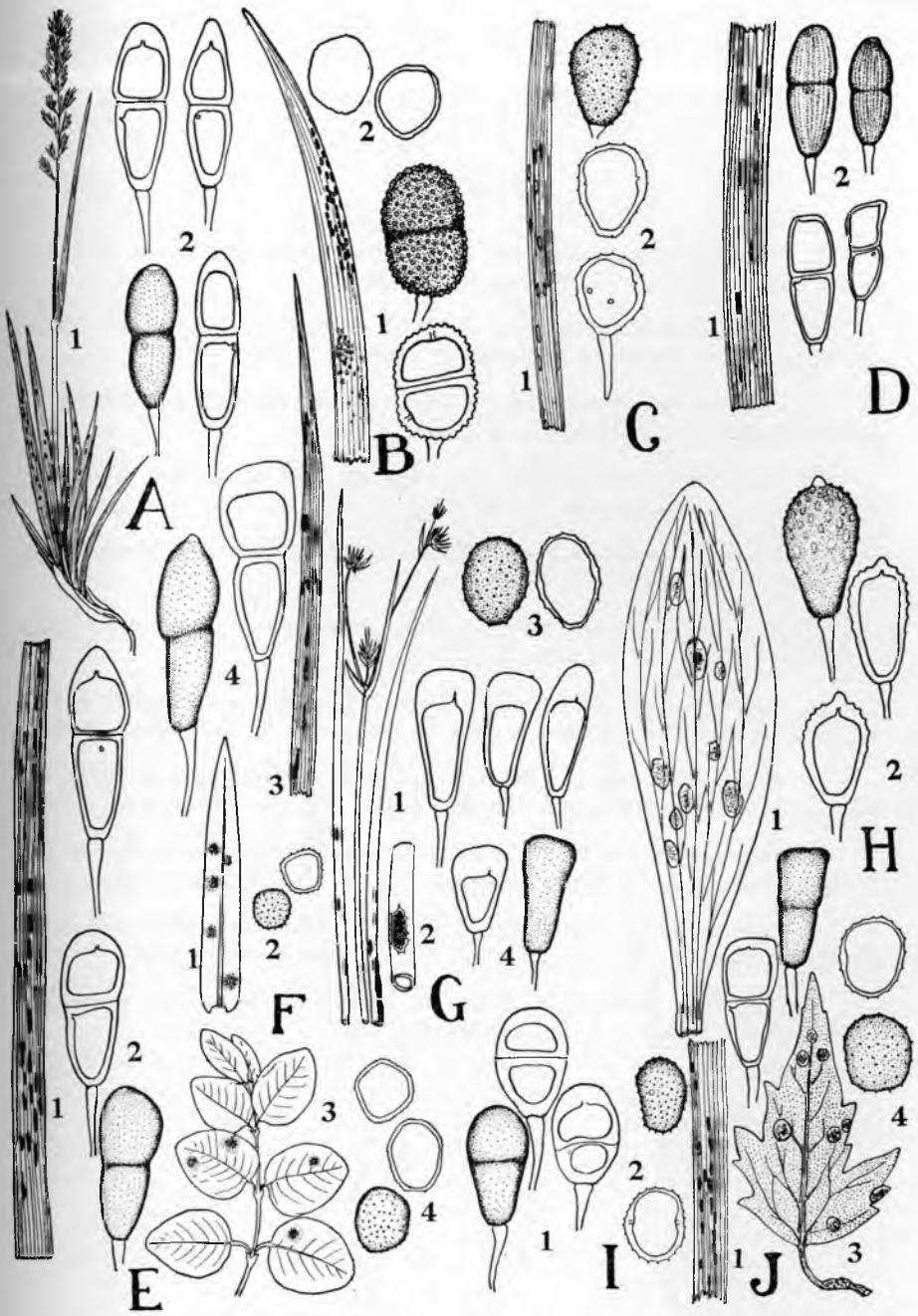


PLATE III

## PLATE IV

A. *Puccinia comandrae* Peck. 1. Telia on stems and leaves of *Comandra pallida* DC.  $\times 1$ . 2. Teliospores  $\times 600$ .

