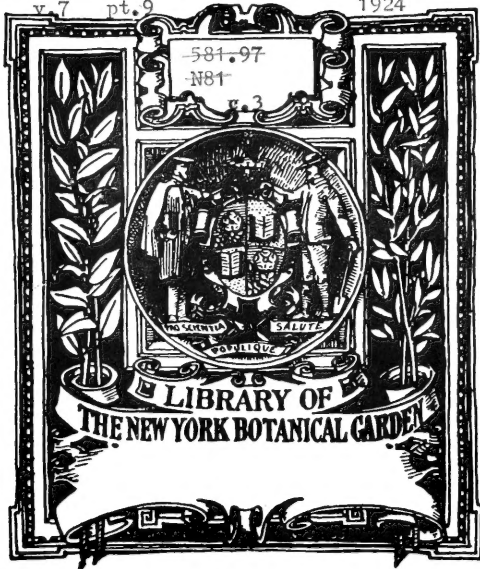


Herb.  
XN  
.072

HERB XN .072

v. 7 pt. 9

1924











VOLUME 7

PART 9

# NORTH AMERICAN FLORA

---

(UREDINALES)

AECIDIACEAE (conclusio)

JOSEPH CHARLES ARTHUR

ADDITIONS AND CORRECTIONS TO UREDINALES



PUBLISHED BY

THE NEW YORK BOTANICAL GARDEN

OCTOBER 29, 1924

HERB  
XN  
.072  
v. 7  
pt. 9



## 3. UREDO.

Uredinia subepidermal, definite, erumpent, sometimes surrounded by paraphyses or peridium. Urediniospores borne singly on pedicels, from which they readily separate, leaving a hilum, 1-celled; wall colored or colorless, echinulate, or in a few species verrucose, the pore one or more, variously disposed. Sometimes accompanied by pycnia, by aecia, or by both.

Genus based upon a concept, and not upon a type species.

- Host belonging to family Pinaceae.  
 Host belonging to family Araceae.  
 Host belonging to family Commelinaceae.  
 Host belonging to family Dioscoreaceae.  
 Host belonging to family Iridaceae.  
 Host belonging to family Orchidaceae.  
 Sori superficial; hyphae emerging through stomata.  
 Sori subepidermal, erumpent.  
 Urediniospore-wall rather thin (1.5-2.5  $\mu$ ).  
 Urediniospore-wall rather thick (2-3  $\mu$ ).  
 Sori round, tardily naked.  
 Sori small; urediniospores 23-29  $\mu$  long.  
 Sori large, bullate; urediniospores 29-37  $\mu$  long.  
 Sori large and flat, early naked.  
 Host belonging to family Piperaceae.  
 Host belonging to family Artocarpaceae.  
 Paraphyses short and inconspicuous.  
 Paraphyses united at bases into a membrane.  
 Host belonging to family Loranthaceae.  
 Host belonging to family Polygonaceae.  
 Host belonging to family Chenopodiaceae.  
 Urediniospores large (32-42  $\mu$ ), with wall thicker above.  
 Urediniospores smaller (23-29  $\mu$ ), with wall uniform.  
 Host belonging to family Amaranthaceae.  
 Urediniospores echinulate, with 2 pores.  
 Urediniospores verrucose, with 3 or 4 pores.  
 Host belonging to family Petiveriaceae.  
 Host belonging to family Corrigiolaceae.  
 Host belonging to family Annonaceae.  
 Host belonging to family Amygdalaceae.  
 Host belonging to family Mimosaceae.  
 Host belonging to family Caesalpiniaceae.  
 Urediniospore-wall 1  $\mu$  thick below, 2-4  $\mu$  above.  
 Urediniospore-wall uniformly thick.  
 Urediniospores large (26-29  $\mu$ ), wall cinnamon-brown.  
 Urediniospores smaller (19-26  $\mu$ ), wall nearly colorless.  
 Host belonging to family Geraniaceae.  
 Host belonging to family Erythroxylaceae.  
 Host belonging to family Meliaceae.  
 Host belonging to family Polygalaceae.  
 Host belonging to family Euphorbiaceae.  
 Urediniospore-wall cinnamon-brown, pores 3.  
 Urediniospore-wall nearly colorless, pores obscure.  
 Host belonging to family Ochnaceae.  
 Host belonging to family Clusiaceae.  
 Host belonging to family Bixaceae.  
 Host belonging to family Flacourtiaceae.  
 Host belonging to family Loasaceae.  
 Host belonging to family Lythraceae.  
 Host belonging to family Onagraceae.  
 Host belonging to family Sapotaceae.  
 Urediniospore-wall hygroscopic, tuberculate.  
 Urediniospore-wall firm, echinulate.  
 Urediniospore-wall uniformly thin (1.5-2  $\mu$ ).  
 Urediniospore-wall thick (2-3  $\mu$ ), thicker above.  
 Host belonging to family Convolvulaceae.  
 Host belonging to family Hydrophyllaceae.  
 Host belonging to family Lamiaceae; urediniospore-pores basal.  
 Urediniospore-wall thicker above, pores 2.  
 Urediniospore-wall uniformly thick.  
 Urediniospore-pores 1.  
 Urediniospore-pores 2.  
 Host belonging to family Solanaceae.  
 Host belonging to family Scrophulariaceae.  
 Host belonging to family Rubiaceae.  
 Uredinia with peripheral paraphyses.  
 Uredinia without paraphyses.  
 Urediniospore-wall pale-yellow.  
 Urediniospore-wall cinnamon-brown.
1. *U. Holwayi*.
  2. *U. Anthurii*.
  3. *U. Commelinae*.
  4. *U. Dioscoreae*.
  5. *U. nominata*.
  6. *U. Behnickiana*.
  7. *U. Gynandrearum*.
  8. *U. pustulata*.
  9. *U. Guacae*.
  10. *U. nigropuncta*.
  11. *U. Piperis*.
  12. *U. rubescens*.
  13. *U. Artocarpi*.
  14. *U. Phorodendri*.
  15. *U. Cocolobae*.
  16. *U. Grayiae*.
  17. *U. Spirostachydis*.
  18. *U. Cyathulae*.
  19. *U. maculans*.
  20. *U. panamensis*.
  21. *U. Paronychia*.
  22. *U. Cherimoliae*.
  23. *U. Licaniae*.
  24. *U. curvata*.
  25. *U. Hymenaeae*.
  26. *U. lutea*.
  27. *U. bauhinicola*.
  28. *U. unilateralis*.
  29. *U. Erythroxyloni*.
  30. *U. Trichiliae*.
  31. *U. peribebuensis*.
  32. *U. Saviae*.
  33. *U. jatrophicola*.
  34. *U. Sawagesiae*.
  35. *U. Clusiae*.
  36. *U. Bixae*.
  37. *U. recondita*.
  38. *U. floridana*.
  39. *U. Cupheae*.
  40. *U. Fuchsiae*.
  41. *U. Lucumae*.
  42. *U. Sapotae*.
  43. *U. amicaea*.
  44. *U. laeticolor*.
  45. *U. contraria*.
  46. *U. sphaelicola*.
  47. *U. degener*.
  48. *U. biporula*.
  49. *U. Nicotianae*.
  50. *U. cumula*.
  51. *U. sabiceicola*.
  52. *U. Hameliae*.

- Uredinospore-wall very thin, 1  $\mu$ .  
 Uredinospore-wall thicker, 1-1.5  $\mu$ .  
 Host belonging to family Valerianaceae.  
 Host belonging to family Carduaceae.  
 Uredinia without paraphyses.  
 Uredinospore-wall colorless (tribe Vernoniae).  
 Uredinospore-wall cinnamon- or chestnut-brown.  
 Uredinospore-wall thick, 2-2.5  $\mu$  (tribe Eupatorieae).  
 Uredinospore-wall thin, 1-2  $\mu$  (tribe Heliantheae).  
 Uredinospores medium-size, 24-29  $\mu$  long.  
 Uredinospores small, 18-22  $\mu$  long.  
 Uredinia with prominent paraphyses (tribe Mutisieae).
53. *U. Rondeletiae*.  
 54. *U. Cephalanthi*.  
 55. *U. Reicheana*.  
 56. *U. Sparganophori*.  
 57. *U. suspecta*.  
 58. *U. vicina*.  
 59. *U. Garcilassae*.  
 60. *U. Wilsoni*.

### 1. *Uredo Holwayi* Arth. Bull. Torrey Club 33: 518. 1906.

O. Pycnia hypophyllous, numerous, scattered, inconspicuous, subcuticular, pale-yellow becoming brownish, discoidal or sometimes columnar, 80-112  $\mu$  in diameter by 40-70  $\mu$  high.

II. Uredinia hypophyllous, from a limited mycelium, in two rows on yellow spots occupying part or all of a leaf, subepidermal, round or oval, 0.1-0.3 mm. across, brownish-yellow, dehiscent by a small central orifice, ruptured epidermis not noticeable; paraphyses united to form a hemispheric pseudoperidium, free at the orifice, clavate-capitate, 10-14  $\mu$  wide, the wall 3-4  $\mu$  thick; uredinospores broadly ellipsoid or obovoid, 15-19 by 21-26  $\mu$ ; wall nearly colorless, rather thick, 2-3  $\mu$ , conspicuously or moderately echinulate below, finely echinulate or smooth above, the pores about 4, scattered, obscure.

#### ON PINACEAE:

*Tsuga heterophylla* (Raf.) Sarg., Alaska, Idaho, Montana; British Columbia.

*Tsuga Mertensiana* (Bong.) Carr., British Columbia.

TYPE LOCALITY: Glacier, British Columbia, on "*Tsuga Mertensiana*," error for *T. heterophylla*.  
 DISTRIBUTION: Northern Idaho and British Columbia to southeastern Alaska.

### 2. *Uredo Anthurii* (Hariot) Sacc. Syll. Fung. 11: 229. 1895.

*Caeoma Anthurii* Hariot, Jour. de Bot. 6: 458. 1892.

II. Uredinia chiefly hypophyllous, scattered, or somewhat grouped on slightly discolored spots, bullate, the membranous epidermis tardily breaking away, pale, somewhat pulverulent, 0.5-0.8 mm. across; peridium and paraphyses none; uredinospores irregularly obovoid, 18-26 by 29-37  $\mu$ ; wall colorless or nearly so, thin, 1-1.5  $\mu$ , moderately echinulate, the pores obscure.

#### ON ARACEAE:

*Anthurium scandens* (Aubl.) Engler, Porto Rico.

TYPE LOCALITY: Greenhouses of Jardin des Plantes in Paris, on *Anthurium* sp.

DISTRIBUTION: Porto Rico; also in greenhouses of France.

### 3. *Uredo Commelyneae* Kalchbr. Grevillea 11: 24. 1882.

II. Uredinia hypophyllous, scattered, round or mammillose, 0.1-0.4 mm. in diameter, dark cinnamon-brown, long covered by the epidermis, finally opening by a small central pore; paraphyses united by their bases and imbricated to form a pseudoperidium, clavate or capitate, 8-12  $\mu$  wide, the wall colorless or golden-brown, thickened up to 4  $\mu$ , frequently thinner on one side, smooth; uredinospores angular-ellipsoid, 15-23 by 19-29  $\mu$ ; wall colorless, thin, 1-2  $\mu$ , closely and finely echinulate or verrucose-echinulate, the pores obscure.

#### ON COMMELINACEAE:

*Commelina elegans* H.B.K., Porto Rico; St. Thomas.

*Commelina longicaulis* Jacq., Porto Rico.

TYPE LOCALITY: Port Natal, South Africa, on *Commelina* sp.

DISTRIBUTION: West Indies; also in South Africa and South America.

### 4. *Uredo Dioscoreae* P. Henn. Hedwigia 35: 255. 1896.

II. Uredinia mostly hypophyllous, scattered or circinating on pale discolored spots in groups 2-3 mm. in diameter, roundish, small, 0.2-0.6 mm. across, early naked, pulverulent, yellow or light cinnamon-brown, ruptured epidermis evident; uredinospores globose or obovoid, 16-24 by 23-31  $\mu$ ; wall colorless or pale-yellow, 1-2  $\mu$  thick, moderately and strongly echinulate, the pores equatorial, obscure.

## ON DIOSCOREACEAE:

*Dioscorea polygonoides* H. & B., Porto Rico.*Dioscorea* sp., Cuba.*Rajania cordata* L., Cuba; Porto Rico.TYPE LOCALITY: Rio de Janeiro, Brazil, on *Dioscorea grandiflora*.

DISTRIBUTION: West Indies; also in South America and Asia.

5. *Uredo nominata* Arth. Bull. Torrey Club 49: 194. 1922.

II. Uredinia amphigenous, grouped upon discolored areas 5–10 mm. across, oblong or linear, 0.4–1.5 mm. long, somewhat tardily naked, pulverulent, light-brown, ruptured epidermis evident; urediniospores ellipsoid or obovoid, 18–23 by 23–32  $\mu$ ; wall light cinnamon-brown, 1.5–2  $\mu$  thick, moderately echinulate, the pores 3 or 4, approximately equatorial.

## ON IRIDACEAE:

*Sisyrrinchium bermudianum* L., Bermuda.TYPE LOCALITY: St. Davids; Bermuda, on *Sisyrrinchium bermudianum*.

DISTRIBUTION: Known only from the type locality.

6. *Uredo Behnickiana* P. Henn. Hedwigia 44: 169. Mr 1905.*Hemileia americana* Masee, Gard. Chron. III. 38: 153. Au 1905.*Uredo americana* Arth. Mycologia 10: 149. 1918.

II. Uredinia hypophyllous, evenly scattered over large, slightly discolored areas, minute, emerging through the stomata, yellowish, pulverulent; urediniospores globose or broadly ellipsoid, 18–21 by 18–24  $\mu$ ; wall colorless or light yellow, thin, 1–1.5  $\mu$ , noticeably echinulate with blunt echinulations, the pores obscure, probably equatorial; pedicels profusely branched.

## ON ORCHIDACEAE:

*Catleya Dowiana* Batem., imported into England from Costa Rica.*Epidendrum vitellinum* Lindl., imported into New Jersey from Mexico*Oncidium Cavendishianum* Batem., imported into England from Guatemala.TYPE LOCALITY: In greenhouses of Kew gardens, England, on *Oncidium Cavendishianum* imported from Guatemala.

DISTRIBUTION: On cultivated plants in greenhouses of New Jersey; also in Europe; probably native of Central America and Mexico.

ILLUSTRATIONS: Gard. Chron. III. 38: f. 53; Grove, Brit. Rust Fungi f. 285.

7. *Uredo Gynandrearum* Corda, Ic. Fung. 3: 3. 1839.

II. Uredinia amphigenous, numerous, early scattered or sometimes confluent over large areas, roundish, 0.4–1 mm. in diameter, rather early naked, pulverulent, yellowish, ruptured epidermis evident; urediniospores broadly ellipsoid or obovoid, 15–21 by 20–26  $\mu$ ; wall 1.5–2.5  $\mu$  thick, sparsely and noticeably echinulate, the pores obscure.

## ON ORCHIDACEAE:

*Habenaria maculosa* Lindl., Cuba; Jamaica; Porto Rico.*Prescottia oligantha* (Sw.) Lindl., Porto Rico.

TYPE LOCALITY: South America, on an unidentified orchid.

DISTRIBUTION: West Indies; also in South America.

ILLUSTRATION: Corda, Ic. Fung. 3: pl. 1, f. 9.

8. *Uredo pustulata* P. Henn. Hedwigia Beibl. 35: 129. 1899.

II. Uredinia amphigenous, scattered, round or oblong, 0.6–1.2 mm. across, tardily naked, yellowish, pulverulent, ruptured epidermis conspicuous; urediniospores obovoid or ellipsoid, 18–23 by 23–29  $\mu$ ; wall colorless or pale-yellow, thick, 2–3  $\mu$ , strongly and sparsely echinulate, the pores obscure.

## ON ORCHIDACEAE:

*Stenorrhynchus lanceolatus* (Aubl.) Griseb., Porto Rico.TYPE LOCALITY: Rio de Janeiro, Brazil, on *Stenorrhynchus* sp.

DISTRIBUTION: Porto Rico; also in South America.

9. *Uredo Guacae* Mayor, Mém. Soc. Neuch. Sci. Nat. 5: 583. 1913.

II. Uredinia hypophyllous, scattered or circinating in groups 3–10 mm. wide, sometimes confluent, round or oblong, bullate, large, 0.5–2 mm. across, tardily naked, orange- or light-

yellow, pulverulent, ruptured epidermis conspicuous; urediniospores obovoid or ellipsoid, 20–27 by 29–37  $\mu$ ; wall colorless or light-yellow, thick, 2.5–3  $\mu$ , sparsely and conspicuously echinulate, the pores probably 2 or 3, equatorial, obscure.

ON ORCHIDACEAE:

*Epidendrum difforme* Jacq., Porto Rico.

*Spathiger rigidus* (Jacq.) Small (*Epidendrum rigidum* Jacq.), Porto Rico.

TYPE LOCALITY: Central Andes, near road to Guaca, Antioquia, Colombia, on *Epidendrum* sp.

DISTRIBUTION: Porto Rico; also in South America.

10. *Uredo nigropuncta* P. Henn. Hedwigia 35: 254. 1896.

*Uredo Cyrtopodii* Sydow, Bull. Herb. Boiss. II. 1: 77. 1901.

II. Uredinia hypophyllous, forming conspicuous irregular orange or blackish masses, round or oblong, 1–2 mm. across, rather early naked, pulverulent, cinnamon-brown, ruptured epidermis evident; urediniospores obovoid or ellipsoid, 20–25 by 24–32  $\mu$ ; wall brownish-yellow, thick, 2–3  $\mu$ , sparsely and coarsely verrucose-echinulate, the pores 3, equatorial.

ON ORCHIDACEAE:

*Bletia patula* Hook., Cuba; Porto Rico.

*Bletia purpurea* (Lam.) DC., Florida; Bahamas; Haiti.

TYPE LOCALITY: Rio Janeiro, Brazil, on "*Stanhopea* sp.," error for *Cyrtopodium punctatum*.

DISTRIBUTION: Southern Florida and the West Indies; also in South America.

11. *Uredo Piperis* P. Henn. Hedwigia Beibl. 38: 70. 1899.

II. Uredinia amphigenous, numerous, scattered or circinating on discolored areas, round, 0.3–0.6 mm. across, rather tardily naked, somewhat pulverulent, dirty cinnamon-brown, ruptured epidermis conspicuous; urediniospores obovoid or ellipsoid, 16–21 by 21–26  $\mu$ ; wall colorless, 1–1.5  $\mu$  thick, sparsely and prominently echinulate, the pores obscure.

ON PIPERACEAE:

*Peperomia hernandifolia* (Vahl) A. Dietr., Porto Rico.

TYPE LOCALITY: Rio de Janeiro, Brazil, on *Piper* sp.

DISTRIBUTION: West Indies; also in South America.

12. *Uredo rubescens* Arth. Mycologia 7: 327. 1915.

II. Uredinia hypophyllous, irregularly grouped on indefinite pale spots, round, small, 0.2–0.4 mm. across, soon naked, as if by a central pore, ruptured epidermis scarcely noticeable; paraphyses peripheral, cylindrical, hyphoid, incurved, scarcely rising above the spore-mass, the wall colorless, smooth; urediniospores ellipsoid, 18–24 by 24–32  $\mu$ ; wall pale cinnamon-brown, 1–2  $\mu$  thick, rather closely and strongly echinulate, the pores obscure.

ON ARTOCARPACEAE:

*Dorstenia Contrajerva* L., Guatemala; Salvador; Porto Rico.

*Dorstenia Houstoni* L., Guatemala.

TYPE LOCALITY: Camuy, Porto Rico, on *Dorstenia Contrajerva*.

DISTRIBUTION: Porto Rico and Guatemala; also in South America.

13. *Uredo Artocarpi* Berk. & Br. Jour. Linn. Soc. 14: 93. 1873.

*Physoella* (?) *Artocarpi* Arth. N. Am. Flora 7: 103. 1907.

II. Uredinia hypophyllous, thickly scattered over wide areas, or somewhat gregarious, bullate, round, small, 0.1–0.2 mm. across, dehiscent by a central pore, overarching epidermis persistent; paraphyses colorless, delicate, hyphoid, at the sides of the sorus uniting to form a membrane with polygonal cells above; urediniospores ellipsoid or obovoid, 16–23 by 18–26  $\mu$ ; wall colorless or pale-yellow, 1–1.5  $\mu$  thick, moderately and noticeably echinulate, the pores probably 2, approximately equatorial, obscure.

ON ARTOCARPACEAE:

*Artocarpus Camansi* Blancò, Porto Rico.

*Artocarpus communis* Forst., Porto Rico.

*Artocarpus incisa* L., Cuba.

*Castilloa elastica* Cerv., Cuba.

TYPE LOCALITY: Ceylon, on *Artocarpus Lakoocha*.

DISTRIBUTION: West Indies; also in India.

14. *Uredo Phorodendri* H. S. Jackson, Brookl. Bot. Gard. Mem.  
1: 285. 1918.

II. Uredinia amphigenous, gregarious, not crowded, punctate, rounded or slightly elongate, 0.4–0.8 mm. across, tardily naked, somewhat pulverulent, bright-orange, dehiscent by an elongate or lacerate fissure of the epidermis, ruptured epidermis remaining firm and persistent; peridium membranous, at first hemispheric, remaining closely adherent to the ruptured epidermis, the cells colorless, isodiametric or somewhat rhomboidal, 14–19  $\mu$  across, the wall 1–1.5  $\mu$  thick, smooth; urediniospores ellipsoid or obovoid, 17–33 by 26–32  $\mu$ ; wall colorless, 1.5–2.5  $\mu$  thick, very closely and minutely echinulate, the pores 10–12, scattered, very indistinct.

ON LORANTHACEAE:

*Phoradendron longispicum* Trel., California.

*Phoradendron villosum* Nutt., Oregon.

TYPE LOCALITY: Corvallis, Oregon, on *Phoradendron villosum*.

DISTRIBUTION: Western Oregon to northern California.

15. *Uredo Coccolobae* P. Henn. Hedwigia 35: 253. 1896.

II. Uredinia mostly hypophyllous, numerous, scattered, minute, about 0.1–0.3 mm. across, punctiform, tardily naked, opening by a central pore, pulverulent, appearing as a rusty discoloration, ruptured epidermis conspicuous; paraphyses encircling the sorus imbricated into a pseudoperidium, clavate or sometimes capitate, 9–10 by 27–50  $\mu$ , the wall colorless, thickened up to 5  $\mu$  at apex, smooth; urediniospores ellipsoid, 21–24 by 29–37  $\mu$ ; wall pale-yellow or colorless, 1–1.5  $\mu$  thick, frequently somewhat thickened at hilum, finely and closely echinulate, the pores about 4, scattered, obscure.

ON POLYGONACEAE:

*Coccolobis Uvifera* (L.) Jacq., Florida; Cuba; Porto Rico.

TYPE LOCALITY: Rio de Janeiro, Brazil, on *Coccolobis populifolia*.

DISTRIBUTION: Southern Florida and the West Indies; also in South America.

EXSICCATI: Barth. N. Am. Ured. 1930.

16. *Uredo Grayiae* Arth. Bull. Torrey Club 34: 591. 1907.

II. Uredinia amphigenous, scattered, sometimes confluent, roundish, 0.5–1 mm. across, soon naked, pulverulent, chocolate-brown, ruptured epidermis somewhat noticeable; urediniospores ellipsoid or obovate-ellipsoid, 19–23 by 32–42  $\mu$ ; wall dark cinnamon-brown, somewhat lighter below, rather thick, 2–2.5  $\mu$ , slightly thicker above, 2.5–3.5  $\mu$ , moderately and noticeably echinulate above, smooth along the sides, the pores 8, in two transverse zones, equidistant from the equator.

ON CHENOPODIACEAE:

*Grayia spinosa* (Hook.) Moq. (*G. polygaloides* H. & A.), Nevada.

TYPE LOCALITY: Fallon, Nevada, on *Grayia spinosa*.

DISTRIBUTION: Known only from the type locality.

17. *Uredo Spirostachydis* Arth. Bull. Torrey Club 37: 576. 1910.

II. Uredinia cauliculous, scattered or irregularly grouped, roundish, 0.4–0.8 mm. across, rather tardily naked, pulverulent, cinnamon-brown, ruptured epidermis conspicuous; urediniospores ellipsoid, 18–21 by 23–29  $\mu$ ; wall cinnamon-brown, 2–2.5  $\mu$  thick, moderately and rather finely echinulate, the pores 6–8, scattered, somewhat obscure.

ON CHENOPODIACEAE:

*Allenrolfea occidentalis* (S. Wats.) Kuntze (*Spirostachys occidentalis* S. Wats.), Arizona.

TYPE LOCALITY: North Yuma, Arizona, on *Spirostachys occidentalis*.

DISTRIBUTION: Known only from the type locality.

18. *Uredo Cyathulae* Mayor, Mém. Soc. Neuch. Sci. Nat.

5: 584. 1913.

II. Uredinia hypophyllous, scattered or confluently circinating in groups 2–10 mm. wide on slightly discolored spots, round or oblong, 0.5–2 mm. across, early naked, compact becoming pulverulent, dark cinnamon- or chestnut-brown, ruptured epidermis conspicuous;

urediniospores broadly ellipsoid, 23–26 by 26–29  $\mu$ ; wall light chestnut- or golden-brown, about 3  $\mu$  thick, sparsely and strongly echinulate, the pores usually 2 and approximately equatorial.