B. *Puccinia treleasiana* Paz. 1. Telia on leaf of *Caltha leptosepala* DC  $\times 1$ . 2. Sori enlarged  $\times 10$ . 3. Teliospores  $\times 600$ .

C. *Puccinia heucherae* (Schw.) Diet. 1. Telia on leaf of *Mitella pentandra* Hook.  $\times 1$ . 2. Teliospores  $\times 600$ .

D. *Puccinia punctata* Link. 1. Telia on leaf of *Galium triflorum* Michx.  $\times 1$ . 2. Teliospores  $\times 600$ .

E. *Puccinia aberrans* Peck. Teliospores from leaves of *Smelowskia americana* Rydb.  $\times 600$ .

F. *Puccinia ranunculi* Blytt. 1. Telia on leaves of *Ranunculus stenolobus* Rydb.  $\times 1$ . 2. Teliospores  $\times 600$ .

G. *Puccinia heucherae* (Schw.) Diet.=(*P. pallido-maculata* E. & E.) 1. Telia on leaf of *Saxifraga arguta* D. Don.  $\times 1$ . 2. Teliospores  $\times 600$ .

H. *Puccinia heucherae* (Schw.) Diet.=(*P. curtipes* Howe). Telia on leaf of *Heuchera parviflora* (Hook.) Nutt.  $\times 1$ . 2. Teliospores  $\times 600$ .

I. *Puccinia drabae* Rud. 1. Telia on leaves of *Draba pectinata* (S. Wats.) Rydb.  $\times 1$ . 2. Same enlarged  $\times 5$ . 3. Teliospores  $\times 600$ .

J. *Puccinia arenariae* (Schum.) Wint. 1. *Arenaria Uintahensis* Nels. showing telia  $\times 1$ . 2. Leaf of same  $\times 2$ . 3. Teliospores  $\times 600$ .

K. *Puccinia Parnassiae* Arth. 1. Leaves of *Parnassia fimbriata* Banks showing telia  $\times 1$ . 2. Teliospores  $\times 600$ .

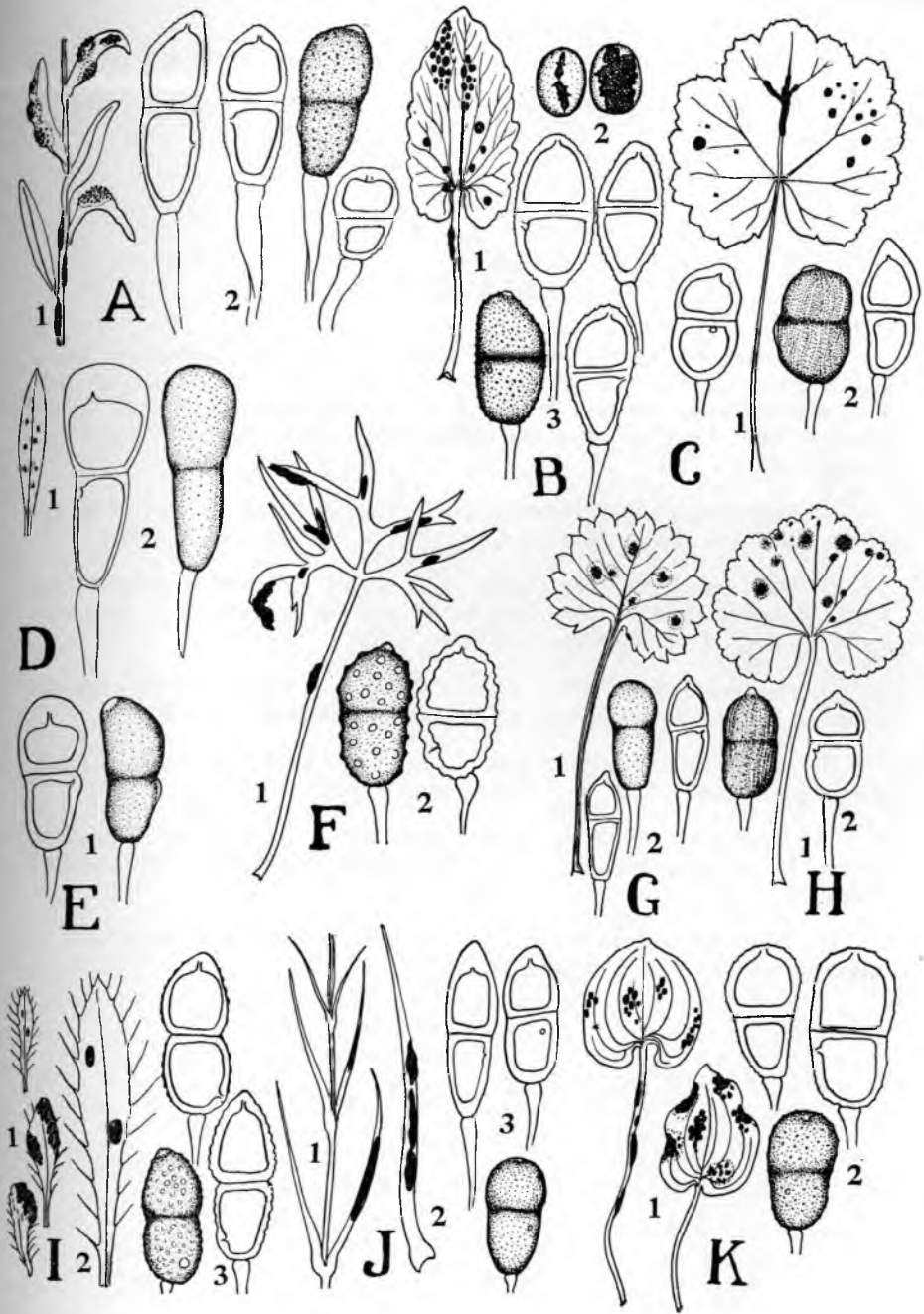


PLATE IV

## PLATE V

A. *Uromyces fabae* (Pers.) de Bary. 1. *Lathyrus utahensis* Jones leaf showing Aecia  $\times 1$ . 2. Leaflet of same showing urediosori  $\times 1$ . 3. Leaflet of same showing telia  $\times 1$ . 4. Urediospores  $\times 600$ . 5. Teliospores  $\times 600$ . Leaf of *Vicia americana* Muhl. showing telia  $\times 1$ ; teliospores  $\times 600$ .

B. *Uromyces hedsari-obscuri* (DC.) Car. & Picc. 1. Leaf of *Hedysarum utahensis* Rydb. showing telia  $\times 1$ . 2. Teliospores  $\times 600$ .

C. *Uromyces intricatus* Cooke. 1. Leaf of *Eriogonum heracleoides* Nutt. showing aecia  $\times 1$ . 2. Leaf of same showing telia  $\times 1$ . 3. aeciospores  $\times 600$ . 4. Teliospores  $\times 600$ .

D. *Puccinia leveilei* Mont. 1 and 2. Leaves of *Geranium richardsonii* Fisch. & Trauty. showing telia  $\times 1$ . 3 and 4. Teliospores  $\times 600$ .

E. *Uromyces occidentalis* Diet. 1. Leaf of *Lupinus parviflorus* Nutt. showing urediosori  $\times 1$ . 2. Urediospores  $\times 600$ .

F. *Uromyces trifolii-repentis* (Liro) Arth. 1. Leaf of *Trifolium repens* L. showing telia  $\times 1$ . 2. Teliospores  $\times 600$ . 3. Urediospores  $\times 600$ .

G. *Puccinia malvacearum* Bert. 1. Leaf of *Malva rotundifolia* L. showing telia  $\times 1$ . 2. Teliospores  $\times 600$ .