ON AMARANTHACEAE:

*Cyathula achyranthoides* (H.B.K.) Moq., Panama.

TYPE LOCALITY: Near Honda, Cundinamarca, Colombia, on *Cyathula achyranthoides*.

DISTRIBUTION: Panama; also in South America.

ILLUSTRATION: Mém. Soc. Neuch. Sci. Nat. 5: f. 89.

19. *Uredo maculans* Pat. & Gaill. Bull. Soc. Myc. Fr. 4: 98. 1888.

II. Uredinia amphigenous, scattered or confluently circinating in groups 3–8 mm. wide on slightly discolored areas, round or oblong, 0.5–3 mm. across, early naked, pulverulent, dark cinnamon-brown, ruptured epidermis somewhat noticeable; urediniospores globoid or broadly-ellipsoid, 23–27 by 24–29  $\mu$ ; wall cinnamon-brown, thick, 3–4  $\mu$ , very closely and finely verrucose, the pores 3 or 4, approximately equatorial.

ON AMARANTHACEAE:

*Achyranthes Williamsii* Standley, Panama.

*Achyranthes* sp., Costa Rica.

TYPE LOCALITY: Caracas, Venezuela, on *Amaranthaceae*.

DISTRIBUTION: Central America; also in South America.

20. *Uredo panamensis* Arth. Bull. Torrey Club 45: 155. 1918.

II. Uredinia hypophyllous, rarely epiphyllous, crowded and often confluent in circular groups, round or oval, 0.2–0.8 mm. across, early naked, pulvinate, cinnamon-brown, ruptured epidermis evident; urediniospores globoid or broadly ellipsoid, 20–27 by 24–31  $\mu$ ; wall cinnamon-brown, thick, 2–3  $\mu$ , very closely and finely echinulate, the pores distinct, 3, approximately equatorial.

ON PETIVERIACEAE:

*Phytolacca decandra* L., Panama.

TYPE LOCALITY: Panama, on *Phytolacca decandra*.

DISTRIBUTION: Known only from the type locality.

21. *Uredo Paronychiae* H. S. Jackson, sp. nov.

II. Uredinia hypophyllous, solitary, one to few on discolored spots 1–2 mm. across, round, small, 0.2–0.5 mm. in diameter, tardily naked, yellowish-brown, pulverulent, ruptured epidermis conspicuous; urediniospores broadly ellipsoid or globoid, 20–23 by 23–26  $\mu$ ; wall light golden-brown, 2–2.5  $\mu$  thick, closely and evenly verrucose-echinulate, the pores indistinct, 4 to 6, scattered.

ON CORRIGIOLACEAE:

*Paronychia chilensis* DC., California.

Type collected at Lands End, San Francisco, California, on *Paronychia chilensis*, October 15, 1921, W. C. Blasdale 1156.

22. *Uredo Cherimoliae* Lagerh. Bull. Soc. Myc. Fr. 11: 215. 1895.

*Uredo cupulata* Ellis & Ev. Field Mus. Publ. Bot. 2: 16. 1900.

*Physopella Cherimoliae* Arth. Résult. Sci. Congr. Bot. Vienne 338. 1906.

II. Uredinia hypophyllous, numerous, scattered or somewhat aggregated into irregular groups, small, 0.1–0.4 mm. in diameter, early naked, pulverulent, pale-brownish, ruptured epidermis evident; paraphyses surrounding the sorus, somewhat imbricated to form a pseudo-peridium, clavate, contracted near apex, 10–13  $\mu$  wide by 40–50  $\mu$  long, the wall colorless, about 1  $\mu$  thick below, thickened above so as to obliterate the lumen; urediniospores obovoid, 16–19 by 26–31  $\mu$ ; wall pale-yellow, thin, about 1  $\mu$ , finely and rather closely echinulate, the pores obscure.

ON ANNONACEAE:

*Annona Cherimolia* Mill., Florida.

*Annona muricata* L., Cuba.

*Annona reticulata* L., Cuba.  
*Annona squamosa* L., Florida; Cuba.  
*Annona squamosa* × *Cherimolia*, Florida.  
*Annona* sp., Yucatan.

TYPE LOCALITY: Ecuador, on *Annona Cherimolia*.

DISTRIBUTION: Southern Florida; western Cuba and northeastern Yucatan; also in South America.

### 23. *Uredo Licaniae* P. Henn. Hedwigia 34: 99. 1895.

II. Uredinia amphigenous, scattered or indefinitely grouped, round, prominent, 0.2–0.8 mm. in diameter, early naked, pulvinate, lemon-yellow, somewhat pulverulent, ruptured epidermis inconspicuous; paraphyses none; urediniospores obovate-globoid or obovate, 14–20 by 17–26  $\mu$ ; wall pale-yellow or colorless, 1.5  $\mu$  thick, appearing thicker, evenly verrucose-echinulate, the pores obscure, apparently equatorial.

ON AMYGDALACEAE:

*Couepia polyandra* (H.B.K.) Rose, Salvador.

TYPE LOCALITY: Goyaz near Meiaponte, Brazil, on *Licania* sp.

DISTRIBUTION: Southern Salvador; also in South America.

### 24. *Uredo curvata* Arth. Bull. Torrey Club 49: 195. 1922.

II. Uredinia hypophyllous, loosely grouped on slightly discolored areas 3–5 mm. across, round, small, 0.1–0.3 mm. in diameter, soon naked, pulverulent, dark chestnut-brown, ruptured epidermis inconspicuous; paraphyses numerous, peripheral, incurved, hyphoid or somewhat clavate, slender, about 7 by 30  $\mu$ , colorless below, light chestnut-brown above, sometimes one- or two-septate; urediniospores obovate, 14–16 by 26–32  $\mu$ , very strongly incurved; wall chestnut-brown, uniformly thin, 1  $\mu$ , with one indistinct pore on the concave side below the equator, evenly echinulate-verrucose.

ON MIMOSACEAE:

*Inga vera* Willd., Cuba.

TYPE LOCALITY: San Diego de los Baños, Cuba, on *Inga vera*.

DISTRIBUTION: Known only from the type locality.

### 25. *Uredo Hymenaeae* Mayor, Mém. Soc. Neuch. Sci. Nat. 5: 585. 1913.

II. Uredinia hypophyllous, numerous, scattered or loosely grouped on brownish spots, round, 0.3–0.7 mm. across, opening by an irregular central break in the overarching epidermis, pulverulent, dark cinnamon-brown; paraphyses none; urediniospores obovoid or ellipsoid, 13–17 by 26–39  $\mu$ ; wall golden- or cinnamon-brown, thin, 1  $\mu$ , thicker at the apex, 2–4  $\mu$ , moderately echinulate, the pores 2, superequatorial.

ON CAESALPINIACEAE:

*Hymenaea Courbaril* L., Cuba; Porto Rico.

TYPE LOCALITY: Central Andes, between Sabaletas and Titiribi, Antioquia, Colombia, on *Hymenaea* sp.

DISTRIBUTION: West Indies; also in South America.

### 26. *Uredo lutea* Arth. Mycologia 7: 321. 1915.

II. Uredinia hypophyllous, abundantly scattered or in small groups on discolored spots, pustular, 0.3–0.7 mm. across, long covered by the brown overarching epidermis, finally sparingly pulverulent; paraphyses none; urediniospores irregularly ellipsoid or obovoid, 19–21 by 26–29  $\mu$ ; wall cinnamon-brown, about 1.5  $\mu$  thick, moderately echinulate, the pores usually indistinct, 2 or rarely 3, equatorial.

ON CAESALPINIACEAE:

*Chamaefistula antillana* Britt. & Rose, Porto Rico.

TYPE LOCALITY: Porto Rico, on "*Cassia quinquangulata*," error for *Chamaefistula antillana*.

DISTRIBUTION: Porto Rico.

27. *Uredo bauhiniicola* P. Henn. Hedwigia 34: 98. 1895.

II. Uredinia hypophyllous, scattered or sometimes circinating in groups 2-3 mm. wide and confluent, on dark-brown circular spots, roundish, 0.2-0.7 mm. across, rather tardily naked, pulverulent, yellowish or dirty-gray, ruptured epidermis evident; urediniospores ellipsoid or obovoid, 15-18 by 19-26  $\mu$ ; wall colorless or light-yellow, 1.5-2.5  $\mu$  thick, moderately and noticeably echinulate, the pores obscure, probably equatorial.

## ON CAESALPINIACEAE:

*Bauhinia heterophylla* Kunth, Cuba.

TYPE LOCALITY: Goyaz, Brazil, on *Bauhinia rubiginosa*.

DISTRIBUTION: Cuba; also in South America.

EXSICCATI: Barth. N. Am. Ured. 2183.

28. *Uredo unilateralis* Arth. Bull. Torrey Club 45: 155. 1918.

II. Uredinia hypophyllous, in groups 2-4 mm. across, more or less circinating, or scattered, round, 0.2-0.8 mm. in diameter, soon naked, cinnamon-brown, somewhat pulverulent, ruptured epidermis evident; urediniospores broadly obovoid or spatulate-obovoid, flattened or concave on one side, 20-26 by 26-32  $\mu$ ; wall cinnamon-brown, 1-2  $\mu$  thick, sparsely and noticeably echinulate except on concave side which is smooth, with one pore on concave side, subequatorial, sometimes near the hilum.

## ON GERANIACEAE:

*Geranium mexicanum* H.B.K., Mexico (state).

TYPE LOCALITY: Amecameca, Mexico, on *Geranium mexicanum*.

DISTRIBUTION: Known only from the type locality.

EXSICCATI: Barth. N. Am. Ured. 2481.

29. *Uredo Erythroxylois* Graz. Bull. Soc. Myc. Fr. 7: 152. 1891.

II. Uredinia hypophyllous, numerous, scattered, small, 0.2-0.5 mm. across, roundish, cinnamon-brown, tardily erumpent, ruptured epidermis conspicuous; urediniospores angularly ellipsoid, obovoid, or pyriform, 17-23 by 21-30  $\mu$ ; wall cinnamon-brown above, much paler below, uniformly thin, 1  $\mu$ , sparsely echinulate above becoming smooth toward the base, the pores 2 or 3, approximately equatorial or scattered.

## ON ERYTHROXYLACEAE:

*Erythroxylois areolatum* L., Mona Island.

*Erythroxylois brevipipes* DC., Porto Rico.

*Erythroxylois havanense* Jacq., Cuba.

TYPE LOCALITY: Bolivia, on *Erythroxylois Coca*.

DISTRIBUTION: West Indies; also in South America.

EXSICCATI: Barth. Fungi Columb. 2287.

30. *Uredo Trichiliae* Arth. Mycologia 9: 90. 1917.

II. Uredinia caulicolous or hypophyllous, on etiolated shoots and on midrib and veins, oblong or linear, 0.5-3.5 mm. long, numerous, soon naked, pulverulent, bright-yellow, ruptured epidermis evident; peridium and paraphyses none; urediniospores obovoid or ellipsoid, small, 13-15 by 16-23  $\mu$ ; wall colorless or nearly so, thin 1-1.5  $\mu$ , closely and finely echinulate, the pores obscure.

## ON MELIACEAE:

*Trichilia pallida* Sw., Porto Rico.

TYPE LOCALITY: Maricao along Rio Grande, Porto Rico, on *Trichilia pallida*.

DISTRIBUTION: Porto Rico; also in South America.

31. *Uredo peribebuyensis* Speg. Anal. Soc. Ci. Argent.  
17: 123. 1884.

II. Uredinia caulicolous and hypophyllous, irregularly grouped or sometimes confluent, on light discolored areas, roundish, 0.4-1 mm. across, rather tardily naked, pulverulent, cinnamon-brown, ruptured epidermis noticeable; paraphyses none; urediniospores ellipsoid or obovoid, 19-23 by 24-34  $\mu$ ; wall golden-brown, variable in thickness, 1-2.5  $\mu$ , closely echinulate, the pores 2-4, equatorial, evident.



## ON POLYGALACEAE:

*Polygala americana* Mill., Guatemala.*Polygala Watsoni* Chod. (*P. acicularis* S. Wats.), Chihuahua.TYPE LOCALITY: Cordillera de Peribebuy, Paraguay, on *Moninia* sp.

DISTRIBUTION: Northern Mexico to Guatemala; also in South America.

32. *Uredo Saviae* Arth. & Johnston, Mem. Torrey Club  
17: 168. 1918.

II. Uredinia hypophyllous, scattered, oval or oblong, 0.1–0.3 mm. long, rather early naked, cinnamon-brown, ruptured epidermis usually overarching and conspicuous; urediniospores angularly pyriform or obovoid, 16–21 by 23–29  $\mu$ ; wall cinnamon-brown, about 1  $\mu$  thick, closely echinulate, the pores 3, approximately equatorial, in the angles of the spore.

## ON EUPHORBIACEAE:

*Savia sessiliflora* (Sw.) Willd., Cuba.TYPE LOCALITY: San Juan, Isle of Pines, on *Savia sessiliflora*.

DISTRIBUTION: Known only from the type locality.

33. *Uredo jatrophicola* Arth. Mycologia 7: 331. 1915.

II. Uredinia mostly hypophyllous, crowded or confluent on slightly discolored spots or evenly scattered, bullate-conic, small, 0.1–0.3 mm. in diameter, long covered by the overarching epidermis, opening by a central pore that gradually enlarges; peridium paraphysoid, the paraphyses clavate or capitate with the slender stalks firmly united into an enveloping wall imbricately projecting into the cavity of the sorus, 9–12  $\mu$  broad, the wall about 1  $\mu$  thick and colorless below, 3–7  $\mu$ , and colorless or tinted above, smooth; urediniospores ellipsoid or obovoid-ellipsoid, 16–20 by 24–29  $\mu$ ; wall very pale-yellow or colorless, thin, 1–1.5  $\mu$ , moderately and rather finely echinulate, the pores obscure.

## ON EUPHORBIACEAE:

*Adenoropium angustifolium* (Griseb.) Arth. (*Jatropha angustifolia* Griseb.), Cuba.*Adenoropium gossypifolium* (L.) Pohl (*Jatropha gossypifolia* L.), Cuba; Porto Rico; St. Croix; Santo Domingo.*Curcas Curcas* (L.) Britt. & Millsp. (*Jatropha Curcas* L.), Cuba; Porto Rico; Santo Domingo.TYPE LOCALITY: Hormigueros, Porto Rico, on *Jatropha Curcas*.

DISTRIBUTION: West Indies.

34. *Uredo Sauvagesiae* Arth. Mycologia 8: 23. 1916.

II. Uredinia hypophyllous, grouped on blackish-purple spots, 1–3 mm. across, round, small, 0.1 mm. in diameter, ruptured epidermis prominent, dark cinnamon-brown; urediniospores ellipsoid or obovoid, 17–20 by 24–27  $\mu$ ; wall cinnamon-brown, thin, 1–1.5  $\mu$ , closely and finely echinulate, the pores probably 2, equatorial, indistinct.

## ON OCHNACEAE:

*Sauvagesia erecta* L., Porto Rico.TYPE LOCALITY: Jejome Alto, Porto Rico, on *Sauvagesia erecta*.

DISTRIBUTION: Porto Rico.

35. *Uredo Clusiae* Arth. Mycologia 9: 91. 1917.

II. Uredinia hypophyllous, scattered, mammilliform, 0.3–0.6 mm. across, dark-brown, opening by a central pore or rupture, deep-seated; urediniospores obovoid or ellipsoid, 19–23 by 28–35  $\mu$ ; wall light-yellow, about 1.5  $\mu$  thick, sparsely and strongly echinulate, the markings 1–2  $\mu$  long and 3  $\mu$  apart, the pores obscure.

## ON CLUSIACEAE:

*Clusia rosea* Jacq., Porto Rico.TYPE LOCALITY: Maricao, mountains along Rio Grande, Porto Rico, on *Clusia rosea*.

DISTRIBUTION: Known only from the type locality.

36. *Uredo Bixae* Arth. Mycologia 7: 327. 1915.

II. Uredinia amphigenous, numerous, scattered singly in groups of two to four on small purple spots, very small, about 0.1 mm. across, soon naked, ruptured epidermis inconspicuous;

paraphyses peripheral showing as a whitish circle, rising but little above the surface of the leaf, numerous, incurved, clavate-cylindric, 9–10 by 27–35  $\mu$ , the walls colorless, smooth, the inner thin, 1  $\mu$ , the outer thicker, 2–5  $\mu$ ; urediniospores obovoid, 16–23 by 26–37  $\mu$ ; wall nearly colorless, thin, 1  $\mu$  or less, closely and finely echinulate, the pores obscure.

ON BIXACEAE:

*Bixa Orellana* L., Porto Rico.

TYPE LOCALITY: Adjuntas, Porto Rico, on *Bixa Orellana*.

DISTRIBUTION: Porto Rico.

37. *Uredo recondita* Speg. Bol. Acad. Ci. Cordoba  
23: 186. 1919.

II. Uredinia hypophyllous, scattered, round or oblong, 0.2–0.5 mm. long, tardily naked, opening by irregular splitting of the epidermis, somewhat pulverulent, cinnamon-brown, ruptured epidermis conspicuous; peridium and paraphyses none; urediniospores ellipsoid or oblong, 13–18 by 19–29  $\mu$ ; wall cinnamon-brown, thin, 1  $\mu$ , moderately and conspicuously echinulate, the pores inconspicuous, probably 3 or 4, scattered.

ON FLACOURTIACEAE:

*Myroxylon Salzmanni* (Clos) Kuntze (*Xylosma Salzmanni* Eichl.), Costa Rica.

TYPE LOCALITY: Carthago, Costa Rica, on *Xylosma Salzmanni*.

DISTRIBUTION: Known only from the type locality.

38. *Uredo floridana* Sydow, Hedwigia Beibl. 40: 129. 1901.

II. Uredinia hypophyllous, in indefinite groups, small, round, soon naked, pulverulent, orange-yellow; peridium and paraphyses none; urediniospores ellipsoid or obovoid, 14–20 by 20–30  $\mu$ ; wall pale-yellow, thin, 1.5–2  $\mu$ , rather sparsely echinulate with blunt conic warts, the pores equatorial, obscure.

ON LOASACEAE:

*Mentzelia cordata* Kellogg, Lower California.

*Mentzelia floridana* Nutt., Florida.

TYPE LOCALITY: Florida on *Mentzelia floridana*.

DISTRIBUTION: Southern Florida and Lower California.

39. *Uredo Cupheae* P. Henn. Hedwigia 34: 99. 1895.

II. Uredinia amphigenous, scattered or loosely grouped, roundish, 0.3–0.7 mm. in diameter, dark cinnamon-brown, rather early naked, pulverulent, ruptured epidermis conspicuous; paraphyses none; urediniospores ellipsoid or obovoid, 15–19 by 21–28  $\mu$ ; wall light cinnamon-brown, often paler below, thin, 1  $\mu$ , moderately echinulate, the pores 2 or 3, equatorial, indistinct.

ON LYTHRACEAE:

*Ginoria americana* Jacq., Cuba.

*Parsonsia Parsonsia* (L.) Britton (*Cuphea Parsonsia* R. Br.), Jamaica; Porto Rico.

TYPE LOCALITY: Goyaz, Brazil, on *Cuphea micrantha*.

DISTRIBUTION: West Indies; also in South America.

40. *Uredo Fuchsiae* Arth. & Holway; Arth. Am. Jour. Bot.  
5: 538. 1918.

II. Uredinia hypophyllous, in small irregular groups 0.5–3 mm. across, round, 0.1–0.2 mm. in diameter, long covered by the epidermis, pulverulent, pale-yellow, ruptured epidermis evident; peridium hemispheric, delicate, opening at first by a small pore, later more or less uncovered, the peridial cells rectangular or rhombic, abutted, the walls colorless, thin, 1  $\mu$ , smooth; urediniospores ellipsoid, 13–16 by 18–24  $\mu$ ; wall colorless, moderately thick, 1–2  $\mu$ , moderately and rather inconspicuously echinulate, the pores obscure.

ON ONAGRACEAE:

*Fuchsia splendens* Zucc., Guatemala.

*Lopezia hirsuta* Jacq., Costa Rica; Guatemala.

TYPE LOCALITY: Volcan de Agua, Antigua, Guatemala, on *Fuchsia splendens*.

DISTRIBUTION: Central America.

41. *Uredo Lucumae* Arth. & Johnston, Mem. Torrey Club  
17: 169. 1918.

O. Pycnia amphigenous, numerous, on spots with the uredinia, subcuticular, brownish, flattish, 80–100  $\mu$  in diameter by 40–60  $\mu$  in height; ostiolar filaments wanting.

II. Uredinia amphigenous, sometimes only hypophyllous, in groups 1–15 mm. across on dark spots, roundish, 0.1–0.3 mm. in diameter, early naked, pulverulent, light chestnut-brown, surrounded and partly covered by the hypertrophied tissues; urediniospores globose or broadly ellipsoid, 29–35 by 35–42  $\mu$ , larger when wet through the swelling of an outer gelatinous covering; wall of two layers, the inner golden- or cinnamon-brown, 2–3  $\mu$  thick, the outer pale, 2–6  $\mu$  thick in water, bearing coarse conic tubercles, the pores 2 or more, scattered or sometimes equatorial, indistinct.

ON SAPOTACEAE:

*Lucuma nervosa* A. DC., Cuba.

TYPE LOCALITY: Santiago de las Vegas, Cuba, on *Lucuma nervosa*.

DISTRIBUTION: Cuba.

42. *Uredo Sapotae* Arth. & Johnston, Mem. Torrey Club  
17: 169. 1918.

II. Uredinia hypophyllous, scattered or gregarious in close groups of a few each on small discolored areas 0.5–1 mm. in diameter, oval, 0.1–0.3 mm. long, rather tardily naked, cinnamon-brown, pulverulent, opening by a lateral rupture of the epidermis which remains as an evident flap; urediniospores with pores in surface view appearing triangular, with pores in optical section broadly obovoid, 18–22 by 21–26  $\mu$ ; wall cinnamon-brown, moderately thick, 1.5–2  $\mu$ , closely echinulate, the pores 2, opposite, close to the hilum.

ON SAPOTACEAE:

*Sapota Achras* Mill. (*Achras Sapota* L.), Bahamas; Bermuda; Cuba.

TYPE LOCALITY: Santiago de las Vegas, Cuba, on *Achras Sapota*.

DISTRIBUTION: Islands from Bermuda to Cuba.

EXSICCATI: Barth. N. Am. Ured. 2184.

43. *Uredo amicosae* Arth. Bull. Torrey Club 46: 121. 1919.

II. Uredinia hypophyllous, scattered, bullate, 0.2–0.4 mm. in diameter, opening by a central pore; paraphyses thickly imbricated, the united bases forming a tissue-like lining to the sides of the sorus, the long free ends cylindrical or fusiform-cylindrical, 10–16 by 67–112  $\mu$ , acuminate or acute, the wall colorless, thickened to nearly or quite obliterate the lumen; urediniospores pedicellate, angularly oblong, ellipsoid, or obovoid, 23–24 by 40–60  $\mu$ ; wall golden-brown, 2–3  $\mu$  thick, sometimes twice as thick at apex, sparsely and strongly echinulate, the pores obscure, possibly 3 or 4 and equatorial.

ON SAPOTACEAE:

*Chrysophyllum Cainito* L., Porto Rico.

TYPE LOCALITY: Mesas near Mayagüez, Porto Rico, on *Chrysophyllum Cainito*.

DISTRIBUTION: Known only from the type locality.

44. *Uredo laeticolor* Arth. Bull. Torrey Club 47: 473. 1920.

*Uredo Operculinae* Arth. Mycologia 9: 95. 1917. Not *U. Operculinae* Sydow, 1913.

II. Uredinia hypophyllous, in small crowded groups on slightly discolored spots, or scattered singly, bullate, small, light cinnamon-brown, opening by a small rupture of the over-arching epidermis; peridium and paraphyses none; urediniospores obovoid or oblong-obovoid, 14–23 by 23–29  $\mu$ ; wall pale-brownish or nearly colorless, thin, about 1  $\mu$ , finely and closely echinulate, the pores obscure.

ON CONVULVACEAE:

*Operculina dissecta* (Jacq.) House (*Impomoea dissecta* Pursh), Cuba; Porto Rico.

TYPE LOCALITY: Yauco, along railroad east, Porto Rico, on *Operculina dissecta*.

DISTRIBUTION: West Indies.

45. *Uredo contraria* Arth. Bull. Torrey Club 47: 472. 1920.

II. Uredinia hypophyllous, scattered, round, minute, 0.1–0.3 mm. in diameter, early naked, yellow, very pulverulent, ruptured epidermis inconspicuous; urediniospores oblong or obovate-oblong, 20–24 by 27–35  $\mu$ ; wall colorless, 1.5–2  $\mu$  thick, finely and rather sparsely echinulate, the pores obscure.

## ON HYDROPHYLLACEAE:

*Phacelia californica* Cham., California.

*Phacelia tanacetifolia* Benth., California.

TYPE LOCALITY: Carmel, California, on *Phacelia tanacetifolia*.

DISTRIBUTION: Coast of central California in vicinity of the type locality.

46. *Uredo sphacelicola* Dietel & Holway; Dietel, Erythea 1: 248. 1893.

II. Uredinia amphigenous, scattered or circinating on pale discolored spots, round, 0.4–2 mm. in diameter, early naked, cinnamon-brown, pulverulent or sometimes appearing pulvinate, ruptured epidermis evident; urediniospores oblate-spheroid or sometimes ellipsoid, 26–31 by 23–34  $\mu$ ; wall dark cinnamon-brown, 1–1.5  $\mu$  thick, sometimes thickened above to 2.5  $\mu$ , moderately echinulate, markings sometimes more conspicuous above, the pores 2, opposite or nearly so, basal.