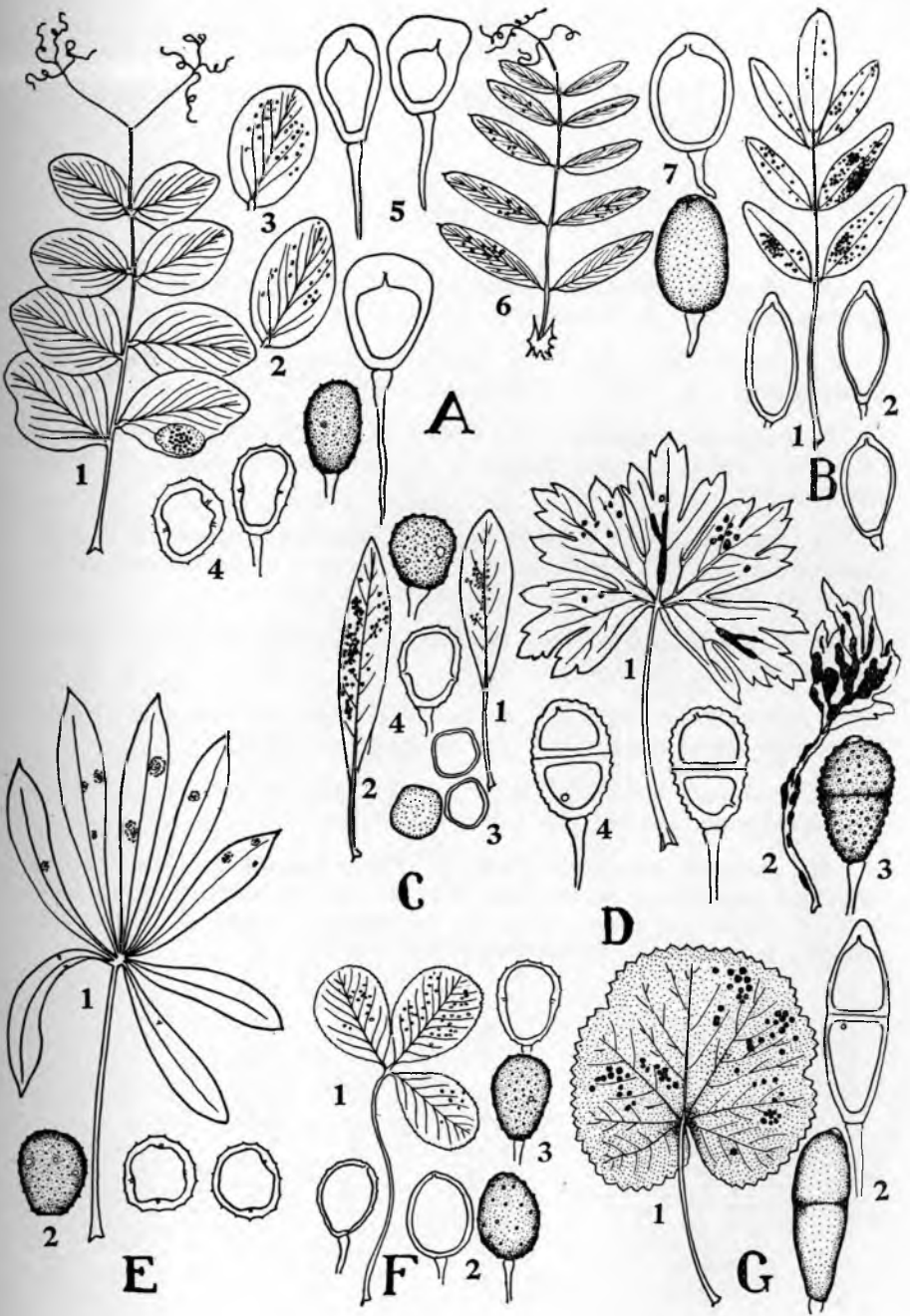


PLATE V

## PLATE VI

A. *Puccinia poromera* Holw. 1. Leaf of *Angelica dilatata* Nels. showing telia  $\times 1$ . 2. Teliospores  $\times 600$ .

B. *Puccinia ellisii* De T. 1. Leaf of *Cynomarathrum nuttallii* Gray showing telia  $\times 1$ . 2 and 3. Teliospores  $\times 600$ .

C. *Puccinia pimpinellae* (Str.) Mart. 1. Leaf of *Osmorrhiza obtusa* (C. & R.) Fern., showing telia  $\times 1$ . 2. Urediospores  $\times 600$ . 3. Teliospores  $\times 600$ .