## ON LAMIACEAE:

*Sphacele calycina* Benth., California.

TYPE LOCALITY: Mt. Tamalpais, California, on *Sphacele calycina*.

DISTRIBUTION: Known only from the type locality.

EXSICCATI: Barth. N. Am. Ured. 584; Ellis & Ev. Fungi Columb. 560, 766; Ellis & Ev. N. Am. Fungi 3149, 3249.

47. *Uredo degener* (Mains & Holway) Arthur.

*Puccinia* (?) *degener* Mains & Holway; Arth. Am. Jour. Bot. 5: 482. 1918.

II. Uredinia hypophyllous, scattered or crowded in small groups, round, 0.1–0.3 mm. in diameter, early naked, pulverulent, cinnamon-brown, ruptured epidermis evident; urediniospores broadly obovoid, globoid or flattened-globoid, 19–23 by 19–25  $\mu$ ; wall light cinnamon-brown, thin, 1–1.5  $\mu$ , moderately and rather prominently echinulate, with one pore, subequatorial, usually 5–7  $\mu$  from the hilum.

## ON LAMIACEAE:

*Salvia albiflora* Mart. & Gal. (?), Guatemala.

TYPE LOCALITY: Road from Quezaltenango to Colomba, Guatemala, on *Salvia albiflora* (?).

DISTRIBUTION: Known only from the type locality.

48. *Uredo biporula* Arth. Bull. Torrey Club 46: 121. 1919.

II. Uredinia hypophyllous, scattered or somewhat crowded, round, 0.2–0.3 mm. in diameter, early naked, pulverulent, dark cinnamon-brown, ruptured epidermis inconspicuous; urediniospores triangular-obovoid, 21–23 by 23–26  $\mu$ ; wall dark cinnamon-brown, 1–2  $\mu$  thick, moderately echinulate, the pores 2, basal on opposite sides of the hilum.

## ON LAMIACEAE:

*Salvia fulgens* Cav., Mexico (state).

TYPE LOCALITY: Amecameca, Mexico, on *Salvia fulgens*.

DISTRIBUTION: Known only from the type locality.

49. *Uredo Nicotianae* Arth.; Blasdale, Univ. Calif. Publ. Bot. 7: 141. 1919.

II. Uredinia mostly hypophyllous, scattered upon discolored areas 1–1.5 cm. across, round, 0.2–0.5 mm. in diameter, early naked, appanate, pulverulent, pale-cinnamon to whitish, ruptured epidermis evident; urediniospores globoid or broadly ellipsoid, 23–26 by 24–32  $\mu$ ; wall colorless, 1.5–3  $\mu$  thick, closely and coarsely verrucose, the pores obscure.

## ON SOLANACEAE:

*Nicotiana Bigelovii* S. Wats., California.

TYPE LOCALITY: Rionido, California, on *Nicotiana Bigelovii*.

DISTRIBUTION: Known only from the type locality.

50. *Uredo cumula* Arth. Bull. Torrey Club 49: 195. 1922.

II. Uredinia amphigenous, somewhat aggregate or scattered, round, applanate, small, 0.1–0.4 mm. across, soon naked, pulverulent, cinnamon-brown, conspicuous, ruptured epidermis noticeable; urediniospores broadly ellipsoid or obovate, small, 18–20 by 22–25  $\mu$ ; wall pale cinnamon-brown, thin, 1  $\mu$  or less, finely echinulate, the pores 2, equatorial, indistinct.

## ON SCROPHULARIACEAE:

*Buchnera elongata* Sw., Cuba.

TYPE LOCALITY: Herradura, Cuba, on *Buchnera elongata*.

DISTRIBUTION: Known only from the type locality.

51. *Uredo sabiceicola* Arth. Mycologia 7: 323. 1915.

II. Uredinia hypophyllous, scattered singly in groups of 2–5 on small discolored spots 0.5–1 mm. across, round, small, 0.1–0.3 mm. in diameter, dull cinnamon-brown; paraphyses peripheral, numerous, incurved, clavate, stout, 10–12 by 19–25  $\mu$ , the wall colorless, thin, 0.5  $\mu$ , somewhat thickened on the outer convex part, 1.5–2  $\mu$ , smooth; urediniospores obovoid, 16–23 by 25–29  $\mu$ ; wall golden-yellow, thin, 1  $\mu$ , moderately verrucose-echinulate, the pores obscure.

## ON RUBIACEAE:

*Sabicea hirsuta* H.B.K., Porto Rico.

TYPE LOCALITY: Mayagüez, Porto Rico, on "*Sabicea aspera*," error for *S. hirsuta*.

DISTRIBUTION: Porto Rico; also in South America.

52. *Uredo Hameliae* Arth. Mycologia 8: 23. 1916.

II. Uredinia amphigenous, loosely grouped on indefinite, slightly paler spots, 1–1.5 cm. across, applanate, round, 0.2–0.6 mm. in diameter, pale cinnamon-brown; urediniospores globoid or obovoid, 15–21 by 19–24  $\mu$ ; wall pale-yellow, thin, 1  $\mu$ , distinctly and moderately echinulate, the pores possibly 2 and equatorial, obscure.

## ON RUBIACEAE:

*Hamelia erecta* Jacq. (*H. patens* Jacq.), Costa Rica; Porto Rico.

TYPE LOCALITY: Lajos, Porto Rico, on *Hamelia patens*.

DISTRIBUTION: Porto Rico and Central America.

53. *Uredo Rondeletiae* Arth. & Holway; Arth. Am. Jour. Bot.

5: 539. 1918.

II. Uredinia hypophyllous, scattered, round, 0.1–0.4 mm. across, early naked, pulverulent, cinnamon-brown, ruptured epidermis evident; peridium and paraphyses none; urediniospores obovoid-reniform, 13–21 by 23–29  $\mu$ ; wall cinnamon-brown, thin, 1  $\mu$ , closely echinulate, the pores obscure.

## ON RUBIACEAE:

*Rondeletia cordata* Benth., Guatemala.

TYPE LOCALITY: Guatemala City, Guatemala, on *Rondeletia cordata*.

DISTRIBUTION: Known only from the type locality.

54. *Uredo Cephalanthi* Arth. Bull. Torrey Club 29: 231. 1902.

II. Uredinia mostly hypophyllous, diffusely scattered, irregularly bullate, small, 0.1–0.4 mm. across, rather early naked, pulverulent, pale-yellowish, ruptured epidermis evident; urediniospores ellipsoid or obovoid, 15–20 by 19–26  $\mu$ ; wall very light cinnamon-brown, thin, 1–1.5  $\mu$ , closely echinulate, the pores probably 4, equatorial, obscure.

## ON RUBIACEAE:

*Cephalanthus occidentalis* L., Florida; Cuba.

TYPE LOCALITY: Palmetto, Florida, on *Cephalanthus occidentalis*.

DISTRIBUTION: Southern Florida and Cuba.

55. *Uredo Reicheana* Arthur, sp. nov.

II. Uredinia amphigenous, chiefly hypophyllous, occurring singly or gregarious in groups of 2–4 on angular, yellowish areas 1–4 mm. across, round, rather large, 0.5–0.8 mm. in diameter,

early naked, pulverulent, cinnamon-brown, ruptured epidermis usually noticeable; urediniospores depressed-globoid, 18–22  $\mu$  high by 24–28  $\mu$  wide; wall light cinnamon-brown, 1.5–2  $\mu$  thick, moderately and strongly echinulate, the pores 4–5 around hilum, and one or two in upper part.

ON VALERIANACEAE:

*Valeriana subincisa* Benth., Mexico (state).

Type collected in Federal District, Mexico, February, 1922, K. Reiche, communicated by P. Dietel, February, 1924.

56. *Uredo Sparganophori* P. Henn. Hedwigia 43: 160. 1904.

II. Uredinia amphigenous, scattered singly or in irregular, sometimes circinating groups on brownish discolored spots, bullate, round or oblong, 0.2–0.6 mm. across, rather tardily naked, pulverulent, light yellowish-brown, ruptured epidermis conspicuous; urediniospores ellipsoid or obovoid, 18–23 by 24–31  $\mu$ ; wall colorless, thin, 1–1.5  $\mu$ , moderately or sparsely and strongly echinulate, the pores probably 2, equatorial, obscure.

ON CARDUACEAE:

*Struchium Sparganophorum* (L.) Kuntze (*Sparganophorum Vailantii* Gaert.), Cuba; Jamaica; Porto Rico.

TYPE LOCALITY: Rio Juruá, Santa Clara, Brazil, on *Sparganophorum Vailantii*.

DISTRIBUTION: West Indies; also in South America.

57. *Uredo suspecta* Jackson & Holway; Arth. Mycologia 10: 150. 1918.

II. Uredinia hypophyllous, few, gregarious, scattered or frequently confluent, roundish, 0.2–0.5 mm. across, tardily naked, pulverulent, dark cinnamon-brown, ruptured epidermis conspicuous; urediniospores ellipsoid or obovoid, 26–29 by 30–35  $\mu$ ; wall dark cinnamon-brown, 2–2.5  $\mu$  thick, moderately and prominently echinulate, the pores 2, distinct, opposite and approximately equatorial.

ON CARDUACEAE:

*Eupatorium daleoides* (DC.) Hemsl.?, Costa Rica.

TYPE LOCALITY: Cartago, Costa Rica, on *Eupatorium daleoides*.

DISTRIBUTION: Known only from the type locality.

58. *Uredo vicina* Arth. Mycologia 7: 325. 1915.

II. Uredinia hypophyllous, scattered, round, 0.3–0.5 mm. across, early naked, pulverulent, dark cinnamon-brown, ruptured epidermis evident; urediniospores globoid, often flattened above, 24–29  $\mu$  in diameter; wall chestnut-brown, 1.5–2  $\mu$  thick, closely echinulate, the pores 3 or 4, equatorial.

ON CARDUACEAE:

*Wedelia lanceolata* DC., Porto Rico.

TYPE LOCALITY: Guanica, Porto Rico, on *Wedelia lanceolata*.

DISTRIBUTION: Porto Rico; also in South America.

59. *Uredo Garcilassae* P. Henn. Hedwigia 43: 160. 1904.

II. Uredinia hypophyllous, scattered, round, small, 0.2–0.5 mm. across, somewhat tardily naked, pulverulent, cinnamon-brown, becoming bare and whitish through scattering of spores, ruptured epidermis not conspicuous; urediniospores broadly ellipsoid or obovate, small, 16–18 by 18–22  $\mu$ ; wall light cinnamon-brown, thin, 1–1.5  $\mu$ , closely and very finely echinulate, the pores 2, approximately opposite and considerably subequatorial.

ON CARDUACEAE:

*Garcilassa rivularis* Poepp. & Endl., Panama.

TYPE LOCALITY: Terapoto, Peru, on *Garcilassa rivularis*.

DISTRIBUTION: Panama; also in South America.

60. *Uredo Wilsoni* Arth. Bull. Torrey Club 37: 577. 1910.

II. Uredinia hypophyllous, scattered, punctiform, 0.1–0.3 mm. across, soon naked, pulverulent, chestnut-brown, ruptured epidermis inconspicuous; paraphyses abundant, peripheral,

cylindric, septate, the walls smooth, colored; urediniospores globose or broadly ellipsoid, 21-25 by 26-29  $\mu$ ; wall light chestnut-brown, rather thick, 2-2.5  $\mu$ , strongly and closely echinate with conic, blunt warts, the pores 2, equatorial and opposite.

## ON CARDUACEAE:

*Anastrophia bahamensis* Urban, Bahamas.

TYPE LOCALITY: Hanna Hill, Long Cay, Bahamas, on *Anastrophia bahamensis*.

DISTRIBUTION: Known only from the type locality.

## EXCLUDED SPECIES

UREDIO AECIDIODES Peck, Ann. Rep. N. Y. State Mus. 24: 88. 1872. (*Uredo Peckii* Thüm. Myc. Univ. 538. 1877). On *Amphicarpa monoica* Ell. (*Falcata comosa* Kuntze), New York. This is *Synchytrium decipiens* Farl.

UREDIO CALIFORNICA Ellis & Ev. Erythraea 1: 205. 1893. On *Vicia gigantea* Hook., Mill Valley, California. This does not belong to the Uredinales; may be a *Gloeosporium*.

## 4. AECIDIUM.

Sori on angiospermous hosts (usually aecia, or in a few cases telia), definite, subepidermal, erumpent, the spore-mass usually surrounded by a peridium; peridium one cell in thickness, cupulate, urceolate or cylindrical, firm or evanescent, opening at the apex, the margin becoming erect or revolute, erose or lacerate, the peridial cells abutted or overlapping, usually smooth without and verrucose within; aeciospores catenulate, one-celled, usually globose, or not much longer than broad; wall colorless, or occasionally colored, verrucose, the pores rarely visible.

Pycnia when present subepidermal, definite, with protruding ostiolar filaments, or occasionally subcuticular, and then without ostiolar filaments.

Genus based upon a concept, and not upon a type species.

- |  |                               |
|--|-------------------------------|
| Host belonging to family Liliaceae.                              | 1. <i>A. anthericicola</i> .  |
| Host belonging to family Dracaenaceae.                           | 2. <i>A. Yuccae</i> .         |
| Host belonging to family Trilliaceae.                            | 3. <i>A. Trillii</i> .        |
| Host belonging to family Amaryllidaceae.                         |                               |
| Aeciospores rather small, 16-20 x 20-27 $\mu$ .                  | 4. <i>A. Zephyranthis</i> .   |
| Aeciospores large, 23-26 x 27-32 $\mu$ .                         | 5. <i>A. modestum</i> .       |
| Host belonging to family Iridaceae.                              | 6. <i>A. residuum</i> .       |
| Host belonging to family Orchidaceae.                            | 7. <i>A. Graebnerianum</i> .  |
| Host belonging to family Urticaceae.                             |                               |
| Aeciospores very small, 10-13 x 13-16 $\mu$ .                    | 8. <i>A. Boehmeriae</i> .     |
| Aeciospores larger, 17-19 x 18-23 $\mu$ .                        | 9. <i>A. libertum</i> .       |
| Host belonging to family Loranthaceae.                           | 10. <i>A. Loranthi</i> .      |
| Host belonging to family Alliaceae.                              |                               |
| Aeciospores small, 15-16 x 16-23 $\mu$ , the wall 1 $\mu$ .      | 11. <i>A. Pisoniae</i> .      |
| Aeciospores larger, 16-19 x 21-28 $\mu$ , the wall 1-1.5 $\mu$ . | 12. <i>A. Mirabilis</i> .     |
| Host belonging to family Ranunculaceae.                          | 13. <i>A. indecismum</i> .    |
| Host belonging to family Berberidaceae.                          | 14. <i>A. Butlerianum</i> .   |
| Host belonging to family Papaveraceae.                           | 15. <i>A. plenum</i> .        |
| Host belonging to family Saxifragaceae.                          | 16. <i>A. Mitellae</i> .      |
| Host belonging to family Caesalpiniaceae.                        | 17. <i>A. Chamaecristae</i> . |
| Host belonging to family Fabaceae.                               | 18. <i>A. Onobrychidis</i> .  |
| Host belonging to family Linaceae.                               | 19. <i>A. Lini</i> .          |
| Host belonging to family Malpighiaceae.                          | 20. <i>A. Byrsonimatis</i> .  |
| Host belonging to family Rutaceae.                               | 21. <i>A. Xanthoxyli</i> .    |
| Host belonging to family Polygalaceae.                           |                               |
| Aeciospores small, 16-20 $\mu$ in diameter.                      | 22. <i>A. renatum</i> .       |
| Aeciospores larger, 18-26 $\mu$ in diameter.                     | 23. <i>A. polygalinum</i> .   |
| Host belonging to family Euphorbiaceae.                          |                               |
| Pycnia subcuticular.   |                               |
| Aeciospores small, 12-18 x 13-19 $\mu$ .                         | 24. <i>A. seriatum</i> .      |
| Aeciospores larger, 15-20 x 16-25 $\mu$ .                        | 25. <i>A. javacuum</i> .      |
| Pycnia subepidermal.   |                               |
| Aeciospore-wall thick, 2-2.5 $\mu$ .                             | 26. <i>A. Mozinnae</i> .      |
| Aeciospore-wall much thinner, 1-1.5 $\mu$ .                      |                               |
| Aeciospores small, 13-16 x 16-19 $\mu$ .                         | 27. <i>A. albicans</i> .      |
| Aeciospores larger, 18-22 x 19-24 $\mu$ .                        | 28. <i>A. Tithymali</i> .     |
| Aeciospore-wall very thin, 1 $\mu$ or less.                      | 29. <i>A. Argithamniae</i> .  |
| Host belonging to family Cyrtillaceae.                           | 30. <i>A. Cyrtillae</i> .     |
| Host belonging to family Hippocastanaceae.                       | 31. <i>A. Aesculi</i> .       |
| Host belonging to family Sapindaceae.                            | 32. <i>A. Reichei</i> .       |
| Host belonging to family Vitaceae.                               | 33. <i>A. mexicanum</i> .     |
| Host belonging to family Tiliaceae.                              | 34. <i>A. Triumphettae</i> .  |

- Host belonging to family Fouquieriaceae.  
 Host belonging to family Thymelaeaceae.  
 Host belonging to family Elaeagnaceae.  
 Host belonging to family Onagraceae.  
 Aeciospores large, with wall 2-3  $\mu$  thick.  
 Aeciospores small, with wall 1  $\mu$  thick.  
 Host belonging to family Ammiaceae.  
 Aecia cupulate, margin revolute.  
 Aecia cylindrical, margin erect.  
 Host belonging to family Apocynaceae.  
 Aeciospore-wall thin, 1-1.5  $\mu$ .  
 Aeciospores large, 16-22  $\mu$  in diameter, the wall evenly thick.  
 Aeciospores small, 14-16  $\mu$  in diameter, the wall thicker above.  
 Aeciospore-wall thick, 2-4  $\mu$ .  
 Aeciospores large, 20-29  $\mu$  in diameter, the wall thicker above.  
 Aeciospores small, 16-25  $\mu$  in diameter, the wall evenly thick.  
 Host belonging to family Convolvulaceae.  
 Host belonging to family Heliotropiaceae.  
 Host belonging to family Boraginaceae.  
 Aeciospores rather small, 13-19 x 17-24  $\mu$ .  
 Aeciospores larger, 19-23 x 23-26  $\mu$ .  
 Host belonging to family Ehretiaceae.  
 Host belonging to family Verbenaceae.  
 Host belonging to family Lamiaceae.  
 Aeciospores small, 17-20 x 19-24  $\mu$ , the wall 1  $\mu$ .  
 Aeciospores larger, 19-23 x 23-29  $\mu$ , the wall 1.5-2.5  $\mu$ .  
 Host belonging to family Solanaceae.  
 Aecia scattered over large areas, systemic.  
 Aecia in limited groups.  
 Aeciospores inconspicuously verrucose.  
 Aeciospores noticeably verrucose.  
 Host belonging to family Scrophulariaceae.  
 Aecia scattered over the whole leaf.  
 Aecia in limited groups.  
 Host belonging to family Bignoniaceae.  
 Host belonging to family Acanthaceae.  
 Host belonging to family Rubiaceae.  
 Aeciospore-wall evenly thick.  
 Aeciospore-wall 1  $\mu$  thick or less.  
 Aeciospore-wall 1-2  $\mu$  thick.  
 Aecia scattered over entire leaf.  
 Aecia in groups.  
 Aeciospore-wall colorless.  
 Aeciospore-wall pale-yellow.  
 Aeciospore-wall much thicker above.  
 Aeciospore-wall cinnamon-brown.  
 Aeciospore-wall colorless.  
 Host belonging to family Caprifoliaceae.  
 Host belonging to family Campanulaceae.  
 Host belonging to family Ambrosiaceae.  
 Host belonging to family Carduaceae.  
 Of the tribe Eupatorieae.  
 Aeciospore-wall evenly thick.  
 Aeciospore-wall 1-1.5  $\mu$  thick.  
 Aeciospore-wall 1  $\mu$  thick.  
 Aeciospore-wall much thicker above.  
 Of the tribe Astereae.  
 Of the tribe Heliantheae.  
 Aeciospore-wall thin, 1-1.5  $\mu$ .  
 Aeciospores large, 24-40  $\mu$  in length.  
 Aeciospores small, 16-27  $\mu$  in length.  
 Peridial cells slightly or not imbricated.  
 Peridial cells strongly imbricated.  
 Aeciospore-wall thick, 2.5-3.5  $\mu$ .  
 Of the tribe Helenieae.  
 Of the tribe Senecioneae.  
 Aeciospore-wall colorless.  
 Aeciospore-wall thin, 1  $\mu$  or less.  
 Aeciospore-wall moderately thick, 1.5-2.5  $\mu$ .  
 Aeciospore-wall very thick, 2.5-3.5  $\mu$ .  
 Aeciospore-wall cinnamon-brown.  
 Of the tribe Mutisieae.  
 Host belonging to family Cichoriaceae.
35. *A. Cannonii*.  
 36. *A. hydnoides*.  
 37. *A. arctoum*.  
 38. *A. Anograe*.  
 39. *A. Betheli*.  
 40. *A. Ligustici*.  
 41. *A. mutum*.  
 42. *A. Apocyni*.  
 43. *A. Thenardiae*.  
 44. *A. leporinum*.  
 45. *A. Thevetiae*.  
 46. *A. Jacquemontiae*.  
 47. *A. guatemalense*.  
 48. *A. Tournefortiae*.  
 49. *A. Borreriae*.  
 50. *A. Cordiae*.  
 51. *A. Verbenae*.  
 52. *A. zonatum*.  
 53. *A. subsimulans*.  
 54. *A. Physalidis*.  
 55. *A. teneris*.  
 56. *A. Lycii*.  
 57. *A. Collinsiae*.  
 58. *A. insulsum*.  
 59. *A. simplicius*.  
 60. *A. Tracyanum*.  
 61. *A. Ixorae*.  
 62. *A. Borreriae*.  
 63. *A. Bouvardiae*.  
 64. *A. abscedens*.  
 65. *A. pulverulentum*.  
 66. *A. Faramaeae*.  
 67. *A. Triostei*.  
 68. *A. Campanulastri*.  
 69. *A. Ivae*.  
 70. *A. arcularium*.  
 71. *A. ampliatum*.  
 72. *A. stetiicola*.  
 73. *A. Keerliae*.  
 74. *A. Wedeliae-hispidae*.  
 75. *A. Batesii*.  
 76. *A. Dahliae*.  
 77. *A. Borrichiae*.  
 78. *A. conspicuum*.  
 79. *A. Mesadeniae*.  
 80. *A. Liabi*.  
 81. *A. praecipuum*.  
 82. *A. huallatinum*.  
 83. *A. Peresiae*.  
 84. *A. columbiense*.

### 1. *Aecidium anthericicola* Arth. Bull. Torrey Club 45: 149. 1918.

O. Pycnia amphigenous, in small orbicular groups, small, honey-yellow becoming chocolate-brown, inconspicuous, subepidermal, flattened-globoid, 80-98 by 64-77  $\mu$ ; ostiolar filaments up to 60  $\mu$  long, not projecting beyond the ostiole.



I. Aecia hypophyllous in annular groups 2-7 mm. across about the pycnia, at first bullate then erect, the margin erose; peridial cells quadrate, 16-20 by 20-26  $\mu$ , abutted or overlapping, the outer wall slightly or no thicker than the inner wall, 3-6  $\mu$ ; aeciospores globoid, 16-20 by 19-23  $\mu$ ; wall colorless, thin, 1.5  $\mu$ , very finely verrucose, appearing smooth when wet.

## ON LILIACEAE:

*Anthericum nanum* Baker, Mexico (state).

TYPE LOCALITY: Dedregal near Talpam, Valley of Mexico, Mexico, on *Anthericum nanum*.

DISTRIBUTION: Known only from the type locality.

## 2. *Aecidium Yuccae* Arth. Bull. Torrey Club 49: 194. 1922.

O. Pycnia amphigenous, in small and crowded groups, inconspicuous, honey-yellow, subepidermal, small, globoid, 80-115  $\mu$  in diameter; ostiolar filaments prominent, 45-65  $\mu$  long, agglutinated into a column.

I. Aecia amphigenous, irregularly arranged in loose groups, cylindric, 0.3-0.5 mm. in diameter, somewhat higher; peridium firm, erect, the margin finely erose; peridial cells angularly globoid or ellipsoid in face view, rectangular or somewhat rhomboidal in section, 16-18 by 23-35  $\mu$ , abutted or slightly overlapping, the outer wall 3-5  $\mu$  thick, smooth, the inner wall thinner, about 2  $\mu$ , finely verrucose; aeciospores globoid or broadly ellipsoid, 16-20 by 19-24  $\mu$ ; wall colorless, thin, 1  $\mu$  or less, very closely and finely verrucose.

## ON DRACAENACEAE:

*Yucca glauca* Nutt., Nebraska.

TYPE LOCALITY: Crawford, Nebraska, on *Yucca glauca*.

DISTRIBUTION: Known only from the type locality.

## 3. *Aecidium Trillii* Burrill, Bot. Gaz. 9: 190. 1884.

O. Pycnia amphigenous, crowded in groups 1-3 mm. across, conspicuous, subepidermal, chestnut- or chocolate-brown, flattened globoid, 112-128  $\mu$  wide by 65-75  $\mu$  high; ostiolar filaments 64-80  $\mu$  long, agglutinated into a column up to 50  $\mu$  in diameter, conspicuous.