D. *Puccinia jonesii* Peck 1. Leaf of *Lomatium platycarpum* C. & R. showing aecia  $\times 1$ . 2. Aeciospores  $\times 600$ . 3. Leaf of *Leptotaenia multifida* Nutt. showing telia  $\times 1$ . 4. Teliospores  $\times 600$ .

E. *Puccinia menthae* Pers. 1. Leaf of *Mentha canadensis* L. showing telia  $\times 1$ . 2. Teliospores  $\times 600$ .

F. *Melampsora bigelowii* Thüm. 1. Leaf of *Salix caudata* (Nutt.) Heller showing urediosori  $\times 1$ . 2. Urediospores  $\times 600$ .

G. *Puccinia fergussoni* B. & Br. 1. Leaf of *Viola nephrophylla* Greene showing telia  $\times 1$ . 2. Teliospores  $\times 600$ .

H. *Puccinia plumbaria* Peck. 1. *Phlox longifolia* Nutt. showing effect of aecial stage on the host  $\times 1$ . 2. Leaf of same showing aecia  $\times 3$ . 3. Detail of aecia  $\times 20$ . 4. Aeciospores  $\times 600$ . 5. Same host showing telia  $\times 1$ . 6. Teliospores  $\times 600$ .

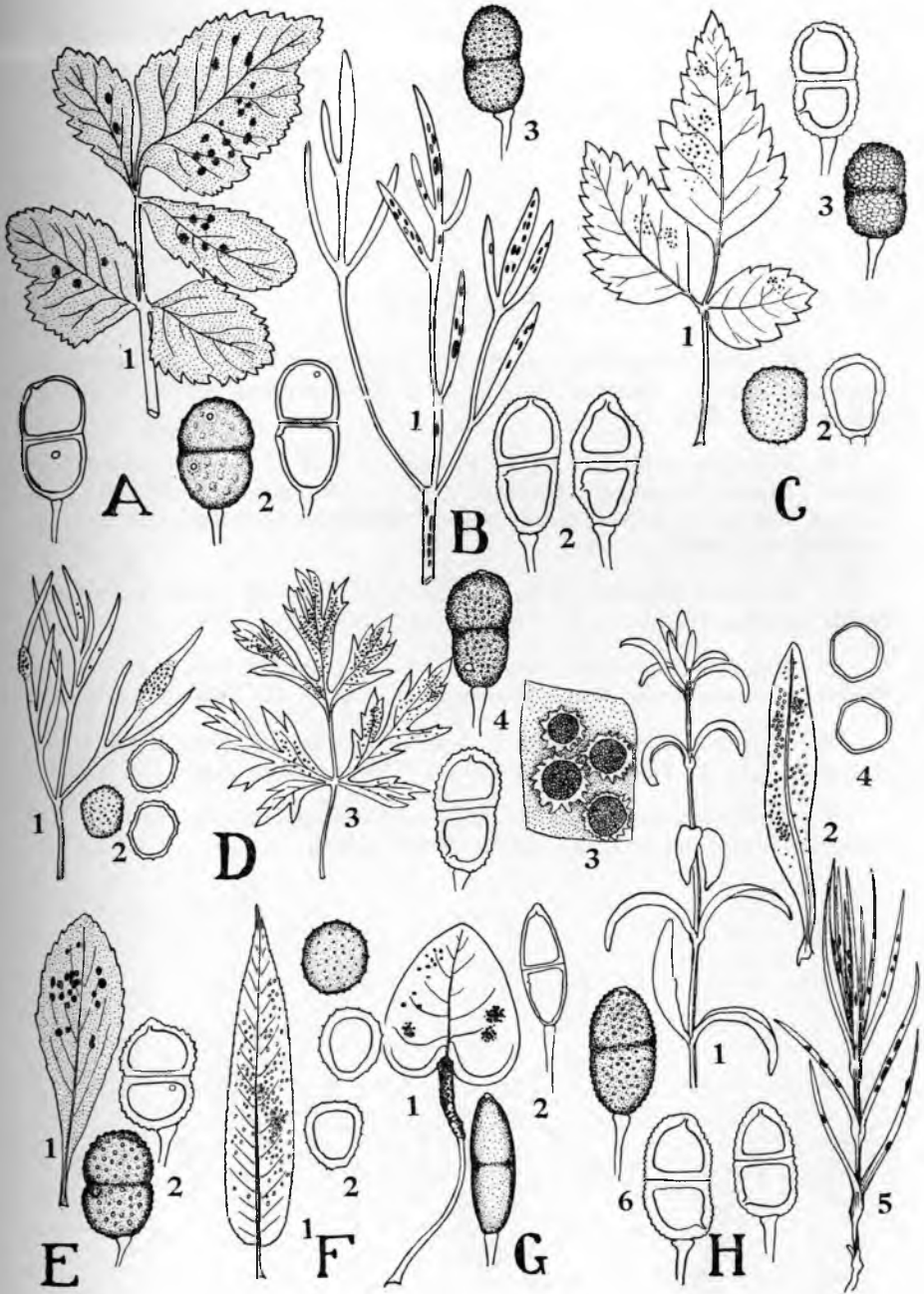


PLATE VI