I. Aecia hypophyllous, crowded in circular areas about the pycnia, the groups 4-6 mm. in diameter, cupulate, 0.2-0.3 mm. in diameter, 0.1-0.2 mm. high; peridium light yellow, the margin recurved, erose or somewhat lacerate, soon falling apart; peridial cells rhombic in side view, 17-23 by 26-29  $\mu$ , slightly overlapping, the outer wall thick, 7-10  $\mu$ , transversely striate, the inner wall thin, about 1.5  $\mu$ , finely and closely verrucose; aeciospores globoid or ellipsoid, 19-22 by 20-24  $\mu$ ; wall colorless or slightly yellow, thin, 1  $\mu$  or less, very finely and closely verrucose.

## ON TRILLIACEAE:

*Trillium erectum* L., New York.

*Trillium grandiflorum* (Michx.) Salisb., New York.

*Trillium recurvatum* Beck, Illinois.

TYPE LOCALITY: Pine Hills, Union County, Illinois, on *Trillium recurvatum*.

DISTRIBUTION: Local in Illinois and New York.

## 4. *Aecidium Zephyranthis* Shear, Bull. Torrey Club 29: 454. 1902.

O. Pycnia amphigenous, crowded in elliptic groups 1-2 mm. long, conspicuous, subepidermal, honey-yellow becoming chestnut-brown, flattened-globoid, 65-110  $\mu$  in diameter, 50-80  $\mu$  high; ostiolar filaments up to 70  $\mu$  long, agglutinated but spreading out somewhat after emerging from the ostiole to form an inverted top-shaped mass.

I. Aecia amphigenous, crowded about the pycnia in groups 5-10 mm. long, short-cylindric, 0.2 mm. in diameter, 0.2-0.3 mm. high; peridium light-yellow, the margin somewhat recurved, erose; peridial cells rhomboidal in side view, 16-19 by 23-35  $\mu$ , in face view irregularly oblong or elliptic, 13-20  $\mu$  wide, overlapping, the outer wall 7-9  $\mu$  thick, transversely striate, the inner wall 3-4  $\mu$  thick, closely and coarsely verrucose; aeciospores irregularly globoid or ellipsoid, 16-20 by 20-27  $\mu$ ; wall colorless, 1-1.5  $\mu$  thick, closely and very finely verrucose.

## ON AMARYLLIDACEAE:

*Zephyranthes* sp., Mexico (state).

TYPE LOCALITY: Talpam, Valley of Mexico, Mexico, on *Zephyranthes* sp.

DISTRIBUTION: Southern Mexico in vicinity of the type locality.

5. *Aecidium modestum* Arth. Bull. Torrey Club 46: 124. 1919.

O. Pycnia caulicolous, few in groups 1-3 mm. across, inconspicuous, subepidermal, dark-brown, globoid, 160-220  $\mu$  in diameter; ostiolar filaments up to 90  $\mu$  long, projecting only slightly beyond the ostiole.

I. Aecia caulicolous, crowded in elliptic or oblong groups 4-10 mm. long, short-cylindric or laterally compressed, 0.3-0.4 by 0.3-0.7 mm. broad by 0.5-0.7 mm. high; peridium white, erect, erose or somewhat lacerate; peridial cells narrow and seen with difficulty in side view, in face view very irregular in shape, 19-32 by 35-58  $\mu$ , the outer wall thin, about 1-1.5  $\mu$ , almost smooth, the inner and side walls 2-3  $\mu$  thick, closely and prominently verrucose; aeciospores ellipsoid or oblong, 23-26 by 27-32  $\mu$ ; wall colorless, 1-1.5  $\mu$  thick, finely and closely verrucose.

## ON AMARYLLIDACEAE:

*Zephyranthes* sp., Hidalgo.

TYPE LOCALITY: Near Ixmiquilpan, Hidalgo, on *Zephyranthes* sp.

DISTRIBUTION: Known only from the type locality.

6. *Aecidium residuum* Arthur, sp. nov.

O. Pycnia amphigenous, numerous, small, inconspicuous, pale honey-yellow, subepidermal, deep-seated, scarcely protruding above surface of leaf, globoid, 50-80  $\mu$  in diameter; ostiolar filaments few, 30-35  $\mu$  long.

I. Aecia amphigenous, on scarcely discolored spots, usually concentric, large, 0.3-0.5 mm. in diameter, pustulate, deep-seated, the epidermis overarching, opening by a central aperture; peridium fragile, evanescent; peridial cells ovoid in face-view, angularly globoid in section, abutted, 20-24 by 22-26  $\mu$ , the outer wall 5-7  $\mu$  thick, transversely striate, smooth, the inner wall 3-5  $\mu$  thick, coarsely verrucose; aeciospores globoid or broadly ellipsoid, 19-24 by 22-27  $\mu$ ; wall colorless, moderately thick, 1.5-2.5  $\mu$ , finely and prominently verrucose.

## ON IRIDACEAE:

*Sisyrinchium graminoides* Bickn., Oklahoma.

Type collected at Enid, Oklahoma, on *Sisyrinchium graminoides*, November 1, 1919, W. H. Ballamy, communicated by R. S. Kirby

7. *Aecidium Graebnerianum* P. Henn. Hedwigia 37: 273. 1898.

*Aecidium alaskanum* Trel. Harriman Alaska Exp. Crypt. 37. 1904.

O. Pycnia not seen.

I. Aecia usually hypophyllous, crowded in groups 2-4 mm. across, cupulate, 0.3-0.4 mm. in diameter, 0.1-0.2 mm. high; peridium light-yellow, the margin recurved, erose; peridial cells rhombic or rhomboidal, 19-26 by 23-35  $\mu$ , the outer wall thick, 7-12  $\mu$ , transversely striate, the inner wall thinner, 3-5  $\mu$ , closely tuberculate; aeciospores irregularly globoid or ellipsoid, 15-18 by 16-22  $\mu$ ; wall colorless, thin, 1-1.5  $\mu$ , very closely and finely verrucose.

## ON ORCHIDACEAE:

*Cocloglossum bracteatum* (Willd.) Parl. (*Habenaria bracteata* R. Br.), Alaska.

*Limnorchis borealis* (Cham.) Rydb., Montana.

*Limnorchis dilatata* (Pursh) Rydb. (*Habenaria dilatata* Hook.), Alaska, Oregon, Washington.

*Limnorchis leucostachys* (Lindl.) Rydb. (*Habenaria leucostachys* S. Wats.), Alaska, California.

*Limnorchis stricta* (Lindl.) Rydb. (*Habenaria gracilis* S. Wats.), Alaska; British Columbia.

*Limnorchis viridiflora* (Cham.) Rydb. (*Habenaria hyperborea* Coult.), Alaska.

*Orchis aristata* Fisch., Alaska.

TYPE LOCALITY: On the Clukow River, Death Valley, California, on *Habenaria dilatata*.

DISTRIBUTION: Southeastern California, northward into Alaska.

EXSICCATI: Barth. N. Am. Ured. 1401; Sydow, Ured. 1799.

8. *Aecidium Boehmeriae* Arth. Bull. Torrey Club 34: 590. 1907.

O. Pycnia epiphyllous, subepidermal, few in small groups about 1 mm. across, honey-yellow becoming brownish, punctiform, not conspicuous, globoid or depressed-globoid, small, 70-90  $\mu$  in diameter by 50-75  $\mu$  high; ostiolar filaments up to 65  $\mu$  long.

I. Aecia hypophyllous, gregarious, in irregular or sometimes in annular groups 2-10 mm. across, on larger discolored spots, short, small, about 0.1 mm. in diameter, rather pale-yellow;

peridium colorless, margin erose, recurved; peridial cells rhombic or rhomboidal in side view, small, 13-19 by 19-26  $\mu$ , the outer wall thick, 5-7  $\mu$ , transversely striate, smooth, the inner wall thinner, 3  $\mu$ , closely and finely verrucose; aeciospores globoid, often angular, very small, 10-13 by 13-16  $\mu$ ; wall pale-yellow, very thin, 0.5-1  $\mu$ , very finely verrucose, appearing smooth when wet.

## ON URTICACEAE:

*Boehmeria cylindrica* (L.) Willd., District of Columbia, Indiana, Maryland.

TYPE LOCALITY: Takoma Park, District of Columbia, on *Boehmeria cylindrica*.

DISTRIBUTION: Vicinity of the type locality and one locality in central Indiana.

9. *Aecidium libertum* Arth. Bull. Torrey Club 37: 580. 1910.

O. Pycnia hypophyllous, in small groups usually in the points of the teeth, conspicuous, subepidermal, honey-yellow to chestnut-brown, somewhat flattened-globoid, 125-160  $\mu$  in diameter by 95-110  $\mu$  high; ostiolar filaments up to 128  $\mu$  long, projecting in a short, broad column.

I. Aecia hypophyllous, evenly distributed over the whole surface of the leaf, substratum neither thickened nor discolored; peridium short-cylindric, 0.3-0.4 mm. in diameter, margin somewhat recurved, lacerate; peridial cells cuboidal in side view, 13-19 by 23-26  $\mu$ , in face view square or rectangular, 15-23  $\mu$  wide, squarely abutted except a downwardly imbricated outer tooth, the outer wall smooth, 5-7  $\mu$ , the inner wall slightly thinner, 3-4  $\mu$ , and closely verrucose; aeciospores angularly globoid, 17-19 by 18-23  $\mu$ ; wall pale-yellow, thin, 1  $\mu$ , closely and finely verrucose.

## ON URTICACEAE:

*Urtica chamaedryoides* Pursh, Oklahoma.

TYPE LOCALITY: Sapulpa, Oklahoma, on *Urtica chamaedryoides*.

DISTRIBUTION: Known only from the type locality.

10. *Aecidium Loranthis* Thüm. in Lorentz, Veg. Entre Rios 3. 1878.

O. Pycnia amphigenous, in small groups with the aecia, rather inconspicuous, subepidermal, dark-brown, globoid or ellipsoid, 128-190 by 160-270  $\mu$ ; ostiolar filaments 120-160  $\mu$  long, not projecting much beyond the ostiole.

I. Aecia amphigenous, upon somewhat thickened areas of the leaf up to 8 mm. in diameter, cupulate, 0.3-0.6 mm. in diameter, up to 1 mm. high; peridium light-yellow, fragile, soon breaking off; peridial cells rhombic or rhomboidal, 21-26 by 30-42  $\mu$ , abutted or slightly overlapping, the outer wall about 7  $\mu$  thick, transversely striate, the inner wall 4-7  $\mu$ , closely tuberculate; aeciospores globoid, ellipsoid or oblong, 26-35 by 35-45  $\mu$ ; wall colorless, 2-2.5  $\mu$  thick, closely and finely verrucose.

## ON LORANTHIACEAE:

*Psittacanthus calyculatus* (DC.) G. Don, Guatemala.

TYPE LOCALITY: Vicinity of Santa Candida, South America, on *Loranthus uruguensis*.

DISTRIBUTION: Guatemala; also in South America.

11. *Aecidium Pisoniae* Arth. & Johnston, Mem. Torrey Club 17: 161. 1918.

O. Pycnia amphigenous, few, on discolored areas, noticeable, subepidermal, dark chestnut-brown, globoid, 96-128  $\mu$  in diameter; ostiolar filaments 64-80  $\mu$  long.

I. Aecia hypophyllous, crowded in groups 3-5 mm. across, cupulate, 0.1-0.2 mm. in diameter; peridium colorless, the margin erose, somewhat recurved, the peridial cells rhomboidal in longitudinal section, 12-16 by 16-34  $\mu$ , abutted, the wall 1.5-2  $\mu$  thick, the outer smooth, the inner very finely and closely verrucose; aeciospores globoid or oblong, 15-16 by 16-23  $\mu$ ; wall tinted with yellow, thin, about 1  $\mu$ , very finely and closely verrucose.

## ON ALLIONIACEAE:

*Pisonia aculeata* L. (?), Cuba.

TYPE LOCALITY: Ceballos, Cuba, on *Pisonia aculeata*?

DISTRIBUTION: Known only from the type locality.

12. *Aecidium Mirabilis* Dietel & Holway; Holway, Bot. Gaz.  
24: 37. 1897.

O. Pycnia epiphyllous, loosely grouped upon reddish-brown spots about 1 cm. across, noticeable, subepidermal, dark chestnut-brown, slightly flattened-globoid, 95–140  $\mu$  in diameter, 80–95  $\mu$  high; ostiolar filaments up to 30  $\mu$  long, not projecting beyond the ostiole.

I. Aecia hypophyllous, crowded in groups about 1 cm. across, cylindrical, 0.3–0.4 mm. in diameter, 0.7–0.9 mm. high; peridium yellow, the margin recurved, lacerate; peridial cells rhomboidal, 18–23 by 29–32  $\mu$ , slightly overlapping, the outer wall thick, 7–10  $\mu$ , finely transversely striate, the inner wall thinner, 3–4  $\mu$ , very closely and strongly verrucose; aeciospores ellipsoid or oblong, 16–19 by 21–28  $\mu$ ; wall colorless, thin, 1–1.5  $\mu$ , closely and finely verrucose.

ON ALLIIONACEAE:

*Mirabilis multiflora* A. Gray, Arizona.

*Mirabilis* sp., Mexico (state).

TYPE LOCALITY: Rio Hondo near City of Mexico, Mexico, on *Mirabilis* sp.

DISTRIBUTION: Southern Arizona to southern Mexico.

13. *Aecidium indecisum* Arth. Bull. Torrey Club 47: 474. 1920.

O. Pycnia hypophyllous, scattered over all or large areas of the leaves among the aecia, conspicuous, subepidermal, honey-yellow, globoid, 80–110  $\mu$  in diameter; ostiolar filaments long, 75–100  $\mu$ .

I. Aecia hypophyllous, scattered over all or large areas of the leaf, cupulate, 0.3–0.5 mm. in diameter, projecting but slightly above the host-tissue; peridium remaining somewhat incurved and covered by the host-tissues, erose; peridial cells oblong or rhomboidal in side view, 16–26 by 30–40  $\mu$ , abutted or slightly overlapping, the outer wall thick, 8–10  $\mu$ , transversely striate, smooth, the inner wall thinner, 3–6  $\mu$ , closely and rather finely verrucose; aeciospores ellipsoid or globoid, 16–19 by 21–26  $\mu$ ; wall colorless, thin, 1–1.5  $\mu$ , closely and inconspicuously verrucose.

ON RANUNCULACEAE:

*Ranunculus Bolanderi* Greene, California.

*Ranunculus californicus* Benth., California.

*Ranunculus Lobtii* A. Gray, California.

TYPE LOCALITY: Berkeley, California, on *Ranunculus californicus*.

DISTRIBUTION: Central California.

EXSICCATI: Barth. N. Am. Ured. 1303; Sydow, Ured. 900.

14. *Aecidium Butlerianum* Rosen & Arth.; Rosen & Kirby,  
Phytopathology 9: 572. 1919.

O. Pycnia epiphyllous, gregarious, on bluish-brown spots 1–3 mm. across, inconspicuous, honey-yellow becoming blackish, punctiform, subepidermal, globoid seen in section, 140–160  $\mu$  in diameter; ostiolar filaments short.

I. Aecia hypophyllous, opposite the pycnia on slightly hypertrophied spots 1–3 mm. across, low, 1.5–3 mm. broad; peridium fragile; peridial cells polygonal in face view, oblong or rhombic in section, 12–16 by 28–35  $\mu$ , overlapping, the outer wall 5–7  $\mu$  thick, transversely striate, smooth, the inner wall 1.5–2  $\mu$  thick, verrucose; aeciospores ellipsoid, 20–26 by 29–37  $\mu$ ; wall colorless, 2.5–3.5  $\mu$  thick, closely and noticeably verrucose.

ON BERBERIDACEAE:

*Mahonia trifoliolata* (Moric.) Fedde (*Berberis trifoliolata* Moric., *B. trifoliata* Hartw.), Texas.

TYPE LOCALITY: Boerne, Texas, on *Berberis trifoliolata*.

DISTRIBUTION: Known only from the type locality.

15. *Aecidium plenum* Arth. Bull. Torrey Club 45: 149. 1918.

O. Pycnia amphigenous, crowded in groups 0.2–0.3 mm. across, cinnamon-brown, small, inconspicuous, subepidermal.

I. Aecia hypophyllous, crowded in circular groups about the pycnia, 1–2 mm. across, without conspicuous spots, cupulate or short cylindrical; peridium erect or somewhat recurved,

irregularly and deeply lacerate; peridial cells angularly oblong in face view, about 20 by 30  $\mu$ , narrowly oblong in radial section, somewhat overlapping, about 8-10 by 30  $\mu$ , the outer wall 5-9  $\mu$  thick, smooth, the inner wall 3-6  $\mu$ , coarsely verrucose; aeciospores globoid or ellipsoid, 16-21 by 18-24  $\mu$ ; wall colorless, thin, 1  $\mu$ , finely and closely verrucose.

## ON PAPAVERACEAE:

*Argemone intermedia* Sweet, Texas.

TYPE LOCALITY: Burkburnett, Texas, on *Argemone intermedia*.

DISTRIBUTION: Known only from the type locality.

16. *Aecidium Mitellae* Ellis & Ev.; Arth. Bull. Torrey Club

47: 475. 1920.

O. Pycnia not seen.

I. Aecia hypophyllous, in crowded circular groups 2-3 mm. across; peridium cupulate, small; aeciospores globoid or broadly ellipsoid, 15-18 by 18-26  $\mu$ ; wall thin, 1  $\mu$ , colorless, minutely verrucose.

## ON SAXIFRAGACEAE:

*Mitella nuda* L., Newfoundland.

TYPE LOCALITY: Shoal Point, Bay of Islands, Newfoundland, on *Mitella nuda*.

DISTRIBUTION: Known only from the type locality.

17. *Aecidium Chamaecristae* Arth. Bull. Torrey Club

46: 123. 1919.

*Aecidium Cassiae* Ellis & Kellerm. Trans. Kans. Acad. 10: 91, hyponym. 1887. Not *A. Cassiae* Bres. 1891.

O. Pycnia amphigenous, in small groups upon reddish discolored areas of the leaf, noticeable, subepidermal, honey-yellow becoming chocolate-brown, globoid, 70-96 by 80-96  $\mu$ ; ostiolar filaments 60-100  $\mu$  long, agglutinated into a column.

I. Aecia amphigenous, loosely grouped upon reddish spots 2-8 mm. across, cupulate, 0.1-0.2 mm. in diameter, short; peridium yellow, recurved, erose; peridial cells rhombic or rhomboidal, 16-23 by 26-35  $\mu$ , considerably overlapping, the outer wall thick, 9-10  $\mu$ , transversely striate, smooth, the inner wall thinner, 4-6  $\mu$ , closely verrucose; aeciospores globoid or ellipsoid, 15-19 by 18-25  $\mu$ ; wall colorless, thin, 1-1.5  $\mu$ , finely and closely verrucose.

## ON CAESALPINACEAE:

*Chamaecrista fasciculata* (Michx.) Greene (*Cassia fasciculata* Michx.), Kansas, Nebraska.

TYPE LOCALITY: Manhattan, Kansas, on *Cassia* "*Chamaecrista*," error for *C. fasciculata*.

DISTRIBUTION: Eastern Kansas and Nebraska.

EXSICCATI: Ellis & Ev. N. Am. Fungi 1825.

18. *Aecidium Onobrychidis* Burrill, Bot. Gaz. 9: 189. 1884.

*Aecidium amphigenum* Ellis & Kellerm. Jour. Myc. 2: 4. 1886. Not *A. amphigenum* Hazsl. 1877.

*Aecidium Kellermanni* De-Toni, in Sacc. Syll. Fung. 7: 788. 1888.

*Aecidium Daleae* Kellerm. & Swingle, Jour. Myc. 5: 13. 1889.

*Aecidium Lupini* Peck, Ann. Rep. N. Y. State Mus. 46: 33. 1893.

*Aecidium Falcatae* Arth. Bull. Torrey Club 33: 32. 1906.

*Aecidium Petalostemonis* Kellerm. & Carl.; Arth. Torrey Club Bull. 34: 589. 1907.

*Aecidium fluxum* Arth. Bull. Torrey Club 34: 590. 1907.

O. Pycnia amphigenous, crowded in small groups on discolored spots, noticeable, subepidermal, honey-yellow becoming chestnut-brown, globoid or flattened-globoid, 100-160 by 80-140  $\mu$ ; ostiolar filaments 50-100  $\mu$  long, agglutinated into a column.

I. Aecia hypophyllous or amphigenous, crowded in groups 2-6 mm. across on discolored spots, cupulate, 0.2-0.3 mm. in diameter; peridium yellowish, the margin recurved, lacerate; peridial cells rhomboidal in side view, 16-27 by 26-42  $\mu$ , considerably overlapping, the outer wall thick, 5-12  $\mu$ , transversely striate, the inner wall thinner, 3-5  $\mu$ , closely and rather prominently verrucose; aeciospores globoid or ellipsoid, 18-27 by 21-29  $\mu$ ; wall colorless, 1-2  $\mu$  thick, smooth or inconspicuously verrucose except for an irregularly placed and shaped band of coarse verrucose markings.

## ON FABACEAE:

*Baptisia australis* (L.) R. Br., Kansas.

*Baptisia bracteata* Ell. (*B. leucophaea* Nutt.), Kansas, Nebraska.

*Falcata comosa* (L.) Kuntze (*Amphicarpa monoica* Ell.), Iowa, North Dakota, Wisconsin.  
*Glycine Apios* L. (*Apios Apios* MacM., *A. tuberosa* Moench), Iowa, Nebraska.  
*Lupinus argenteus* Pursh, South Dakota, Wyoming.  
*Lupinus perennis* L., New York, Wisconsin.  
*Orbeilium Onobrychis* (Nutt.) Rydb. (*Psoralea Onobrychis* Nutt.), Illinois.  
*Parosela enneandra* (Nutt.) Britt. (*Dalea enneandra* Nutt., *D. laxiflora* Pursh), Kansas, Nebraska.  
*Petalostemon candidus* (Willd.) Michx., Kansas, Nebraska.  
*Petalostemon oligophyllus* (Torr.) Rydb., Nebraska.  
*Petalostemon purpureus* (Vent.) Rydb. (*P. violaceus* Michx.), Kansas, Nebraska.  
*Petalostemon villosus* Nutt., Colorado, Nebraska, North Dakota.

TYPE LOCALITY: LaSalle County, Illinois, on *Psoralea Onobrychis*.

DISTRIBUTION: Plains of western North Dakota and central Colorado eastward to Illinois, and one station in New York.

EXSICCATI: Barth. Fungi Columb. 2204, 2296, 2303, 2497, 2602, 2604, 2903, 3301; Barth. N. Am. Ured. 1, 402, 706, 1502; Breckle, Fungi Dak. 326, 501; Clements, Crypt. Form. Colo. 595; Ellis, N. Am. Fungi 1436; Ellis & Ev. Fungi Columb. 1473; Ellis & Ev. N. Am. Fungi 1845; Sydow, Ured. 1448.

### 19. *Aecidium Lini* Dearness & House, Bull. N. Y. State Mus. 179: 26. 1915.

O. Pycnia amphigenous or caulicolous, on yellowish or reddish spots 2-6 mm. long, noticeable, subepidermal, deeply seated in the host-tissue, honey-yellow becoming chestnut-brown, ellipsoid or oblong, 112-128  $\mu$  wide by 128-160  $\mu$  high; ostiolar filaments up to 60  $\mu$  long, not projecting beyond the ostiole.

I. Acia hypophyllous or caulicolous, loosely grouped upon the discolored spots with the pycnia, cupulate, small, 0.1-0.2 mm. in diameter; peridium pale-yellow, the margin erose, somewhat recurved; peridial cells rhombic or rhomboidal in side view, 19-23 by 24-29  $\mu$ , overlapping considerably, the outer wall thick, 7-10  $\mu$ , faintly transversely striate, the inner wall thinner, 3-4  $\mu$ , closely and rather finely verrucose; aeciospores ellipsoid or oblong, 13-16 by 18-23  $\mu$ ; wall colorless, 1.5  $\mu$  thick, minutely and inconspicuously verrucose.

ON LINACEAE:

*Linum virginianum* L., New York.

TYPE LOCALITY: New York, on *Linum virginianum*.

DISTRIBUTION: Known only from the type locality.

### 20. *Aecidium Byrsonimatis* P. Henn. Hedwigia 34: 101. 1895.

*Aecidium byrsonimaticola* P. Henn. Hedwigia 34: 322. 1895.  
*Endophyllum singulare* Dietel & Holway, Bot. Gaz. 31: 336. 1901.  
*Aecidium Byrsonimae* Kern & Kellerm. Jour. Myc. 13: 24. 1907.  
*Aecidium singulare* Arth. Am. Jour. Bot. 5: 540. 1918.

O. Pycnia amphigenous and caulicolous, preceding or among the aecia, numerous, evenly scattered over the hypertrophied leaves and branches, conspicuous, subcuticular, becoming chestnut-brown, conic, large, 150-200  $\mu$  broad by 75-85  $\mu$  high; ostiolar filaments wanting.

I. Acia amphigenous and caulicolous, from an unlimited mycelium causing extensive hypertrophy, numerous, scattered, often crowded, cylindrical, deep-seated, 0.5-0.7 mm. in diameter by 1-1.5 mm. high; peridium white, margin erose, somewhat recurved, often deeply torn; peridial cells rhomboidal in side view, 19-26 by 35-65  $\mu$ , overlapping, the outer wall 3-4  $\mu$  thick, smooth, the inner wall 5-7  $\mu$  thick, coarsely papillate-verrucose, the markings somewhat deciduous; aeciospores angularly oval or oblong, often truncate at base and narrowed above, 26-35 by 39-47  $\mu$ ; wall pale golden-brown, thick, 3-5  $\mu$ , much thicker above, 5-15  $\mu$ , closely and coarsely verrucose, the markings somewhat deciduous, leaving smooth patches.

ON MALPHIGIACEAE:

*Byrsonima crassifolia* (L.) DC., Guatemala, Jalisco.

*Byrsonima variabilis* A. Juss., Nicaragua.

TYPE LOCALITY: Goyaz, Brazil, on *Byrsonima* sp.

DISTRIBUTION: Central Mexico southward through Central America; also in South America.

### 21. *Aecidium Xanthoxyli* Peck, Bot. Gaz. 6: 275. 1881.

O. Pycnia mostly epiphyllous or caulicolous, intermingled with or opposite the aecia, conspicuous, subepidermal, chestnut-brown, globoid or flattened-globoid, 100-140 by 100-130  $\mu$ ; ostiolar filaments up to 30  $\mu$  long, projecting slightly beyond the ostiole.

I. Aecia hypophyllous or caulicolous, sometimes amphigenous, loosely grouped upon spots 0.2-2 cm. in diameter or sometimes occupying most or all of the leaflet, cylindrical, 0.2-0.3 mm. in diameter, up to 1 mm. high; peridium yellow, the margin erect, erose; peridial cells rhomboidal, 16-26 by 26-40  $\mu$ , overlapping, the outer wall thick, 7-14  $\mu$ , transversely striate, the inner wall thinner, 3-8  $\mu$ , closely and strongly verrucose; aeciospores globoid or ellipsoid, 15-23 by 18-26  $\mu$ ; wall colorless, rather thin, 1-2  $\mu$ , very closely and finely verrucose.

## ON RUTACEAE:

*Fagara Clava-Herculis* (L.) Small (*Xanthoxylum Clava-Herculis* L.), Texas.

*Fagara fruticosa* (A. Gray) Small (*Xanthoxylum carolinianum fruticosum* A. Gray), Alabama.

*Xanthoxylum americanum* Mill., Iowa, Kansas, Missouri, Nebraska, Wisconsin.

TYPE LOCALITY: Decorah, Iowa, on *Xanthoxylum americanum*.

DISTRIBUTION: Southwestern Wisconsin to Nebraska southward to Alabama and central Texas.

EXSICCATI: Barth. N. Am. Ured. 102, 1004; Carleton, Ured. Am. 6; Ellis & Ev. Fungi Columb. 1477; Ellis, N. Am. Fungi 1013; Rab.-Wint. Fungi Eur. 2928; Sydow, Ured. 1548.

22. *Aecidium renatum* Arth. Bull. Torrey Club 47: 477. 1920.

O. Pycnia epiphyllous, inconspicuous, subepidermal.

I. Aecia hypophyllous, thickly covering the surface of the leaf, short-cylindric, 0.2-0.4 mm. in diameter; peridium erect, erose; peridial cells rhomboidal, 16-19 by 26-32  $\mu$ , strongly overlapping, the outer wall 3-5  $\mu$  thick, smooth, the inner wall 6-9  $\mu$ , prominently verrucose; aeciospores globoid, 19-23 by 21-24  $\mu$ ; wall colorless, thin, 1  $\mu$ , closely and finely verrucose.

## ON POLYGALACEAE:

*Polygala longa* Blake, New Mexico.

TYPE LOCALITY: Organ Mountains, New Mexico, on *Polygala longa*.

DISTRIBUTION: KNOWN only from the type locality.

23. *Aecidium polygalinum* Peck, Bot. Gaz. 6: 275. 1881.

O. Pycnia epiphyllous, in small groups about 1 mm. in diameter, rather inconspicuous, subepidermal, honey-yellow, globoid or broadly ellipsoid, 100-120 by 140-150  $\mu$ ; ostiolar filaments short, up to 30  $\mu$ , slightly projecting.

I. Aecia hypophyllous, loosely grouped upon yellowish spots 3-10 mm. in diameter, cupulate, 0.2-0.3 mm. in diameter; peridium yellow, the margin erose, recurved; peridial cells rhomboidal, 16-23 by 32-35  $\mu$ , overlapping, the outer wall thick, 8-10  $\mu$ , transversely striate, the inner wall thinner, 3.5-4  $\mu$ , closely and strongly verrucose; aeciospores irregularly globoid or ellipsoid, 15-20 by 18-26  $\mu$ ; wall colorless, thin, 1  $\mu$ , very closely and finely verrucose.

## ON POLYGALACEAE:

*Polygala Senega* L., Iowa, Michigan, Wisconsin.

TYPE LOCALITY: Ann Arbor, Michigan, on *Polygala Senega*.

DISTRIBUTION: Isolated localities from southern Michigan to northeastern Iowa.

EXSICCATI: Ellis, N. Am. Fungi 1009; Rab.-Wint. Fungi Eur. 3319; Sydow, Ured. 1396.

24. *Aecidium seriatum* Arth. & Holway; Arth. Am. Jour. Bot. 5: 541. 1918.

O. Pycnia hypophyllous, numerous in circular groups 1-3 mm. in diameter, surrounded by the aecia, punctate, noticeable, subcuticular, hemispheric, chestnut-brown, 80-112  $\mu$  wide by 40-75  $\mu$  high; ostiolar filaments wanting.

Aecia hypophyllous, abundant in more or less evident concentric circles surrounding the pycnia, the outer circle 1.5-2 cm. in diameter; sori low-cupulate, 0.25-0.5 mm. in diameter, scarcely exceeding the somewhat raised and browned ruptured epidermis in height; peridium white, margin rather smoothly torn; peridial cells almost rectangular in radial longitudinal section, 15-22  $\mu$  thick by 18-26  $\mu$  long, overlapping about one-fourth by a downward extension of the outer part of the outside wall, the outer wall smooth, transversely striate, 6-8  $\mu$  thick, the inner wall closely and prominently verrucose, 3-4  $\mu$  thick; aeciospores irregularly globoid, 12-18  $\mu$  wide by 13-19  $\mu$  long; wall colorless, about 1  $\mu$  thick, very finely and inconspicuously verrucose, often appearing smooth.

## ON EUPHORBIAEAE:

*Eumecanithus lancifolius* (Schlecht.) Millsp. (*Euphorbia lancifolia* Schlecht.), Guatemala.

TYPE LOCALITY: Cahabor river, Alta Vera Paz, Guatemala, on *Eumecanithus lancifolius*.

DISTRIBUTION: KNOWN only from the type locality.

25. *Aecidium favaceum* Arth. Mycologia 7: 254. 1915.

O. Pycnia amphigenous, very numerous on discolored spots 3-5 mm. across, minute, evident, subcuticular, 60-90  $\mu$  across, flattened; ostiolar filaments wanting.

I. Aecia hypophyllous, crowded in groups on the pycnial area, hemispheric, the sori open; peridium about 0.3 mm. across, delicate and evanescent; peridial cells oblong, 12-16 by 22-26  $\mu$ , readily separating, the walls 3-5  $\mu$  thick, the inner slightly thicker and strongly verrucose, the outer smooth; aeciospores globoid or broadly ellipsoid, 15-20 by 16-25  $\mu$ ; wall nearly or quite colorless, 1.5-2  $\mu$  thick, minutely and closely verrucose.

ON EUPHORBIACEAE:

*Phyllanthus nobilis* (L.f.) Müll.-Arg., Porto Rico.

TYPE LOCALITY: Hormigueros, Porto Rico, on *Phyllanthus nobilis*.

DISTRIBUTION: Porto Rico.

26. *Aecidium Mozinnae* Arth. Bull. Torrey Club 45: 152. 1918.

O. Pycnia chiefly epiphyllous, few in orbicular groups, honey-yellow, inconspicuous, subepidermal, globoid, 90-125  $\mu$  across; ostiolar filaments present, abundant, up to 65  $\mu$  long, agglutinated into a column.

I. Aecia hypophyllous, encircling the pycnial area, on yellowish spots 2-5 mm. across; peridium cylindrical, the margin erect and erose; peridial cells quadrate or rectangular, 19-24 by 29-34  $\mu$ , abutted or slightly overlapping, the outer wall 10-12  $\mu$  thick, transversely striate, smooth, the inner wall 3-5  $\mu$  thick, strongly verrucose; aeciospores angularly ellipsoid or globoid, 19-23 by 24-29  $\mu$ ; wall nearly or quite colorless, 2-2.5  $\mu$  thick, closely and noticeably verrucose.

ON EUPHORBIACEAE:

*Mozinna spathulata* Ortega (*Jatropha spathulata* Müll.-Arg.), Guanajuato.

TYPE LOCALITY: State of Guanajuato, Mexico, on *Mozinna spathulata*.

DISTRIBUTION: Known only from the type locality.

27. *Aecidium albicans* Arth. & Holway; Arth. Mycologia 10: 146. 1918.

O. Pycnia hypophyllous, few, usually wanting, associated when present with the small groups of aecia, subepidermal, yellowish-brown, ovoid, 26-48 by 48-67  $\mu$ ; ostiolar filaments wanting.

I. Aecia hypophyllous, solitary, scattered or in small groups of two to four, short-cylindric, 0.1 mm. or less across, 0.1-0.3 mm. high; peridium white, the margin recurved, erose; peridial cells rhombic, 12-13 by 16-19  $\mu$ , abutted, the outer wall smooth, the inner wall very finely and closely verrucose, both walls 1.5-3  $\mu$  thick; aeciospores angularly globoid or ellipsoid, 13-16 by 16-19  $\mu$ ; wall colorless, 1-1.5  $\mu$  thick, finely and closely verrucose.

ON EUPHORBIACEAE:

*Phyllanthus acidus* (L.) Skeels, Salvador.

*Phyllanthus acuminatus* Vahl. Costa Rica, Guatemala.

TYPE LOCALITY: Orotina, Costa Rica, on *Phyllanthus acuminatus*.

DISTRIBUTION: Central America.

28. *Aecidium Tithymali* Arth. Bull. Torrey Club 45: 151. 1918.

O. Pycnia hypophyllous, scattered sparsely over the surface of the leaf, preceding and accompanying the aecia, punctiform, honey-yellow or brownish, noticeable, subepidermal, globoid or flask-shaped, 110-150  $\mu$  broad; ostiolar filaments 60-100  $\mu$  long, agglutinated into a column.

I. Aecia hypophyllous, evenly and loosely scattered, at first bullate and opening by a pore or irregular break of the epidermis; peridium erect or recurved, torn, fragile; peridial cells rhomboidal, 10-15 by 23-27  $\mu$ , somewhat overlapping, the outer wall 5-7  $\mu$  thick, transversely striate, the inner wall 2-3  $\mu$  thick, verrucose; aeciospores globoid or broadly ellipsoid; 18-22 by 19-24  $\mu$ ; wall nearly or quite colorless, thin, 1-1.5  $\mu$ , finely verrucose.



## ON EUPHORBIACEAE:

*Tithymalus commutatus* (Engelm.) Klotzsch & Garcke (*Euphorbia commutata* Engelm.), Indiana, Iowa, Maryland, Wisconsin.

*Tithymalus leiococcus* (Engelm.) Small (*Euphorbia texana* Boiss.), Texas.

*Tithymalus missouriensis* (Norton) Small (*Euphorbia dictyosperma* auct.), Nebraska.

TYPE LOCALITY: Lafayette, Indiana, on *Tithymalus commutatus*.

DISTRIBUTION: Local from Maryland to eastern Nebraska and southern Texas.

EXSICCATI: Barth, N. Am. Ured. 703.

29. *Aecidium Argithamniae* Arth. Bull. Torrey Club 33: 33. 1906.

O. Pycnia epiphyllous, few, upon yellowish, red-bordered spots, conspicuous, subepidermal, deeply seated in the tissue, honey-yellow becoming chocolate-brown, ellipsoid, 160–175  $\mu$  broad by 225–240  $\mu$  high; ostiolar filaments up to 90  $\mu$  long, projecting but little beyond the ostiole.

I. Aecia hypophyllous, circinating opposite the pycnia on spots 2–5 mm. across, cupulate, 0.2–0.3 mm. in diameter; peridium pale-yellow, the margin recurved, lacerate; peridial cells rhomboidal in side view, 15–16 by 32–35  $\mu$ , somewhat overlapping, the outer wall 5–6  $\mu$ , smooth, the inner wall 3–4  $\mu$  thick, closely verrucose; aeciospores globoid or ellipsoid, 15–18 by 18–23  $\mu$ ; wall nearly colorless, very thin, 1  $\mu$  or less, very closely and finely verrucose, appearing smooth.

## ON EUPHORBIACEAE:

*Chyropetalum Schiedeanum* (Müll.-Arg.) Pax (*Argythamnia Schiediana* Müll.-Arg.) (?), Hidalgo.

TYPE LOCALITY: Trinidad, Hidalgo, Mexico, on "*Argithamnia*" *Schiediana*.

DISTRIBUTION: Known only from the type locality.

30. *Aecidium Cyrillae* Arth. Bull. Torrey Club 45: 150. 1918.

O. Pycnia epiphyllous, few on reddish-brown spots, inconspicuous, subepidermal, globoid or flask-shaped, 128–140  $\mu$  broad by 160–175  $\mu$  high; ostiolar filaments up to 60  $\mu$  long, slightly projecting beyond the ostiole.

I. Aecia hypophyllous, in groups of two to eight, rarely more, on reddish-brown spots 2–4 mm. across, short-cylindric, white; peridium erect, erose; peridial cells quadrangular in radial section, 16–21 by 24–32  $\mu$ , with a strongly overlapping projection, the outer wall 4–6  $\mu$  thick, smooth, the inner wall 7–9  $\mu$  thick, often thickened up to 13  $\mu$  at the apex, verrucose; aeciospores irregularly ellipsoid or globoid, 19–23 by 23–26  $\mu$ ; wall colorless, thin, 1–1.5  $\mu$ , greatly thickened above, 7–9  $\mu$ , closely and finely verrucose.

## ON CYRILLACEAE:

*Cyrilla racemiflora* L., Louisiana, Mississippi.

TYPE LOCALITY: Ocean Springs, Mississippi, on *Cyrilla racemiflora*.

DISTRIBUTION: Near the coast of the Mississippi Sound.

31. *Aecidium Aesculi* Ellis & Kellerm. Bull. Torrey Club 11: 114. 1884.

O. Pycnia epiphyllous, crowded in groups about 1 mm. in diameter upon yellowish-brown spots, noticeable, subepidermal, honey-yellow, slightly flattened-globoid, about 130  $\mu$  wide by 120  $\mu$  high; ostiolar filaments up to 40  $\mu$  long, projecting slightly beyond the ostiole.

I. Aecia hypophyllous, loosely grouped upon yellowish-brown spots 2–6 mm. across, cylindric, 0.1–0.2 mm. in diameter, 0.5–1.2 mm. long; peridium light-yellow, the margin at first erect, becoming recurved and lacerate; peridial cells rhombic or rhomboidal, 18–23 by 24–35  $\mu$ , slightly overlapping, the outer wall thick, 9–12  $\mu$ , transversely striate, the inner wall thinner, 3.5–5  $\mu$ , closely verrucose; aeciospores globoid or ellipsoid, 17–22 by 21–26  $\mu$ ; wall colorless, thin, 1  $\mu$ , very closely and finely verrucose.

## ON HIPPOCASTANACEAE:

*Aesculus arguta* Buckl., Kansas.

*Aesculus glabra* Willd., Kansas, Nebraska.

TYPE LOCALITY: Manhattan, Kansas, on *Aesculus glabra*.

DISTRIBUTION: North-central Kansas and adjoining Nebraska.

EXSICCATI: Barth, Fungi Columb. 2301; Barth, N. Am. Ured. 501; Ellis, N. Am. Fungi 1429; Ellis & Ev. Fungi Columb. 1290; Kellerm. & Swingle, Kans. Fungi 1; Roum. Fungi Gall. 3665; Sydow, Ured. 1198.

32. *Aecidium Reichei* Dietel, Ann. Myc. 12: 85. 1914.

O. Pycnia amphigenous or caulicolous, in small groups, subepidermal, brownish, globose in section, 100–140  $\mu$  in diameter; ostiolar filaments up to 135  $\mu$  long, slightly projecting.

I. Aecia hypophyllous or caulicolous, in small groups 1–5 mm. across, cupulate, 0.2 mm. in diameter; peridium yellowish, the margin erect or incurved, erose; peridial cells rhomboidal in longitudinal section, 16–19 by 29–42  $\mu$ , abutted or slightly overlapping, the outer wall transversely striate, about 10  $\mu$  thick, smooth, the inner wall coarsely verrucose, 4–7  $\mu$ ; aeciospores irregularly globose or oblong, 13–20 by 20–29  $\mu$ ; wall colorless, 1–1.5  $\mu$  thick, finely and closely verrucose.

## ON SAPINDACEAE:

*Cardiospermum Halicacabum* L., Mexico (state).

TYPE LOCALITY: [Near City of Mexico], Mexico, on *Cardiospermum Halicacabum*.

DISTRIBUTION: Known only from the type locality.

33. *Aecidium mexicanum* Dietel & Holway; Holway, Bot. Gaz. 24: 36. 1897.

*Aecidium Clemensae* Arth. Bull. Torrey Club 46: 122. 1919.

O. Pycnia amphigenous, grouped or scattered upon light-colored spots 3–4 mm. in diameter, conspicuous, subepidermal, honey-yellow becoming chocolate-brown, globose or flattened-globose, 95–110  $\mu$  broad by 85–100  $\mu$  high; ostiolar filaments up to 90  $\mu$  long.

I. Aecia hypophyllous, grouped on light-colored spots 3–6 mm. across, short-cylindric, 0.2–0.3 mm. in diameter, 0.3–0.5 mm. high; peridium white, the margin erect, erose; rarely revolute and lacerate; peridial cells rhomboidal or rectangular, 18–24 by 29–35  $\mu$ , considerably overlapping, the outer wall 5–7  $\mu$  thick, transversely striate, smooth, the inner wall 3.5–4  $\mu$  thick, closely verrucose; aeciospores globose, 19–24 by 21–27  $\mu$ ; wall colorless, rather thick, 1.5–2  $\mu$ , very closely and finely verrucose.

## ON VITACEAE:

*Cissus incisa* (Nutt.) DesMoul., Oklahoma.

*Cissus* sp., Mexico (state).

TYPE LOCALITY: Near City of Mexico, Mexico, on *Cissus* sp.

DISTRIBUTION: Southwestern Oklahoma to southern Mexico.

34. *Aecidium Triumphetae* P. Henn. Hedwigia 35: 259. 1896.

O. Pycnia amphigenous, crowded in small groups 1–1.5 mm. in diameter upon yellowish spots, conspicuous, subepidermal, dark chestnut-brown, globose or flask-shaped, 100–110  $\mu$  broad by 95–110  $\mu$  high; ostiolar filaments up to 90  $\mu$  long, somewhat agglutinated into a column.

I. Aecia hypophyllous, crowded upon yellowish spots 3–10 mm. in diameter; peridium white, the margin recurved, somewhat fimbriate; peridial cells rhombic or rhomboidal, 19–26 by 32–39  $\mu$ , overlapping somewhat, the outer wall 7–9  $\mu$  thick, transversely striate, the inner wall 5–7  $\mu$  thick, strongly verrucose; aeciospores globose, 15–19 by 19–23  $\mu$ ; wall colorless, 1.5–2  $\mu$  thick, very closely and finely verrucose.

## ON TILIACEAE:

*Triumpheta polyandra* DC. (*T. insignis* S. Wats.), Jalisco.

TYPE LOCALITY: Loreto, Argentina, on *Triumpheta* sp.

DISTRIBUTION: Southern Mexico; also in South America.

35. *Aecidium Cannonii* D. Griff. Bull. Torrey Club 34: 210. 1907.

O. Pycnia chiefly epiphyllous, crowded in small groups 1–1.5 mm. in diameter upon dark discolored spots, inconspicuous, subepidermal, flattened-globose, 80–110  $\mu$  broad by 50–65  $\mu$  high; ostiolar filaments up to 100  $\mu$  long, projecting in a short agglutinated column.

I. Aecia hypophyllous, crowded upon dark discolored areas 5–10 mm. in diameter, cylindric, 0.2–0.3 mm. in diameter, up to 1 mm. high; peridium white, the margin recurved, erose; peridial cells rhombic or rhomboidal, 19–26 by 26–39  $\mu$ , overlapping by a downward projection of the outer wall, the outer wall thick, 9–11  $\mu$ , faintly transversely striate, the inner wall

thinner, 3-4  $\mu$ , closely verrucose; aeciospores angularly globoid or ellipsoid, 24-27 by 29-31  $\mu$ ; wall colorless, thick, 2.5-3.5  $\mu$ , very closely and finely verrucose, appearing smooth.

## ON FOUQUIERIAEAE:

*Fouquieria splendens* Engelm., Arizona.

TYPE LOCALITY: Sabaño Cañon, Santa Catalina mountains, Arizona, on *Fouquieria splendens*.

DISTRIBUTION: Known only from the type locality.

36. *Aecidium hydroideum* Berk. & Curt. *Grevillea* 3: 61. 1874.

O. Pycnia amphigenous, crowded in small groups 1-2 mm. in diameter upon yellowish spots, noticeable, subepidermal, honey-yellow becoming chestnut-brown, flattened-globoid, 80-100  $\mu$  broad by 50-70  $\mu$  high; ostiolar filaments up to 55  $\mu$  long, agglutinated into a short column.

I. Aecia hypophyllous, crowded upon yellowish spots 2-10 mm. in diameter, cupulate or short-cylindric, 0.3-0.5 mm. in diameter; peridium white, the margin recurved, lacerate; peridial cells rhomboidal, 15-19 by 19-27  $\mu$ , slightly overlapping, the outer wall 5-9  $\mu$  thick, faintly transversely striate, the inner wall 2.5-4  $\mu$  thick, closely and strongly verrucose; aeciospores globoid or ellipsoid, 12-17 by 14-19  $\mu$ ; wall colorless, thin, 1  $\mu$  or less, very closely and finely verrucose.

## ON THYMELAEACEAE:

*Dirca palustris* L., Alabama, Indiana, Iowa, Maine, Michigan, Minnesota, Missouri, New York, Ohio, Wisconsin

TYPE LOCALITY: Alabama, on *Dirca palustris*.

DISTRIBUTION: Northern Alabama and Maine, westward to Missouri and northern Minnesota.

EXSICCATI: Barth. *Fungi Columb.* 4501; Barth. *N. Am. Ured.* 901; Ellis & Ev. *N. Am. Fungi* 1816; Rab.-Wint. *Fungi Eur.* 3017; Rav. *Fungi Car.* 4: 94; Roum. *Fungi Gall.* 3862; Thüm. *Myc. Univ.* 1120.

37. *Aecidium arctoum* Arth. *Bull. Torrey Club* 47: 477. 1920.

O. Pycnia epiphyllous, and to a less extent hypophyllous among the aecia, numerous, rather inconspicuous, small, subepidermal, in section globoid, 128-160  $\mu$  in diameter; ostiolar filaments prominent, up to 80  $\mu$  long.

I. Aecia hypophyllous, diffused on slightly paler spots 3-7 mm. across, cupulate, very small, 0.1-0.2 mm. in diameter; peridium delicate, erect or somewhat recurved, the margin erose or fimbriate; peridial cells rhomboidal, 16-19 by 28-32  $\mu$ , somewhat overlapping, the outer wall 1-1.5  $\mu$  thick, smooth, the inner wall 3-6  $\mu$  thick, moderately verrucose; aeciospores globoid, or some of them oblong, 21-26 by 23-29  $\mu$ ; wall colorless, thin, 1-1.5  $\mu$ , minutely verrucose.

## ON ELAEAGNACEAE:

*Elaeagnus angustifolia* L., North Dakota.

TYPE LOCALITY: Kulm, North Dakota, on *Elaeagnus angustifolia*.

DISTRIBUTION: Known only from the type locality.

EXSICCATI: Brenckle, *Fungi Dak.* 476

38. *Aecidium Anograe* Arth. *Bull. Torrey Club* 28: 664. 1901.

O. Pycnia amphigenous, grouped on the spots with the aecia, inconspicuous, subepidermal, honey-yellow becoming brownish, globoid, 100-120  $\mu$  in diameter by 80-100  $\mu$  high; ostiolar filaments 30-80  $\mu$  long.

I. Aecia amphigenous, chiefly hypophyllous, gregarious on roundish or irregular reddened spots, cylindric, 0.2-0.3 mm. in diameter by 0.5-0.6 mm. high; peridium white, the margin erect, toothed; peridial cells rectangular, 18-24 by 22-35  $\mu$ , slightly overlapping, the outer wall 6-10  $\mu$ , transversely striate, the inner wall 3-5  $\mu$ , coarsely verrucose; aeciospores irregularly globoid or ellipsoid, 18-23 by 22-26  $\mu$ ; wall pale-yellow, thick, 2-3  $\mu$ , evenly verrucose.

## ON ONAGRACEAE:

*Anogra Nuttallii* (Sweet) Spach, Nebraska.

TYPE LOCALITY: Long Pine, Nebraska, on *Anogra* "pallida," error for *A. Nuttallii*.

DISTRIBUTION: Known only from the arid northwestern part of Nebraska.

EXSICCATI: Barth. *Fungi Columb.* 2601; Barth. *N. Am. Ured.* 1701.