## PLATE VII

A. *Puccinia balsamorhizae* Peck 1. Portion of leaf of *Balsamorhiza macrophylla* Nutt. showing telia  $\times 1$ . 2. Urediospores  $\times 600$ . 3 and 4. Teliospores  $\times 600$ .

B. *Puccinia cirsii* Lasch. 1. Portion of leaf of *Cirsium undulatum* (Nutt.) Spreng. showing urediosori  $\times 1$ . 2. Urediospores  $\times 600$ . 3. Portion of leaf of *C. eatoni* (Gray) B. L. Robinson showing telia  $\times 1$ . 4. Teliospores  $\times 600$ .

C. *Puccinia hieracii* (Schum.) Mart. 1. Leaf of *Crepis acuminata* Nutt. showing telia  $\times 1$ . 2. Teliospores  $\times 600$ .

D. *Puccinia balsamorhizae* Peck = (*P. wyethiae* Peck) 1. Leaf of *Wyethia amplexicaulis* Nutt. showing telia  $\times \frac{1}{2}$ . 2. Teliospores  $\times 600$ .

E. *Puccinia arnicalis* Peck 1. Leaf of *Arnica cordifolia* Hook. showing telia  $\times 1$ . 2. Teliospores  $\times 600$ . 3. Urediospores  $\times 600$ .

F. *Puccinia cnici* Mart. 1. Leaf of *Cirsium lanceolatum* (L.) Hill showing urediosori  $\times 1$ . 2. Urediospores  $\times 600$ .