39. *Aecidium Betheli* Arth. Bull. Torrey Club 47: 476. 1920.

O. Pycnia not seen.

I. Aecia hypophyllous, in small and crowded groups 1-3 mm. across, on a hemispheric, hypertrophied substratum, cupulate, small, 0.1-0.2 mm. in diameter; peridium low, erect, the margin erose; peridial cells readily falling apart, rhomboidal, 13-18 by 19-23  $\mu$ , strongly overlapping, the outer wall 7-9  $\mu$  thick, transversely striate, smooth, the inner wall 1  $\mu$ , evenly and noticeably verrucose; aeciospores globoid, small, 13-18 by 16-18  $\mu$ ; wall colorless, thin, 1  $\mu$  or less, very finely and evenly verrucose.

ON ONAGRACEAE:

*Jussiaea californica* (S. Wats.) Jepson, California.

TYPE LOCALITY: Long Beach, California, on *Jussiaea californica*.

DISTRIBUTION: Known only from the type locality.

40. *Aecidium Ligustici* Ellis & Ev. Bull. Torrey Club 11: 73. 1884.

O. Pycnia epiphyllous, scattered upon yellowish swollen areas 0.7-2 cm. across, noticeable, subepidermal, honey-yellow becoming chestnut-brown, globoid, 110-128  $\mu$  in diameter; ostiolar filaments up to 40  $\mu$  long, projecting and agglutinated into a short column.

I. Aecia mostly hypophyllous, loosely grouped upon yellow swollen areas of the blade and veins, cupulate, 0.2-0.5 mm. in diameter; peridium white, fragile, projecting only slightly beyond the host-tissue, the margin revolute, lacerate; peridial cells oblong or ellipsoid in face view, 17-23 by 29-37  $\mu$ , in side view narrow, usually collapsed, overlapping, the walls about 2-3  $\mu$  thick, finely and closely verrucose; aeciospores globoid or ellipsoid, 13-19 by 18-23  $\mu$ ; wall colorless, thin, 1-1.5  $\mu$ , closely and finely verrucose.

ON AMMIACEAE:

*Ligusticum scoticum* L., Maine; Quebec.

TYPE LOCALITY: Island of Anticosti, Gulf of St. Lawrence, on *Ligusticum scoticum*.

DISTRIBUTION: Coastal region from Maine to the mouth of the St. Lawrence River.

EXSICCATI: Thaxter, Rel. Farl. 208.

41. *Aecidium mutum* Arthur, sp. nov.

O. Pycnia amphigenous, loosely surrounded by the aecia, numerous, conspicuous, honey-yellow becoming brownish, subepidermal, in section globoid, 85-125  $\mu$  in diameter; ostiolar filaments up to 90  $\mu$  in length.

I. Aecia amphigenous, gregarious in small groups 1-3 mm. across or on petioles elongate, cylindric, 0.2-0.3 mm. in diameter, 0.5-1 mm. high; peridium firm, yellowish, the margin erect, erose; peridial cells rhomboidal, 16-18 by 24-34  $\mu$ , considerably overlapping, the outer wall 8-9  $\mu$  thick, transversely striate, smooth, the inner wall, 3-3.5  $\mu$  thick, very finely verrucose; aeciospores angularly globoid or ellipsoid, 16-18 by 18-24  $\mu$ ; wall colorless, 1-1.5  $\mu$  thick, very finely verrucose.

ON AMMIACEAE:

*Musineon divaricatum* (Pursh) Coult. & Rose, South Dakota.

Type collected at Newell, South Dakota, June 12, 1912, W. P. Carr.

EXSICCATI: Barth. Fungi Columb. 3846; Barth. N. Am. Ured. 643; Brenckle, Fungi Dak. 204.

42. *Aecidium Apocyni* Schw. Schr. Nat. Ges. Leipzig 1: 68. 1822.

*Aecidium* (*Caecoma*) *Apocynatum* Schw. Trans. Am. Phil. Soc. II. 4: 309. 1832.

O. Pycnia amphigenous, crowded in small groups about 1 mm. in diameter upon yellow or brown spots, noticeable, subepidermal, chocolate-brown, globoid, 65-80  $\mu$  in diameter; ostiolar filaments up to 80  $\mu$  long, agglutinated and projecting in a column almost as wide as the pycnium.

I. Aecia hypophyllous, circinating about the pycnia upon slightly swollen areas 1.5-5 mm. across, cupulate, 0.1-0.3 mm. in diameter, slightly projecting above the host-tissue; peridium pale-yellow, the margin erect, erose; peridial cells rhomboidal, 16-19 by 26-32  $\mu$ , overlapping, the outer wall 3-7  $\mu$  thick, transversely striate, smooth, the inner wall 3-4  $\mu$  thick, closely and

coarsely tuberculate; aeciospores angularly globoid, 15–19 by 18–22  $\mu$ ; wall colorless, thin, 1–1.5  $\mu$ , closely and minutely verrucose.

## ON APOCYNACEAE:

*Apocynum cannabinum* L., Delaware, District of Columbia, New Jersey, North Carolina, Virginia.

*Apocynum androsaemifolium* L., Massachusetts.

TYPE LOCALITY: Salem, North Carolina, on *Apocynum cannabinum*.

DISTRIBUTION: Central North Carolina to eastern Massachusetts.

EXSICCATI: Thaxter, Rel. Farl. 206.

#### 43. *Aecidium Thenardia* Arth. Bull. Torrey Club 45: 150. 1918.

O. Pycnia amphigenous, upon spots with the aecia, few, rather inconspicuous, subepidermal, chestnut- or chocolate-brown, 100–128  $\mu$  in diameter; ostiolar filaments short, not projecting beyond the ostiole.

I. Aecia hypophyllous, in circular groups 8–10 mm. across, often circinating on somewhat larger, yellowish spots, short-cylindric; peridium white, the margin erect, erose or torn; peridial cells in face view oblong, 16–22 by 24–30  $\mu$ , in side view rhomboidal, 13–15  $\mu$  wide, somewhat overlapping, the outer wall 5–6  $\mu$  thick, transversely striate, the inner wall 3–4  $\mu$  thick, moderately verrucose; aeciospores quadrately globoid, 14–16  $\mu$  in diameter; wall colorless, thin, 1–1.5  $\mu$  in diameter, somewhat thicker above, 2–6  $\mu$ , finely and closely verrucose.

## ON APOCYNACEAE:

*Thenardia Galeottiana* Baill., Oaxaca.

TYPE LOCALITY: Near Oaxaca, Mexico, on *Thenardia Galeottiana*.

DISTRIBUTION: Known only from the type locality.

#### 44. *Aecidium leporinum* Arth. Bull. Torrey Club 37: 578. 1910.

O. Pycnia not seen.

I. Aecia hypophyllous, gregarious in circular groups 1–3 mm. across, crowded on substratum, scarcely thickened and little discolored, cylindric, 0.2–0.4 mm. high; peridium erect or somewhat recurved, erose; peridial cells strongly imbricated, rhomboidal below, becoming ovate-lanceolate above when seen in radial section, the outer wall nearly or quite smooth, the inner wall somewhat thicker, closely and prominently verrucose with slender elongate warts; aeciospores angularly and broadly ellipsoid or nearly globoid, 18–21 by 24–29  $\mu$ ; wall pale-yellow, rather thick, 2–2.5  $\mu$ , greatly thickened above, 7–9  $\mu$ , closely and finely verrucose.

## ON APOCYNACEAE:

*Macrosiphonia brachysiphon* (Torr.) A. Gray, Chihuahua.

TYPE LOCALITY: Guayamoba Cañon, Sierra Madre Mountains, Chihuahua, Mexico, on *Macrosiphonia brachysiphon*.

DISTRIBUTION: Known only from the type locality.

#### 45. *Aecidium Thevetiae* Sacc. Ann. Myc. 11: 14. 1913.

O. Pycnia epiphyllous, opposite the aecia.

I. Aecia hypophyllous, crowded in annular groups 5–6 mm. across, cylindric, 1 mm. high, 0.2–0.3 mm. in diameter; peridium colorless, erect, the margin fimbriate; peridial cells oblong-polygonal, 16 by 25  $\mu$ , the wall thick; aeciospores angularly globoid, 16–19  $\mu$  in diameter; wall colorless, thick, 3–4  $\mu$ , appearing smooth in water.

## ON APOCYNACEAE:

*Thevetia cuneifolia* A. DC., Veracruz.

TYPE LOCALITY: Veracruz, Mexico, on *Thevetia cuneifolia*.

DISTRIBUTION: Known only from the type locality.

#### 46. *Aecidium Jacquemontiae* Ellis & Ev. Jour. Myc. 8: 11. 1902.

O. Pycnia not seen.

I. Aecia hypophyllous, crowded in groups 1–5 mm. in diameter upon brown areas, sometimes circinating, cupulate, 0.1–0.3 mm. in diameter, long covered by the epidermis; peridium white, not projecting beyond the ruptured epidermis, the margin erect, erose; peridial cells

oblong or broadly oblong in side view, 15–19 by 23–29  $\mu$ , abutted or slightly overlapping, the outer wall 4–7  $\mu$  thick, transversely striate, the inner wall 2–3  $\mu$  thick, closely verrucose; aeciospores angularly ellipsoid, 13–14 by 18–19  $\mu$ ; wall colorless, 1  $\mu$  thick, closely and minutely verrucose.

ON CONVULVULACEAE:

*Jacquemontia pentantha* (Jacq.) G. Don, Yucatan.

*Thyella hirtiflora* (Mart. & Gall.) House (*T. lactescens* House, *Jacquemontia lactescens*

Seem., *Ipomoea hirtiflora* Mart. & Gall.), Panama.

TYPE LOCALITY: Yucatan, Mexico, on *Jacquemontia pentantha*.

DISTRIBUTION: Southern Mexico and Central America.

47. *Aecidium guatemalense* Kern & Kellerm. Jour. Myc.

13: 23. 1907.

O. Pycnia epiphyllous, gregarious, abundant on discolored spots opposite the aecia, inconspicuous, punctiform, subepidermal, becoming dark-brown, globose, 95–115  $\mu$  wide, 80–105  $\mu$  high; ostiolar filaments up to 90  $\mu$  long.

I. Aecia hypophyllous, gregarious, numerous, on indefinite discolored spots, 0.5–1.5 cm. across, especially extending along the veins, short, 0.2–0.3 mm. in diameter; peridium white, the margin erect, slightly erose; peridial cells broadly rhomboidal, 14–16 by 15–25  $\mu$  long, somewhat overlapping, the walls of equal thickness, 2–4  $\mu$ , the inner moderately verrucose, the outer smooth, transversely striate; aeciospores globose, 16–21 by 18–23  $\mu$ ; wall colorless, thin, about 1  $\mu$ , finely and inconspicuously verrucose.

ON HELIOTROPIACEAE:

*Heliotropium indicum* L., Guatemala.

TYPE LOCALITY: Guálan, Department Zacapa, Guatemala, on *Heliotropium indicum*.

DISTRIBUTION: Known only from the type locality.

48. *Aecidium Tournefortiae* P. Henn. Hedwigia 34: 338. 1895.

O. Pycnia amphigenous, in small groups 1–4 mm. in diameter, noticeable, subepidermal, white becoming dark-brown, globose or ellipsoid, 95–128  $\mu$  broad by 80–112  $\mu$  high; ostiolar filaments up to 50  $\mu$  long, slightly projecting beyond the ostiole.

I. Aecia hypophyllous, loosely grouped upon dark-colored spots 0.5–1.5 cm. in diameter, cupulate, small, about 0.1 mm. in diameter; peridium pale-yellow, the margin erect, erose, fragile; peridial cells rhomboidal, 15–19 by 23–27  $\mu$ , slightly overlapping or abutted, the outer wall 3–5  $\mu$  thick, transversely striate, the inner wall 2–3  $\mu$ , closely verrucose with the markings often uniting and becoming rugose; aeciospores globose or ellipsoid, 13–19 by 17–24  $\mu$ ; wall colorless, thin, 1–1.5  $\mu$ , very closely and finely verrucose.

ON BORAGINACEAE:

*Tournefortia bicolor* Sw., Porto Rico.

*Tournefortia hirsutissima* L., Cuba, Porto Rico.

*Tournefortia peruviana* Poir., Cuba.

*Tournefortia volubilis* L., Panama.

TYPE LOCALITY: Blumenau, Santa Catharina, Brazil, on *Tournefortia* sp.

DISTRIBUTION: West Indies and Panama; also in South America.

49. *Aecidium Bourreriae* Holway; Arth. Bull. Torrey Club

46: 123. 1919.

O. Pycnia amphigenous, few, in center of spots with the aecia, noticeable, subepidermal, chocolate-brown, flattened-globose, 128–160  $\mu$  broad by 95–110  $\mu$  high; ostiolar filaments short, not extending beyond the ostiole.

I. Aecia hypophyllous, loosely grouped in irregular spots 3–10 mm. across, short-cylindrical, 0.2–0.3 mm. in diameter; peridium light-yellow, fragile; peridial cells rhombic in side view, 13–15 by 23–24  $\mu$ , slightly overlapping, the outer wall 6–7  $\mu$  thick, transversely striate, the inner wall 3.5–4.5  $\mu$  thick, closely and rather prominently verrucose; aeciospores globose or ellipsoid, 19–23 by 23–26  $\mu$ ; wall colorless, rather thick, 1.5–2.5  $\mu$ , closely and finely verrucose.

ON BORAGINACEAE:

*Bourreria havanensis* Miers, Bahamas.

TYPE LOCALITY: Nassau, New Providence Island, on *Bourreria havanensis*.

DISTRIBUTION: Known only from the type locality.

50. *Aecidium Cordiae* P. Henn.; Bres., Henn. & Magn. Bot. Jahrb. 17: 491. 1893.

*Aecidium brasiliense* Dietel, Hedwigia 36: 35. 1897.

O. Pycnia epiphyllous, subepidermal, scattered on yellowish spots 8–10 mm. across, globoid, 80–100  $\mu$  in diameter; ostiolar filaments up to 65  $\mu$ , slightly projecting.

I. Aecia hypophyllous, on yellowish spots 8–10 mm. across, cupulate, 0.1–0.2 mm. broad, the margin erose; peridial cells rhombic in longitudinal section, 23–26 by 27–32  $\mu$ , the outer wall transversely striate, 7–10  $\mu$  thick, smooth, the inner wall closely tuberculate, 3–4  $\mu$  thick; aeciospores angularly ellipsoid, 20–29 by 23–33  $\mu$ ; wall colorless, 1–1.5  $\mu$ , thicker above, up to 10  $\mu$ , closely and finely verrucose.

ON EHRETIACEAE:

*Varronia bullata* (L.) Jacq. (*Cordia bullata* L.), Haiti.

TYPE LOCALITY: Haiti, on *Cordia bullata*.

DISTRIBUTION: Haiti; also in South America.

51. *Aecidium Verbenae* Speg. Anal. Soc. Ci. Argent. 9: 174. 1880.

*Aecidium verbenicola* Speg. Anal. Mus. Nac. Buenos Aires 19: 323. 1909. Not *A. verbenicola* Ellis & Kellerm. 1884.

*Aecidium Lantanae* Mayor, Mém. Soc. Neuch. Sci. Nat. 5: 567. 1913.

O. Pycnia hypophyllous, in small groups upon brownish spots about 3 mm. across, subepidermal, globoid, 70–90  $\mu$  in diameter; ostiolar filaments about 80  $\mu$  long, agglutinate and projecting as a prominent column.

I. Aecia hypophyllous or caulicolous, few in small groups on brownish spots, cupulate, small, about 0.1 mm. across, the margin erose; peridial cells overlapping, rhomboidal in longitudinal section, 13–16 by 19–30  $\mu$ , the outer wall, 2–3  $\mu$ , transversely striate, smooth, the inner wall, 2–3  $\mu$ , closely verrucose; aeciospores globoid, 15–19  $\mu$  in diameter; wall colorless, thin, 1  $\mu$  or less, very closely and inconspicuously verrucose.

ON VERBENACEAE:

*Lantana trifolia* L., Nicaragua; Panama.

TYPE LOCALITY: Rio de la Plata, Argentina, on *Verbena litoralis*.

DISTRIBUTION: Central America; also in South America.

ILLUSTRATION: Mém. Soc. Neuch. Sci. Nat. 5: 568, f. 75.

52. *Aecidium zonatum* Sacc. Ann. Myc. 11: 14. 1913.

O. Pycnia epiphyllous, subepidermal, noticeable, dark-brown.

I. Aecia hypophyllous, crowded in brownish spots 2–4 mm. in diameter, encircled by a light-yellow ring 1–2 mm. wide, cupulate, 0.2–0.3 mm. in diameter; peridium yellowish, the margin erect, erose; peridial cells in face view oval or ellipsoid, 23–28 by 33–45  $\mu$ , in radial longitudinal section 7–10  $\mu$  thick, collapsed, probably thicker, the walls 2–2.5  $\mu$  thick, finely and closely verrucose; aeciospores ellipsoid or globoid, 17–20 by 19–24  $\mu$ ; wall colorless, thin, 1  $\mu$ , rather closely and finely verrucose.

ON LAMIACEAE:

*Salvia* sp., Mexico [Veracruz?].

TYPE LOCALITY: Mexico, on *Salvia* sp.

DISTRIBUTION: Known only from the type locality.

53. *Aecidium subsimulans* Arth. & Mains; Arth. Bull. Torrey Club 47: 475. 1920.

O. Pycnia amphigenous, on brownish or reddish spots, 2–5 mm. in diameter, noticeable, subepidermal, cinnamon-brown, flattened-globoid, 95–125  $\mu$  in diameter by 60–95  $\mu$  high; ostiolar filaments up to 125  $\mu$  long.

I. Aecia hypophyllous, crowded on spots with the pycnia, cylindrical, 0.2–0.3 mm. wide, 0.5–1 mm. high; peridium white, the margin somewhat erect, erose; peridial cells rhomboidal, 19–26 by 32–45  $\mu$ , somewhat overlapping, the outer wall thick, 9–13  $\mu$ , transversely striate, smooth, the inner wall 4–6  $\mu$  thick, closely and rather coarsely verrucose; aeciospores globoid or ellipsoid, 19–23 by 23–29  $\mu$ ; wall colorless, 1.5–2.5  $\mu$  thick, very closely and finely verrucose.

## ON LAMIACEAE:

*Salvia candicans* Mart. & Gal., Puebla.*Salvia Lemmoni* A. Gray, Arizona.*Salvia* sp., Hidalgo, Mexico (state).TYPE LOCALITY: Carr Peak, Huachuca mountains, Arizona, on *Salvia Lemmoni*.

DISTRIBUTION: Southern Arizona southward to southern Mexico.

54. *Aecidium Physalidis* Burrill, Bot. Gaz. 9: 190. 1884.

O. Pycnia amphigenous or caulicolous, scattered, covering all or a large portion of the plant, arising from an unlimited mycelium, conspicuous, subepidermal, honey-yellow or pale-brown, globoid or flattened-globoid, 95–120 by 80–100  $\mu$ ; ostiolar filaments up to 80  $\mu$  long, agglutinated into a column.

I. Aecia hypophyllous or caulicolous, scattered, covering all or a large portion of the plant, arising from an unlimited mycelium, cupulate, 0.3–0.5 mm. in diameter; peridium pale-yellow, the margin erose becoming lacerate, recurved; peridial cells rhombic or broadly rhomboidal, 15–23 by 24–32  $\mu$ , overlapping somewhat, the outer wall thick, 5–10  $\mu$ , transversely striate, the inner wall thinner, 3–4  $\mu$ , closely tuberculate-verrucose; aeciospores globoid or ellipsoid, 14–19 by 16–24  $\mu$ ; wall colorless, 1–2  $\mu$  thick, very closely and inconspicuously verrucose.

## ON SOLANACEAE:

*Physalis comata* Rydb., New Mexico, Texas.*Physalis heterophylla* Nees (*P. viscosa* Pursh not L.), Colorado, Illinois, Indiana, Nebraska.*Physalis lanceolata* Michx., Colorado, Kansas, Nebraska.*Physalis longifolia* Nutt., Colorado, Kansas, Nebraska.*Physalis virginiana* Mill., Colorado, Missouri, Oklahoma, Wisconsin.TYPE LOCALITY: Urbana, Illinois, on *Physalis viscosa*.

DISTRIBUTION: Southwestern Wisconsin to the foothills of Colorado, southward to northern Texas and northeastern New Mexico.

EXSICCATI: Barth. Fungi Columb. 3856, 4201; Barth. N. Am. Ured. 561, 653, 903, 1604, 1803; Ellis &amp; Ev. Fungi Columb. 558, 1578, 1860; Ellis &amp; Ev. N. Am. Fungi 2992, 3147.

55. *Aecidium tenerius* Arth. & Holway; Arth. Mycologia 10: 147. 1918.

O. Pycnia not seen.

I. Aecia hypophyllous, scattered or loosely grouped, round, 0.3–0.8 mm. across; peridium inconspicuous, usually hidden by the persistent epidermis; peridial cells long and narrow, often becoming curved, 5–9 by 29–48  $\mu$ , the outer and inner walls quite thin, the inner wall very finely and inconspicuously verrucose; aeciospores globoid or ellipsoid, 19–23 by 24–32  $\mu$ ; wall colorless, 2–2.5  $\mu$  thick, frequently slightly thickened above and below, inconspicuously verrucose, appearing smooth when wet.

## ON SOLANACEAE:

*Acnistus arborescens* Schlecht., Costa Rica.TYPE LOCALITY: San José, Costa Rica, on *Acnistus arborescens*.

DISTRIBUTION: Known only from the type locality.

56. *Aecidium Lycii* Arthur, sp. nov.

O. Pycnia amphigenous, numerous, in groups 1–2 mm. across, small, inconspicuous, pale-yellow, subepidermal, slightly protruding above surface of leaf, globoid in section, 100–115  $\mu$  in diameter; ostiolar filaments short.

I. Aecia hypophyllous, numerous, in orbicular groups surrounding the pycnia on somewhat discolored spots, cupulate, 0.2–0.3 mm. in diameter; peridium white, short, erect or recurved, the margin erose; peridial cells abutted or somewhat overlapping, polygonal in face-view, squarish-oblong in side-view, 16–20 by 25–30  $\mu$ , the outer wall 3–5  $\mu$  thick, smooth, the inner wall 1.5–2.5  $\mu$  thick, closely and strongly verrucose; aeciospores globoid or broadly ellipsoid, 20–24 by 23–28  $\mu$ ; wall colorless, 2–3  $\mu$  thick, finely and closely verrucose.

## ON SOLANACEAE:

*Lycium pallidum* Miers, Arizona.Type collected in the Santa Rita Mountains, Arizona, on *Lycium pallidum*, July 21, 1911, E. O. Wootton.



57. *Aecidium Collinsiae* Ellis & Ev. Bull. Washburn Lab.  
Nat. Hist. 1: 4. 1884.

*Aecidium Tonellae* Dietel & Holway, Erythea 3: 77. 1895.

O. Pycnia hypophyllous, scattered over the entire surface of the leaf, conspicuous, chestnut-brown becoming chocolate-brown, slightly flattened-globoid, 110-160  $\mu$  broad by 80-115  $\mu$  high; ostiolar filaments up to 80  $\mu$  long, agglutinated into a narrow column.

I. Aecia hypophyllous, scattered over the entire surface of the leaf, cupulate, 0.2-0.4 mm. in diameter, about 0.1 mm. high; peridium yellow, the margin recurved, lacerate; peridial cells rhomboidal, 16-25 by 24-35  $\mu$ , considerably overlapping, the outer wall thick, 7-10  $\mu$ , transversely striate, the inner wall thinner, 3.5-5  $\mu$ , closely and strongly verrucose; aeciospores angularly globoid or ellipsoid, 14-18 by 16-20  $\mu$ ; wall colorless, thin, 1-1.5  $\mu$ , closely and finely verrucose.

ON SCROPHULARIACEAE:

*Collinsia parviflora* Dougl., Oregon, Washington.

*Collinsia Rattani* A. Gray, Washington.

*Tonella tenella* (Benth.) Heller (*T. collinsioides* Nutt.), Washington.

TYPE LOCALITY: Falcon Valley, Washington, on *Collinsia parviflora*.

DISTRIBUTION: Southern Washington and northern Oregon.

EXSICCATI: Barth. N. Am. Ured. 202, 301.

58. *Aecidium insulsum* Arthur, sp. nov.

O. Pycnia amphigenous, in small groups, inconspicuous, pale-yellow, subepidermal, small, submerged beneath surface of leaf, globoid, sometimes angular, 90-125  $\mu$  in diameter; ostiolar filaments short.

I. Aecia chiefly hypophyllous, crowded in orbicular groups 1-2 mm. across which often coalesce to cover a large part or all of the leaf, cupulate, small, 0.1-0.2 mm. in diameter; peridium colorless, short, strongly revolute, the margin irregularly lacerate; peridial cells angularly ellipsoid in face-view, rhomboidal in section, 18-21 by 26-30  $\mu$ , somewhat overlapping, the outer wall 5-7  $\mu$  thick, smooth, the inner wall 1-2  $\mu$  thick, coarsely verrucose; aeciospores angularly globoid or quadrilaterally oblong, 16-20 by 18-23  $\mu$ ; wall thin, 1-1.5  $\mu$ , finely verrucose.

ON SCROPHULARIACEAE:

*Collinsia parviflora* Dougl., Utah.

Type collected at Hot Springs, Utah, on *Collinsia parviflora*, May 29, 1917, Wyatt W. Jones.

59. *Aecidium simplicius* Arth. & Johnston, Mem. Torrey Club  
17: 162. 1918.

O. Pycnia not seen.

I. Aecia hypophyllous, scattered or indefinitely grouped, cupulate, short, 0.8-1.5 mm. in diameter; peridium white, the margin erect, lacerate; peridial cells rhomboidal, 21-29  $\mu$  long, slightly or not at all overlapping, the outer wall transversely striate, rather thick, 4-7  $\mu$ , the inner wall rugose, somewhat thinner, 2.5-4  $\mu$ ; aeciospores globoid, 21-26 by 26-29  $\mu$ ; wall colorless, rather thin, 1-1.5  $\mu$ , very finely and closely verrucose.

ON BIGNONIACEAE:

*Tecoma pentaphylla* (L.) Juss., Cuba.

TYPE LOCALITY: Taco, Oriente, Cuba, on *Tecoma pentaphylla*.

DISTRIBUTION: Known only from the type locality.

60. *Aecidium Tracyanum* Sydow, Hedwigia Beibl. 40: 129. 1901.

O. Pycnia amphigenous, in small groups 0.5-1.5 mm. in diameter, conspicuous, subepidermal, chestnut-brown, globoid, 90-120 by 80-130  $\mu$ ; ostiolar filaments up to 65  $\mu$  long, projecting slightly beyond the ostiole.

I. Aecia hypophyllous, loosely grouped upon yellowish spots 0.5-1 cm. across, the spots often uniting, covering the leaf, cupulate, small, about 0.1 mm. in diameter; peridium white, the margin somewhat recurved, erose; peridial cells rhomboidal, 15-23 by 30-42  $\mu$ , overlapping,

the outer wall 4-7  $\mu$  thick, faintly transversely striate, smooth, the inner wall 3-6  $\mu$  thick, moderately verrucose, the markings often uniting to form rugose or reticulate arrangements; aeciospores globoid or ellipsoid, 18-23 by 21-26  $\mu$ ; wall colorless, thin, 0.5-1  $\mu$ , very closely and finely verrucose.

## ON ACANTHACEAE:

*Dyschoriste capitata* (Oerst.) Kuntze (*Calophanes capitata* Oerst.), Jalisco.

*Dyschoriste oblongifolia* (Michx.) Kuntze (*Calophanes oblongifolia* D. Don, *Ruellia oblongifolia* Michx.), Florida.

TYPE LOCALITY: Bradentown, Florida, on *Ruellia* [*oblongifolia*].

DISTRIBUTION: Southern Florida and southern Mexico.

61. *Aecidium Ixorae* Arth. Bull. Torrey Club 47: 473. 1920.

O. Pycnia epiphyllous, scattered unevenly over large discolored areas often 4-8 cm. across, punctiform, prominent, dark-brown, becoming whitish by age, subepidermal, flattened-hemispheric, 150-200  $\mu$  in diameter, about half as high, with a flat hymenium; ostiolar filaments wanting.

I. Aecia hypophyllous, opposite the pycnia, scattered, deep-seated, cylindric, 0.2-0.3 mm. across; peridium colorless, the margin strongly recurved, lacerate; peridial cells rhombohedric, strongly imbricate, the exposed inner face about 16-19  $\mu$  across, in section much prolonged downward on outer side, the inner wall about 3  $\mu$  thick, verrucose, the outer wall about 2  $\mu$  thick, smooth; aeciospores globoid, small, 16-19  $\mu$  in diameter; wall colorless, 1  $\mu$  or less thick, finely verrucose, appearing smooth.

## ON RUBIACEAE:

*Ixora ferrea* (Jacq.) Benth. (*Siderodendron triflorum* Vahl), Cuba.

TYPE LOCALITY: Bahia Honda, Cuba, on *Ixora ferrea*.

DISTRIBUTION: Known only from the type locality.

62. *Aecidium Borreriae* Pat.; Duss, Énum. Champ. Guad. 7. 1903.

O. Pycnia hypophyllous, numerous, scattered over the entire leaf, conspicuous, subepidermal, dark chestnut- or chocolate-brown, flattened-globoid, 120-150  $\mu$  broad by 115-128  $\mu$  high; ostiolar filaments not seen.

I. Aecia hypophyllous, loosely scattered over the entire leaf, evidently arising from an unlimited mycelium, cupulate, 0.2-0.3 mm. in diameter; peridium white, strongly recurved, deeply lacerate, fragile; peridial cells rhomboidal, 13-21 by 30-42  $\mu$ , considerably overlapping, the outer wall 2.5-3  $\mu$  thick, smooth, the inner wall somewhat thicker, 3-4  $\mu$ , closely and prominently verrucose; aeciospores globoid or broadly ellipsoid, 18-23 by 19-26  $\mu$ ; wall colorless, thin, 1-1.5  $\mu$ , closely and minutely verrucose.

## ON RUBIACEAE:

*Hemidiodia ocimifolia* (Willd.) K. Schumann (*Spermacoce ocimifolia* Willd.), Guadeloupe, Porto Rico.

TYPE LOCALITY: Basse-Terre, Guadeloupe, on "*Borreria* sp.," now determined as *Hemidiodia ocimifolia*.

DISTRIBUTION: West Indies; also in South America.

ILLUSTRATION: Mém. Soc. Neuch. Sci. Nat. 5: 569, f. 76.

63. *Aecidium Bouvardiae* Dietel & Holway; Holway, Bot. Gaz.

24: 36. 1897.

*Allodus Bouvardiae* Arth. Résult. Sci. Congr. Bot. Vienne 345. 1906.

O. Pycnia epiphyllous, few, crowded in small groups upon brownish spots, inconspicuous, subepidermal, chocolate-brown, flattened-globoid, 95-125  $\mu$  in diameter by 64-80  $\mu$  high; ostiolar filaments up to 80  $\mu$  long, agglutinated into a short column.

I. Aecia hypophyllous, loosely grouped upon brown spots 3-15 mm. in diameter, short-cylindric, about 0.2 mm. in diameter, up to 1 mm. high; peridium white, the margin erect, erose; peridial cells narrowly rhomboidal, 12-19 by 26-39  $\mu$ , overlapping, the outer wall 3-6  $\mu$  thick, faintly transversely striate, the inner wall 3-5  $\mu$  thick, closely and coarsely verrucose; aeciospores globoid or ellipsoid, 15-19 by 17-23  $\mu$ ; wall colorless, 1-2  $\mu$  thick, closely and finely verrucose.

## ON RUBIACEAE:

*Bouvardia ternifolia* (Cav.) Schlecht. (*B. triphylla* Salisb., *B. hirtella* H.B.K.), Guanajuato, Mexico (state), Querétaro.

TYPE LOCALITY: Rio Hondo, near City of Mexico, Mexico, on *Bouvardia triphylla*.

DISTRIBUTION: Central and southern Mexico.

64. *Aecidium abscedens* Arth. Mycologia 7: 315. 1915.

O. Pycnia epiphyllous, numerous on brownish spots 4–9 mm. across, prominent, golden-yellow becoming dark-brown, hemispheric, subcuticular, 90–200  $\mu$  broad by about half as high.

I. Aecia hypophyllous, very deep-seated, numerous in crowded groups, cupulate, 0.1–0.3 mm. in diameter, soon open; peridium somewhat revolute, coarsely lacerate; peridial cells oblong, 11–16 by 20–37  $\mu$ , colorless, somewhat overlapping, the outer wall 3–5  $\mu$  thick, smooth, the inner wall 3–5  $\mu$ , moderately verrucose; aeciospores broadly ellipsoid or globoid, 16–21 by 20–27  $\mu$ ; wall pale-yellow, thin, 1–1.5  $\mu$ , very closely and finely verrucose.

## ON RUBIACEAE:

*Randia mitis* L. (*aculeata* L.), Costa Rica, Porto Rico.

*Randia Watsoni* B. L. Robinson, Jalisco.

TYPE LOCALITY: Aguada, Porto Rico, on *Randia aculeata*.

DISTRIBUTION: Porto Rico, southern Mexico, and Central America.

65. *Aecidium pulverulentum* Arth. Bull. Torrey Club 33: 521. 1906.

O. Pycnia epiphyllous, numerous, gregarious on dark-brown spots 2–9 mm. in diameter, conspicuous, subcuticular, chocolate-brown, hemispheric, 80–140  $\mu$  in diameter, 40–55  $\mu$  high; ostiolar filaments wanting; pycniospores numerous from a flat hymenium.

I. Aecia hypophyllous, numerous in groups 3–9 mm. in diameter, short-cylindric, deep-seated, small, about 0.1 mm. in diameter; peridium white, evanescent; peridial cells narrowly rhomboidal, 13–16 by 30–45  $\mu$ , overlapping, the outer wall about 2.5  $\mu$  thick, smooth, the inner wall 3.5–4  $\mu$  thick, coarsely verrucose; aeciospores ellipsoid or broadly obovoid, 18–29 by 24–32  $\mu$ ; wall light cinnamon-brown, 3–4  $\mu$  thick, thickened at apex, 7–13  $\mu$ , closely and prominently verrucose.

## ON RUBIACEAE:

*Randia Watsoni* B. L. Robinson, Jalisco.

*Randia* sp., Morelos.

TYPE LOCALITY: Cuernavaca, Morelos, Mexico, on *Randia* sp.

DISTRIBUTION: Southern Mexico.

66. *Aecidium Faramaeae* Arth. Bull. Torrey Club 42: 592. 1915.

O. Pycnia epiphyllous, in small groups, 1–3 mm. across, or scattered over larger hypertrophied areas, subepidermal, deep-seated, becoming blackish-brown, globoid, 144–200  $\mu$  in diameter; ostiolar filaments short, about 30  $\mu$  high.

I. Aecia hypophyllous and caulicolous, in circular groups, 2–5 mm. across, on discolored slightly thickened spots, or scattered over large areas and producing considerable distortion on the immature petioles and stems, low-cylindric, small, 0.2–0.3 mm. in diameter; peridium colorless, the margin erect or somewhat incurved, irregularly torn; peridial cells rhomboidal or oblong, overlapping, 18–26 by 32–39  $\mu$ , the outer wall rather thin, 3–5  $\mu$ , smooth, the inner wall thicker, 5–9  $\mu$ , coarsely verrucose; aeciospores angularly globoid or oblong, 23–26 by 26–34  $\mu$ ; wall colorless, 1.5  $\mu$  thick, much thicker above, 7–12  $\mu$ , moderately and evenly verrucose.

## ON RUBIACEAE:

*Faramaea occidentalis* (L.) A. Rich., Cuba.

TYPE LOCALITY: San Diego de los Baños, Pinar del Rio, Cuba, on *Faramaea occidentalis*.

DISTRIBUTION: Known only from the type locality.

67. *Aecidium Triostei* Arth. Bull. Torrey Club 33: 32. 1906.

O. Pycnia amphigenous, crowded in small groups about 2 mm. in diameter, noticeable, subepidermal, light-brown, flattened-globoid, 65–95  $\mu$  in diameter, 30–50  $\mu$  high; ostiolar filaments up to 30  $\mu$  long, only slightly projecting beyond the ostiole.

I. *Aecia hypophyllous*, circinating about the pycnia in groups 4-5 mm. across, cupulate, 0.1-0.3 mm. in diameter; peridium pale-yellow, the margin erect, erose; peridial cells rhomboidal, 16-21 by 29-32  $\mu$ , slightly overlapping, the outer wall 7-8.5  $\mu$  thick, transversely striate, the inner wall 4-4.5  $\mu$  thick, closely and finely verrucose; aeciospores angularly globose or ellipsoid, 19-23 by 23-26  $\mu$ ; wall colorless, thin, 1  $\mu$ , closely and minutely verrucose.

## ON CAPRIFOLIACEAE:

*Triosteum angustifolium* L., Missouri.

TYPE LOCALITY: Perryville, Missouri, on *Triosteum angustifolium*.

DISTRIBUTION: Known only from the type locality.

68. *Aecidium Campanulastrum* G. W. Wilson, Proc. Iowa Acad.  
17: 74. 1911.

O. Pycnia amphigenous, few, loosely grouped upon yellowish spots 4-10 mm. in diameter, inconspicuous, dark-brown, subepidermal, flattened-globose, 95-110  $\mu$  in diameter by 65-80  $\mu$  high; ostiolar filaments short, about 50  $\mu$  long, not projecting beyond the ostiole.

I. *Aecia hypophyllous*, loosely grouped upon yellowish spots 4-10 mm. in diameter, cupulate, 0.1-0.3 mm. in diameter; peridium pale-yellow, usually almost entirely covered by the ruptured epidermis, the margin erose, soon breaking away; peridial cells rhomboidal, 12-16 by 21-26  $\mu$ , overlapping, the outer wall 3-5  $\mu$  thick, transversely striate, the inner wall thinner, 2-3  $\mu$ , closely and finely verrucose; aeciospores globose or ellipsoid, 12-15 by 13-18  $\mu$ ; wall colorless, thin, 1-1.5  $\mu$ , very obscurely verrucose.

## ON CAMPANULACEAE:

*Campanula americana* L. (*Campanulastrum americanum* Small), Iowa, Minnesota.

TYPE LOCALITY: Fayette, Iowa, on *Campanulastrum americanum*.

DISTRIBUTION: Northern Iowa and southern Minnesota.

EXSICCATI: Barth. Fungi Columb. 4603; Barth. N. Am. Ured. 1102.

69. *Aecidium Iva* H. S. Jackson, Proc. Ind. Acad.  
1917: 373. 1918.

O. Pycnia amphigenous, crowded on yellowish spots, 3-15 mm. in diameter, noticeable, subepidermal, light-yellow or light chestnut-brown, punctiform, globose, 95-160  $\mu$  in diameter; ostiolar filaments up to 80  $\mu$  long.

I. *Aecia* usually hypophyllous, sometimes amphigenous, crowded on spots with the pycnia, cupulate, 0.2-0.4 mm. in diameter; peridium brownish-yellow, the margin recurved, erose; peridial cells rhomboidal, 19-27 by 35-51  $\mu$ , overlapping, the walls 5-7  $\mu$  thick, the outer wall smooth, transversely striate, the inner wall closely and coarsely verrucose; aeciospores globose or ellipsoid, 21-29 by 26-33  $\mu$ ; wall colorless or pale-yellow, 2-3  $\mu$  thick, finely and closely verrucose.

## ON AMBROSIAEAE:

*Iva frutescens* L., Delaware, Florida, Louisiana, Maryland, Virginia.

TYPE LOCALITY: Lewes, Delaware, on *Iva frutescens*.

DISTRIBUTION: Coast of the Atlantic Ocean and Gulf of Mexico from Delaware to Louisiana.

70. *Aecidium arcularium* Arth. Bull. Torrey Club 47: 478. 1920.

O. Pycnia epiphyllous, few, gregarious, minutely punctiform, inconspicuous, subepidermal, globose or depressed-globose, 100-130  $\mu$  broad by 90-100  $\mu$  high; ostiolar filaments up to 45  $\mu$  long.

I. *Aecia hypophyllous* and caulicolous, usually densely crowded in groups 4-10 mm. across; peridium cylindrical, the margin erect, erose or deeply lacerate; peridial cells ellipsoid or oblong-angular, 21-29 by 27-40  $\mu$ , the cells overlapping, the outer wall 5-10  $\mu$  thick, transversely striate, smooth, the inner wall 2-5  $\mu$  thick, finely verrucose; aeciospores globose or ellipsoid, 18-23 by 22-29  $\mu$ ; wall colorless or pale cinnamon-brown, 1-1.5  $\mu$  thick, finely verrucose.

## ON CARDUACEAE:

*Coleosanthus grandiflorus* (Hook.) Kuntze (*Brickellia grandiflora* Nutt.), Arizona, Colorado, New Mexico.

TYPE LOCALITY: Grousemont, Platte Canyon, Colorado, on *Coleosanthus grandiflorus*.

DISTRIBUTION: Northern Colorado to southern Arizona and New Mexico.

71. *Aecidium ampliatum* Jackson & Holway; Arth. Mycologia  
10: 148. 1918.

O. Pycnia epiphyllous, numerous, gregarious in the center of yellowish spots, conspicuous, subepidermal, yellowish becoming orange, globoid or flask-shaped, 80–100  $\mu$  in diameter; ostiolar filaments short.

I. Aecia hypophyllous, crowded on yellowish spots 2–8 mm. across opposite the pycnia, or more often extending along the sides of the veins, cupulate, 0.1–0.2 mm. in diameter; peridium white or yellowish, the margin recurved, lacerate or erose; peridial cells rhomboidal, 21–23 by 42–45  $\mu$ , distinctly overlapping, the outer wall 2.5–3  $\mu$  thick, transversely striate, smooth, the inner wall somewhat thicker, 3.5–4.5  $\mu$ , prominently rugose-verrucose; aeciospores globoid or broadly ellipsoid, 23–27 by 27–30  $\mu$ ; wall colorless, thin, 1  $\mu$ , very finely and closely verrucose.

ON CARDUACEAE:

*Eupatorium* sp., Costa Rica.

TYPE LOCALITY: El Alto, near Carthago, Costa Rica, on *Eupatorium* sp.

DISTRIBUTION: Known only from the type locality.

72. *Aecidium steviicola* Arth. Bull. Torrey Club 45: 154. 1918.

O. Pycnia amphigenous, numerous, in loose groups, punctate, honey-yellow becoming brown, noticeable, subepidermal, globoid, 65–80  $\mu$  in diameter; ostiolar filaments short, 20–50  $\mu$  long, not projecting beyond the ostiole.

I. Aecia hypophyllous, in loose groups surrounding the pycnia on yellowish spots 10–15 mm. across, cupulate, the margin somewhat recurved, erose or lacerate; peridial cells irregularly oblong, 16–19 by 39–45  $\mu$ , overlapping by a downward projection of the outer wall, the outer wall 5–7  $\mu$  thick, faintly transversely striate, smooth, the inner wall thinner, about 3  $\mu$ , closely and rather coarsely verrucose; aeciospores globoid, large, 24–32 by 30–40  $\mu$ ; wall colorless, rather thin, about 1.5  $\mu$ , considerably thickened above, 6–9  $\mu$ , minutely and closely verrucose.

ON CARDUACEAE:

*Stevia* sp., Mexico (state).

TYPE LOCALITY: Popo Park, Federal District, Mexico, on *Stevia* sp.

DISTRIBUTION: Known only from the type locality.

73. *Aecidium Keerliae* Arth. Bull. Torrey Club 45: 154. 1918.

O. Pycnia amphigenous, in close groups 1–2 mm. across, punctiform, honey-yellow becoming brown, noticeable, subepidermal, globoid or slightly flattened-globoid, 95–145  $\mu$  broad by 80–125  $\mu$  high; ostiolar filaments short, up to 50  $\mu$  long, not projecting beyond the ostiole.

I. Aecia hypophyllous, in groups 3–8 mm. across, on somewhat larger, yellowish spots, cupulate, low; peridium slightly recurved, erose or lacerate; peridial cells rhomboidal, 16–18 by 27–31  $\mu$ , abutted or slightly overlapping, the outer wall 5–6  $\mu$  thick, transversely striate, the inner wall 3.5–4  $\mu$ , closely and finely verrucose; aeciospores globoid or ellipsoid, small, 12–18 by 15–20  $\mu$ ; wall nearly or quite colorless, thin, 1  $\mu$ , much thicker above, 3–6  $\mu$ , finely and closely verrucose.

ON CARDUACEAE:

*Keerlia mexicana* A. Gray, Jalisco.

TYPE LOCALITY: Guadalajara, Mexico, on *Keerlia mexicana*.

DISTRIBUTION: Known only from the type locality.

74. *Aecidium Wedeliae-hispidae* Dietel, Ann. Myc. 20: 294. 1922.

O. Pycnia epiphyllous, few in small groups, punctiform, subepidermal, dark-brown, noticeable, in section globoid, 112–130  $\mu$  in diameter; ostiolar filaments short.

I. Aecia chiefly hypophyllous, few in small, annular groups, on yellowish spots 1–1.5 mm. across, cylindrical; peridium white, 0.3–0.5 mm. in diameter, about 0.4 mm. high, deeply lobed and incised; peridial cells in face view rhomboid or oblong, 12–30 by 30–50  $\mu$ , in side view linear-oblong, moderately imbricated, the outer wall 2.5–3  $\mu$  thick, smooth, the inner wall 3–5  $\mu$  thick, closely verrucose; aeciospores oblong, obovate or ellipsoid, 13–23 by 24–40  $\mu$ ; wall colorless, thin, 1–1.5  $\mu$ , finely and closely verrucose.

## ON CARDUACEAE:

*Stemmodontia scaberrima* Cass. (*Wedelia hispida* H.B.K.), Mexico (state).

TYPE LOCALITY: Mexico, on *Wedelia hispida*.

DISTRIBUTION: Known only from the type locality.

75. *Aecidium Batesii* Arth. Bull. Torrey Club 47: 479. 1920.

O. Pycnia mostly epiphyllous, in groups 1-3 mm. in diameter, noticeable, subepidermal, chestnut- or chocolate-brown, flattened-globoid, 125-160  $\mu$  broad by 90-115  $\mu$  high; ostiolar filaments up to 95  $\mu$  long, agglutinated into a column.

I. Aecia amphigenous, loosely grouped upon brownish spots 4-8 mm. across, cupulate, 0.5-0.8 mm. in diameter; peridium yellowish, the margin remaining for a time incurved, covered more or less by the epidermis, finally becoming recurved, lacerate; peridial cells oblong, 15-19 by 32-35  $\mu$ , slightly overlapping or abutted, the outer wall rather thick, 6-10  $\mu$ , transversely striate, smooth, the inner wall thinner, 3-4  $\mu$ , closely and finely verrucose; aeciospores angularly globoid, 19-23 by 24-27  $\mu$ ; wall colorless, 1-1.5  $\mu$  thick, very closely and finely verrucose.

## ON CARDUACEAE:

*Rudbeckia hirta* L., Nebraska.

TYPE LOCALITY: Callaway, Nebraska, on *Rudbeckia hirta*.

DISTRIBUTION: Known only from the type locality.

76. *Aecidium Dahliae* Sydow, Ann. Myc. 18: 155. 1920.

O. Pycnia epiphyllous, in small groups, yellowish-brown, not conspicuous, about 100  $\mu$  in diameter.

I. Aecia hypophyllous, in dense groups, 4-8 mm. across, cupulate, about 0.3 mm. in diameter; peridium recurved, the margin lacerate; peridial cells firmly united, rhomboidal, 17-20 by 30-45  $\mu$ , strongly imbricated; aeciospores angularly globoid, 15-18 by 16-20  $\mu$ ; wall nearly colorless, 1-1.5  $\mu$  thick, minutely and closely verrucose.

## ON CARDUACEAE:

*Dahlia rosea* Cav. (*D. variabilis* Desf.), Mexico (state).

TYPE LOCALITY: Pedregal, Mexico, on *Dahlia variabilis*.

DISTRIBUTION: Known only from the type locality.

77. *Aecidium Borrighiae* Sydow, Hedwigia Beibl. 40: 129. 1901.

O. Pycnia amphigenous in small groups about 1 mm. across, punctiform, noticeable, subepidermal, dark-brown, slightly flattened-globoid, 130-160  $\mu$  broad by 100-130  $\mu$  high; ostiolar filaments up to 130  $\mu$  long, agglutinated into a column.

I. Aecia hypophyllous, loosely grouped about the pycnia in groups 2-5 mm. in diameter, cupulate, 0.1-0.2 mm. in diameter; peridium pale-yellow, the margin recurved, soon falling apart; peridial cells rhomboidal in side view, 16-19 by 34-45  $\mu$ , considerably overlapping, the outer wall rather thick, 8-10  $\mu$ , faintly transversely striate, the inner wall thinner, 4-5  $\mu$ , closely verrucose; aeciospores angularly globoid or ellipsoid, 24-28 by 26-32  $\mu$ ; wall colorless, thick, 2.5-3.5  $\mu$ , closely and minutely verrucose.

## ON CARDUACEAE:

*Borrighia frutescens* (L.) DC., Alabama.

TYPE LOCALITY: Fort Morgan, Alabama, on *Borrighia frutescens*.

DISTRIBUTION: Known only from the type locality.

78. *Aecidium conspicuum* Arth. Bull. Torrey Club 45: 153. 1918.

O. Pycnia amphigenous, crowded in round groups about 1 mm. in diameter, noticeable, subepidermal, honey-yellow, deep-seated, flask-shaped, 125-150  $\mu$  broad by 90-125  $\mu$  high not including the long ostiole; ostiolar filaments up to 80  $\mu$  long, not projecting beyond the ostiole.

I. Aecia amphigenous, very closely crowded in large groups 3-12 mm. across on slightly larger discolored spots, cupulate, 0.3-1 mm. in diameter; peridium white, fragile, the margin erect, erose, not projecting much beyond the ruptured epidermis; peridial cells rhomboidal in side view, 16-26 by 29-39  $\mu$ , strongly overlapping, the outer wall thick, 7-11  $\mu$ , transversely

striate, the inner wall thinner, 2-3  $\mu$ , very closely and finely verrucose; aeciospores angularly globoid, 18-23 by 19-26  $\mu$ ; wall colorless, thin, 1  $\mu$ , very closely and finely verrucose.

## ON CARDUACEAE:

*Dugaldea Hoopesii* (A. Gray) Rydb. (*Helenium Hoopesii* A. Gray), Arizona, Colorado, New Mexico.

TYPE LOCALITY: Snowball Creek, near Pagosa Springs, Colorado, on *Dugaldea Hoopesii*.

DISTRIBUTION: Mountains of southern Colorado into Arizona and New Mexico.