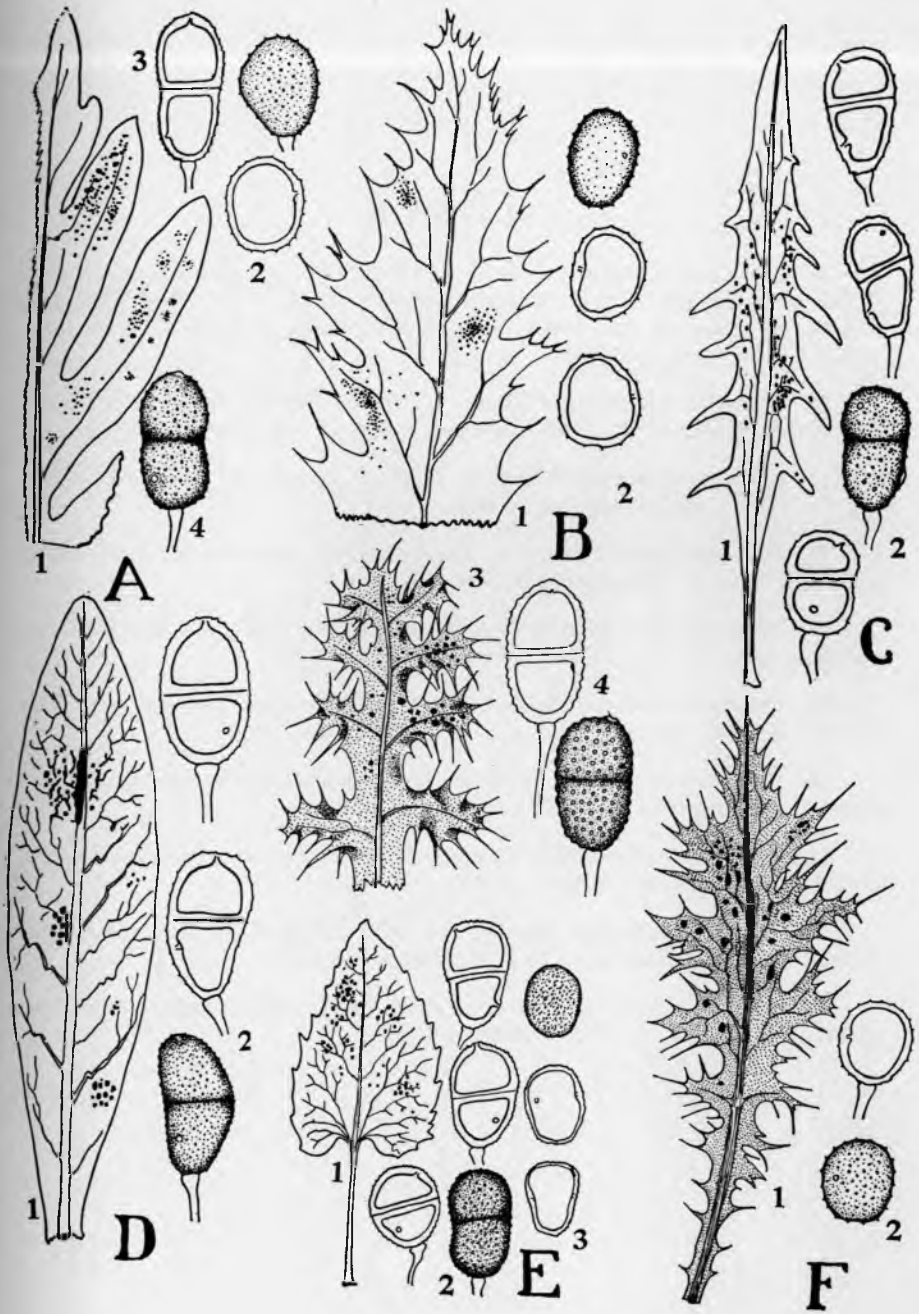


PLATE VII

## PLATE VIII

A. *Puccinia aemulans* Syd. 1. Leaf of *Viguiera multiflora* (Nutt.) Blake showing aecia  $\times 1$ . 2. Detail of the aecia  $\times 10$ . 3. Aeciospores  $\times 600$ . 4. Leaf of the same host showing telia  $\times 1$ . 5. Urediospores  $\times 600$ . 6. Teliospores  $\times 600$ .

B. *Puccinia minussensis* Thum. 1. Leaf of *Lactuca pulchella* (Pursh) DC. showing telia  $\times 1$ . 2. Teliospores  $\times 600$ . 3. Mesospores  $\times 600$ .

C. *Puccinia helianthi* Schw. 1. Leaf of *Helianthus annuus* L. showing telia  $\times 1$ . 2. Teliospores  $\times 600$ .

D. *Puccinia asteris* Duby 1. Leaf of *Aster adscendens* Lindl. showing telia  $\times 1$ . 2. Teliospores  $\times 600$ .

E. *Puccinia subcircinata* E. & E. 1. Leaf of *Senecio crassulus* Gray showing telia  $\times 1$ . 2. Teliospores  $\times 600$ .

F. *Puccinia hieracii* (Schum.) Mart. 1. Leaf of *Agoseris gracilens* (Gray) Kuntze showing telia  $\times 1$ . 2. Teliospores  $\times 600$ .

G. *Puccinia grindeliae* Peck 1. Leaf of *Petradoria pumila* (Nutt.) Greene showing telia  $\times 1$ . 2. Teliospores  $\times 600$ .

H. *Puccinia helianthellae* (Peck) Arth. 1. Teliospores from *Helianthella uniflora* (Nutt.) T. & G.  $\times 600$ .

I. *Puccinia absinthii* (Hedw. f.) DC. 1. Leaf of *Artemisia nova* Nels. showing urediosori  $\times 1$ . 2. Urediospores  $\times 600$ .

J. *Puccinia millefolii* Fckl. 1. Leaves of *Artemisia hookeriana* Bess. showing telia  $\times 1$ . 2. Teliospores  $\times 600$ .

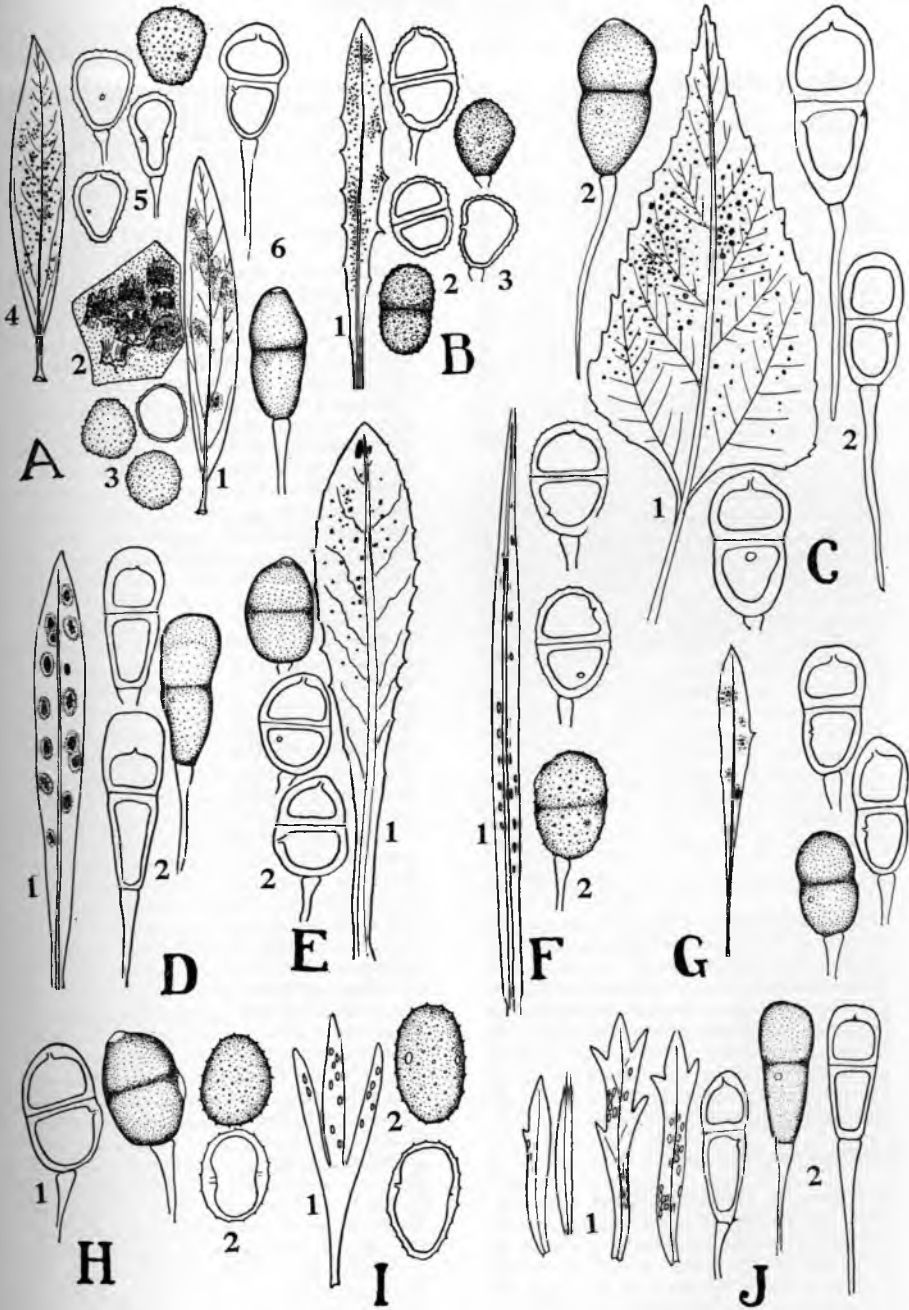


PLATE VIII

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