79. *Aecidium Mesadeniae* Arth. Bull. Torrey Club 47: 479. 1920.

O. Pycnia epiphyllous, few, crowded in small groups 1-2 mm. across, inconspicuous, dark-brown, subepidermal, flattened-globoid, 95-125  $\mu$  broad by 50-65  $\mu$  high; ostiolar filaments up to 40  $\mu$  long, not projecting beyond the ostiole.

I. Aecia usually hypophyllous, crowded in groups 2-6 mm. across, cupulate, small, 0.1-0.3 mm. in diameter; peridium light-yellow, the margin recurved, lacerate; peridial cells rhomboidal, 14-18 by 24-29  $\mu$ , overlapping, the outer wall 7-9  $\mu$  thick, transversely striate, smooth, the inner wall 2-3  $\mu$  thick, closely and rather finely verrucose; aeciospores globoid or ellipsoid, 12-16 by 15-19  $\mu$ ; wall colorless, thin, 1  $\mu$  or less, closely and finely verrucose.

## ON CARDUACEAE:

*Mesadenia atriplicifolia* (L.) Raf. (*Cacalia atriplicifolia* L.), Kansas, Missouri.

*Mesadenia reniformis* (Muhl.) Raf. (*Cacalia reniformis* Muhl.), Wisconsin.

TYPE LOCALITY: Somers, Wisconsin, on *Mesadenia reniformis*.

DISTRIBUTION: Northeastern Wisconsin to northeastern Kansas.

EXSICCATI: Ellis & Ev. N. Am. Fungi 1811; Rab.-Wint.-Paz. Fungi Eur. 3833a.

80. *Aecidium Liabi* Mayor, Mém. Soc. Neuch. Sci. Nat. 5: 576. 1913.

*Aecidium Liabi* Arth. Bull. Torrey Club 47: 479. 1920.

O. Pycnia epiphyllous, somewhat loosely grouped on discolored areas, inconspicuous, dark-brown, subepidermal, ellipsoid, about 95 by 128  $\mu$ ; ostiolar filaments short, about 45  $\mu$ , not projecting beyond the ostiole.

I. Aecia hypophyllous, in groups up to 8 mm. in diameter, cupulate, 0.3-0.8 mm. in diameter; peridium pale-yellow, fragile; peridial cells rhomboidal, 19-23 by 35-55  $\mu$ , considerably overlapping, the outer wall 2-5  $\mu$  thick, smooth, the inner wall thicker, 5-7  $\mu$ , closely tuberculate-verrucose; aeciospores angularly globoid, 21-26 by 26-31  $\mu$ ; wall colorless, 1.5-2.5  $\mu$  thick, closely and distinctly verrucose.

## ON CARDUACEAE:

*Liabum* sp., Veractuz.

TYPE LOCALITY: Summit of Alto Don Elias, 2100 meters, Antioquia, Colombia, on *Liabum igniarium*.

DISTRIBUTION: Southern Mexico; also in South America.

ILLUSTRATION: Mém. Soc. Neuch. Sci. Nat. 5: 576, f. 82.

81. *Aecidium praecipuum* Arth. Bull. Torrey Club 47: 480. 1920.

O. Pycnia amphigenous, in small groups about 2 mm. across, noticeable, pale-yellow becoming dark-brown, subepidermal, flattened-globoid, 110-130  $\mu$  broad by 80-95  $\mu$  high; ostiolar filaments up to 60  $\mu$  long, slightly projecting beyond the ostiole.

I. Aecia hypophyllous, crowded on spots 2-10 mm. across, short-cylindric, 0.3-0.5 mm. in diameter; peridium pale-yellow, the margin erect, erose; peridial cells irregularly oblong, 20-23 by 32-40  $\mu$ , considerably overlapping by a long projection of the outer wall, the outer wall thick, 9-11  $\mu$ , transversely striate, smooth, the inner wall thinner, 4-5.5  $\mu$ , closely and noticeably verrucose; aeciospores angularly globoid or ellipsoid, 16-19 by 19-26  $\mu$ ; wall colorless, thick, 2.5-3.5  $\mu$ , very closely and inconspicuously verrucose.

## ON CARDUACEAE:

*Senecio praecox* DC., Hidalgo, Mexico (state).

TYPE LOCALITY: Sierra de Pachuca, State of Mexico, Mexico, on *Senecio praecox*.

DISTRIBUTION: Southern Mexico.

82. *Aecidium hualtatinum* Speg. Bol. Acad. Ci. Cordoba  
11: 184. 1888.

*Aecidium thermanum* Dietel & Neger, Bot. Jahrb. 24: 161. 1897.  
*Aecidium Herrerianum* Arth. Bull. Torrey Club 33: 520. 1906.

O. Pycnia hypophyllous, in small groups 1 mm. or less across, surrounded by aecia, inconspicuous, subepidermal, almost wholly immersed, honey-yellow becoming dark-brown, flask-shaped, 80–125  $\mu$  broad by 80–110  $\mu$  high; ostiolar filaments 40–65  $\mu$  long, agglutinated into a column.

I. Aecia hypophyllous, gregarious, crowded in small groups 2–5 mm. across, cylindrical, 0.2–0.5 mm. in diameter, up to 1.5 mm. long; peridium pale-yellow, the margin erect, deeply lacerate; peridial cells rhomboidal, 15–25 by 32–50  $\mu$ , occasionally up to 65  $\mu$  long, considerably overlapping, the outer wall much thickened, 9–12  $\mu$ , transversely striate, the inner wall thinner, 4–5  $\mu$ , closely rugose; aeciospores globoid, often angular, large, 23–27 by 28–34  $\mu$ ; wall pale cinnamon-brown, thick, 3–4  $\mu$ , closely and finely verrucose.

ON CARDUACEAE:

*Senecio salignus* DC., Hidalgo.

TYPE LOCALITY: Gabel Island, Patagonia, on *Senecio (Hualtata)*.

DISTRIBUTION: Southern Mexico; also in South America.

83. *Aecidium Pereziae* Arth. Bull. Torrey Club 45: 153. 1918.

O. Pycnia chiefly epiphyllous, closely grouped, honey-yellow becoming brown, punctiform, noticeable, subepidermal.

I. Aecia hypophyllous, numerous, opposite the pycnia, in well defined groups 0.3–0.6 mm. across, on roseate or yellowish spots 10–15 mm. across, cupulate; peridium usually erect, the margin erose or lacerate; peridial cells easily separating, rhomboid, 19–26 by 26–37  $\mu$ , the outer wall 8–10  $\mu$  thick, faintly transversely striate, the inner wall 3–6  $\mu$  thick, moderately verrucose; aeciospores globoid, 13–18 by 16–19  $\mu$ ; wall nearly or quite colorless, thin, 1–1.5  $\mu$ , very minutely verrucose, appearing smooth when wet.

ON CARDUACEAE:

*Perezia* sp., Mexico.

TYPE LOCALITY: Barranca, Mexico, on *Perezia* sp.

DISTRIBUTION: Known only from the type locality.

84. *Aecidium columbiense* Ellis & Ev. Erythea 1: 206. 1893.

O. Pycnia amphigenous, scattered over the entire leaf, conspicuous, subepidermal, light-brown, flattened-globoid, 90–130  $\mu$  in diameter by 70–95  $\mu$  high; ostiolar filaments 50–100  $\mu$  long, agglutinated into a column.

I. Aecia hypophyllous, scattered over the entire leaf, arising from a diffused mycelium causing a narrowing of the leaves, cupulate, rather large, 0.3–1 mm. in diameter; peridium pale-yellow, the margin incurved, erose; peridial cells rhomboidal, 16–19 by 25–32  $\mu$ , overlapping slightly, the outer wall 5–8  $\mu$  thick, transversely striate, the inner wall 3–4  $\mu$  thick, closely and rather finely verrucose; aeciospores globoid, 16–20 by 18–21  $\mu$ ; wall colorless, thin, 1–1.5  $\mu$ , closely and minutely verrucose.

ON CICHORIACEAE:

*Hieracium albertinum* Farr. (*H. Scouleri* A. Gray not Hook.), Washington.

*Hieracium albiflorum* Hook., Oregon, Washington; British Columbia.

*Hieracium* sp., California.

TYPE LOCALITY: British Columbia, on *Hieracium* sp.

DISTRIBUTION: Northern California to British Columbia.

EXSICCATI: Barth. N. Am. Ured. 468 in part.

EXCLUDED OR DOUBTFUL SPECIES

*AECIDIUM ASPERIFOLII* Schw. Schr. Nat. Ges. Leipzig 1: 66, hyponym. 1822. Not *A. Asperifolii* Pers. No specimen extant, and the evidence is strongly indicative of some error in determination.

*AECIDIUM IPOMOEAEPANDURANAE* Schw. Schr. Nat. Ges. Leipzig 1: 69. 1822. (*Caecoma convolvulatum* Schw. Trans. Am. Phil. Soc. II. 4: 292, and *Aecidium convolvulatum* Schw. l. c. 309. 1832.) A species of the Peronosporales, *Albugo Ipomoeae-panduranae* (Schw.) Swingle.



**AECIDIUM (CAEOMA) OSMUNDATUM** Schw. Trans. Am. Phil. Soc. II. 4: 309. (*Caema Osmundatum* Schw. l. c. 294.) 1832. It is now determined as *Mycosyrinx Osmundae* Peck, and thought to be a member of the Ustilaginales or a Hyphomycete.

**AECIDIUM RUMICIS** Schw. Schr. Nat. Ges. Leipzig 1: 66, hyponym. 1822. Not *A. Rumicis* Hoffm. Said to have been on *Rumex* and *Grossularia*. No specimen preserved, and probably not a rust, but some *fungus imperfectus*, as the description says "rarely perfect."

## 5. PERIDERMIMUM.

*Aecia* on gymnospermous hosts, definite, subepidermal, erumpent; peridium usually more than one cell in thickness either above or at base, or throughout, cylindrical, flattened laterally, or irregularly bullate, firm or less often delicate and fragile, opening by circumscissile rupture, or less often at apex, the margin erect, frayed, the peridial cells abutted or overlapping, usually smooth without and verrucose or tuberculate within; aeciospores catenulate, one-celled, globoid or ellipsoid; wall colorless, verrucose or tuberculate, the tubercles often deciduous.

*Pycnia* subcuticular or subepidermal, or subcortical and more or less indefinite, with short or no ostiolar filaments.

Genus based upon a concept, and not upon a type species.

Host belonging to family Pinaceae.

Of the genus *Pinus*; *pycnie* subepidermal.

Aeciospores ellipsoid, the wall thick, 3-3.5  $\mu$ .

Aeciospores oblong, the wall thin, 2-2.5  $\mu$ .

Of the genus *Abies*; *pycnie* subcuticular.

*Aecia* large; peridial cells finely verrucose.

*Aecia* small; peridial cells rugose.

Of the genus *Picea*.

*Pycnia* subcuticular; mycelium annual.

*Pycnia* subepidermal; mycelium perennial.

Host belonging to family Ephedraceae.

1. *P. guatemalense*.

2. *P. Weirii*.

3. *P. ornamentale*.

4. *P. rugosum*.

5. *P. ingenuum*.

6. *P. coloradense*.

7. *P. Ephedrae*.

### 1. *Peridermium guatemalense* Arth. & Kern, Mycologia

6: 121. 1914.

*Peridermium gracile* Arth. & Kern, Bull. Torrey Club 33: 417. 1906. Not *P. gracile* Hark. 1884.

*Peridermium floridum* Hedge. & Hahn, Mycologia 12: 194. 1920.

O. *Pycnia* amphigenous, numerous, subepidermal, low-conoidal, dehiscent by a longitudinal slit, 190-350  $\mu$  broad by 0.5-0.8 mm. long and 60-75  $\mu$  high.

I. *Aecia* amphigenous, numerous on discolored spots occupying part of the leaf, erumpent from longitudinal narrow slits; peridium flattened laterally, 0.3-0.5 by 0.5-1.5 mm. by 1-1.8 mm. high, rupturing irregularly; peridial cells broadly ellipsoid in face view, 23-29 by 30-60  $\mu$ , overlapping, the outer wall 4-6  $\mu$  thick, smooth, the inner wall 6-10  $\mu$  thick, finely and closely verrucose; aeciospores ellipsoid, 18-24 by 22-39  $\mu$ ; wall 3-3.5  $\mu$  thick, closely and evenly verrucose with large deciduous tubercles.

ON PINACEAE:

*Pinus filifolia* Lindl., Jalisco, Oaxaca; Guatemala.

*Pinus palustris* Mill. (*P. australis* Michx.), Florida.

TYPE LOCALITY: Antigua, Sacatepéquez, Guatemala, on *Pinus filifolia*.

DISTRIBUTION: Central Florida, southern Mexico, and Guatemala.

### 2. *Peridermium Weirii* Arthur sp. nov.

O. *Pycnia* amphigenous, brownish, conspicuous, originating between the mesophyll and subepidermal layer, linear, 0.3-0.8 mm. wide by 0.6-1.3 mm. long, dehiscent by a longitudinal slit, slightly raising the leaf-surface, in section 70-96  $\mu$  high.

I. *Aecia* from a limited mycelium, amphigenous, sparse, on yellowish spots, erumpent from longitudinal slits, tongue-shaped, 0.5-1.3 mm. long by 0.5-0.7 mm. high; peridium white, rupturing at first along the summit, fragile; peridial cells not or slightly overlapping, broadly oblong in face view 23-38 by 30-50  $\mu$ , the inner wall closely and rather coarsely verrucose, 4-5  $\mu$  thick, the outer wall nearly or quite smooth and thinner; aeciospores oblong, ovoid, or

broadly ellipsoid, 16–20 by 29–35  $\mu$ ; wall colorless, 2–2.5  $\mu$  thick, evenly and closely verrucose with short rods about 1  $\mu$  long.

ON PINACEAE:

*Pinus contorta* Dougl. (*P. Murrayana* Balf.), Idaho.  
Type collected at Kooskia, Idaho, July, 1917, James R. Weir 14716.

3. *Peridermium ornamentale* Arth. Bull. Torrey Club  
28: 665. 1901.

*Peridermium Holwayi* Sydow, Ann. Myc. 1: 19. 1903.  
*Aecidium ornamentale* Farl. Bibl. Index 1: 71. 1905. Not *A. ornamentale* Kalchbr. 1875.

O. Pycnia amphigenous, numerous, hemispheric or flat, often confluent, inconspicuous, subcuticular, sometimes sunken into and depressing the epidermal cells, 130–175  $\mu$  broad, 25–35  $\mu$  high.

I. Aecia chiefly hypophyllous, on yellowish spots; peridium cylindroid, somewhat flattened laterally, 0.2–0.4 by 0.3–0.6 mm. by 0.5–1.5 mm. high, dehiscent at apex or irregularly; peridial cells oblong or lanceolate-oblong, overlapping, the outer wall 1–1.5  $\mu$  thick, smooth, the inner wall thicker, 2–4  $\mu$ , finely verrucose; aeciospores broadly ellipsoid, 15–18 by 18–29  $\mu$ ; wall colorless, thin, 1–1.5  $\mu$ , finely and closely verrucose.

ON PINACEAE:

*Abies concolor* Lindl. & Gord., California, Oregon.  
*Abies lasiocarpa* (Hook.) Nutt., Idaho, Montana, Oregon, Washington; Alberta, British Columbia.  
TYPE LOCALITY: Mountains of Skamania County, Washington, on *Abies lasiocarpa*.  
DISTRIBUTION: Western Montana to northern California, northward into Canada.  
EXSICCATI: Barth. N. Am. Ured. 2005.

4. *Peridermium rugosum* H. S. Jackson, sp. nov.

O. Pycnia hypophyllous, rather numerous, inconspicuous, scattered, only slightly raised above leaf-surface, subcuticular, hemispheric or lenticular, extending between the cells beneath and greatly depressing the tissues, giving the appearance of being subepidermal, 140–170  $\mu$  broad by 120–160  $\mu$  high.

I. Aecia hypophyllous, on leaves of the preceding season, in two rows on yellow spots, either side of midrib, occupying part or all of leaf, white, deep-seated, cylindric, 0.4–0.5 mm. in diameter by 0.6–1 mm. high; peridium colorless, the margin erect, erose or deeply lacerate; peridial cells polygonal or angularly ellipsoid in face view, oblong in side view, somewhat overlapping, 14–16 by 30–45  $\mu$ , the outer wall smooth 1–1.5  $\mu$  thick, the inner wall 3–4.5  $\mu$  thick, strongly rugose-verrucose, best seen in face view; aeciospores broadly ellipsoid, 16–24 by 24–32  $\mu$ ; wall thin, 1.5–2  $\mu$ , colorless, closely and prominently verrucose, the markings somewhat deciduous.

ON PINACEAE:

*Abies grandis* Lindl., Oregon, Washington.  
Type collected at Lake Cushman, Olympic Mountains, Washington, October, 1915, Rose M. Taylor.

5. *Peridermium ingenuum* Arthur.

*Peridermium ingenuum* Arth.; Rhoads, Hedge., Bethel & Hartley, Phytopathology 8: 336, hyponym. 1918.  
*Aecidium ingenuum* Arth. Bull. Torrey Club 46: 124. 1919.

O. Pycnia hypophyllous, discoid, inconspicuous, subcuticular, 80–130  $\mu$  broad by 40–50  $\mu$  high; ostiolar filaments wanting.

I. Aecia hypophyllous, closely packed in rows, over part or the whole leaf, often confluent; peridium nearly cylindric to tongue-shaped, 0.5–0.8 mm. high, very delicate and fragile; peridial cells in radial section narrowly oblong or linear, 10–16 by 32–42  $\mu$ , somewhat overlapping, the outer wall 1–2  $\mu$  thick, smooth, the inner wall 3–5  $\mu$  thick, closely verrucose with slender tubercles; aeciospores globoid or broadly ellipsoid, 13–16 by 16–23  $\mu$ ; wall colorless, 2–3  $\mu$  thick, half the thickness being due to the close, rather fine, and somewhat deciduous tubercles.

## ON PINACEAE:

*Picea canadensis* (Mill.) B. S. P. (*P. alba* Link, *Abies canadensis* Mill.), South Dakota, Vermont, Wisconsin.

TYPE LOCALITY: Walden, Vermont, on *Picea canadensis*.

DISTRIBUTION: Northern Vermont to the Black Hills in South Dakota.

6. *Peridermium coloradense* (Dietel) Arth. & Kern, Bull. Torrey Club 33: 426. 1906

*Aecidium coloradense* Dietel, in E. & P. Nat. Pfl. 11\*\*: 78. 1897.

*Peridermium boreale* Arth. & Kern, Bull. Torrey Club 33: 425. 1906.

O. Pycnia amphigenous, numerous, conspicuous, honey-yellow becoming blackish-brown, punctiform, subepidermal, in section globoid or flask-shaped, slightly protruding, 100–150  $\mu$  broad.

I. Aecia from perennial mycelium, forming witches' brooms often of great size, hypophyllous, in two irregular rows, erumpent from a lenticular opening 0.5–2.5 mm. long; peridium flattened laterally, 0.5–1.2 mm. high, dehiscent along the sides, the upper part often falling away; peridial cells oblong or ellipsoid, slightly overlapping, the outer wall 1.5–2.5  $\mu$  thick, smooth, the inner wall 3–4  $\mu$ , verrucose; aeciospores broadly ellipsoid or globoid, 16–25 by 23–35  $\mu$ ; wall colorless, 2–4  $\mu$  thick, densely and rather finely verrucose.

## ON PINACEAE:

*Picea albertiana* S. Brown, Alberta, British Columbia.

*Picea canadensis* (Mill.) B. S. P. (*P. alba* Link, *Abies canadensis* Mill.), Michigan, South Dakota, Washington; Saskatchewan, Yukon.

*Picea Engelmanni* (Parry) Engelm., Colorado, Idaho, Montana, Oregon, Utah, Washington, Wyoming; Saskatchewan.

*Picea excelsa* (Lam.) Link (*P. abies* Karst., *P. vulgaris* Link, *Pinus abies* L.), Washington; Manitoba.

*Picea mariana* (Mill.) B. S. P. (*P. nigra* Ait.), Maine, Michigan, Wisconsin; Quebec.

*Picea pungens* Engelm. (*P. Parryana* Sarg.), Colorado, New Mexico, South Dakota, Wyoming.

*Picea rubens* Sarg. (*P. rubra* Dietr.), Maine, New York.

*Picea sitchensis* (Bong.) Carr., Alaska.

TYPE LOCALITY: Music Pass, Sangre de Christo Range, Colorado, on *Picea Engelmanni*.

DISTRIBUTION: Across the northern part of the continent from Maine, Michigan, and South Dakota northward, and in the mountains from northern New Mexico to Oregon northward.

EXSICCATI: Barth. Fungi Columb. 2740; Barth. N. Am. Ured. 112, 1213, 1620, 1729, 1820, 1921, 2024, 2123, 2215, 2332, 2922; Clements, Crypt. Form. Col. 152; Ellis & Ev. Fungi Columb. 876, 1479; Ellis & Ev. N. Am. Fungi 2223; Seym. & Earle, Econ. Fungi 221.

7. *Peridermium Ephedrae* Cooke, Indian Forester 3: 95. 1877.

*Peridermium Pini minor* Berk. & Curt. Grevillea 3: 59. 1874.

*Coleosporium Senecionis minus* De-Toni, in Sacc. Syll. Fung. 7: 752. 1888.

*Aecidium Ephedrae* Dietel, in E. & P. Nat. Pfl. 11\*\*: 79. 1897.

O. Pycnia caulicolous, numerous, conspicuous, scattered irregularly, honey-yellow becoming golden-brown, subcuticular, conic, often truncate, 75–130  $\mu$  broad, 50–70  $\mu$  high.

I. Aecia caulicolous, from a perennial mycelium, numerous, scattered over slightly hypertrophied shoots; peridium cylindrical, slender, 0.3–0.4 mm. in diameter, 1.5–2.5 mm. high, firm, dehiscent at apex; peridial cells oblong, abutted, the walls 4–5  $\mu$  thick, the inner wall finely verrucose; aeciospores broadly ellipsoid or globoid, 16–20 by 19–26  $\mu$ ; wall colorless, thin, 1–1.5  $\mu$ , closely and finely verrucose.

## ON EPHEDRACEAE:

*Ephedra antisiphilitica* C. Meyer, New Mexico, Texas; Lower California, San Luis Potosí.

*Ephedra californica* S. Wats., California; Lower California.

*Ephedra nevadensis* S. Wats., Arizona.

*Ephedra trifurca* Torr., New Mexico.

*Ephedra viridis* Coville, Arizona.

TYPE LOCALITY: Texas, on *Ephedra antisiphilitica*.

DISTRIBUTION: Southwestern Texas and southern California to central Mexico.

EXSICCATI: Barth. N. Am. Ured. 1621; Rav. Fungi Car. 3: 95.

6. CAEOMA.

Aecia (or in some instances uredinia) without peridia (sometimes with paraphyses), more or less indefinite, subepidermal; aeciospores catenulate, one-celled, globoid or ellipsoid; wall colorless or yellowish, verrucose.

Pycnia subcuticular or subepidermal; ostiolar filaments wanting.  
Genus based upon a concept, and not upon a type species.

1. *Caecoma dubium* C. A. Ludwig, *Phytopathology* 5: 281. 1915.

O. Pycnia hypophyllous, rather numerous, scattered, noticeable, golden-brown, subepidermal, hemispheric or discoid, 80–115  $\mu$  wide by 50–80  $\mu$  high; ostiolar filaments wanting.

I. Aecia hypophyllous in two longitudinal lines, subepidermal, oblong, 0.2–0.4 mm. wide by 0.3–0.8 mm. long, not crowded, early naked, pulverulent, light-yellow when dry, ruptured epidermis evident; aeciospores broadly ellipsoid or globoid, 15–21 by 15–22  $\mu$ ; wall colorless, 1.5–2.5  $\mu$  thick, often thicker above, 3–4.5  $\mu$ , prominently and very closely verrucose.

ON PINACEAE:

*Tsuga heterophylla* (Raf.) Sarg., Idaho, Oregon, Washington.  
TYPE LOCALITY: Bainbridge Island, Kitsap County, Washington, on *Tsuga heterophylla*.  
DISTRIBUTION: Northern Idaho to northwestern Washington.  
EXSICCATI: Barth. *Fungi Columb.* 3103; Barth. *N. Am. Ured.* 103.

EXCLUDED SPECIES

- CAECOMA ABERRANS Peck, *Bull. Torrey Club* 22:210. 1895. On bark of living alder, Newfoundland. Not a fungus, but the natural development of lenticels under moist conditions.
- CAECOMA (URED) BRUNNEUM Schw. *Trans. Am. Phil. Soc.* II. 4:291. 1832. On an unknown plant from Philadelphia, Pennsylvania. Examination of the original material shows the spots due probably to some pathological condition and not caused by a fungus of any kind.
- CAECOMA (AECIDIUM) CONVOLVULATUM Schw. *Trans. Am. Phil. Soc.* II. 4:292. 1832. (*Aecidium convolutatum* Schw. *Trans. Am. Phil. Soc.* II. 4:309. 1832, *A. Ipomoeae-panduranae* Schw. *Schr. Nat. Ges. Leipzig* 1:69. 1822). On *Convolvulus panduratus* L., Pennsylvania. A species of the Peronosporales, *Albugo Ipomoeae-panduranae* (Schw.) Swingle.
- CAECOMA (URED) LOBELIAE-CARDINALIS Schw. *Trans. Am. Phil. Soc.* II. 4:291. 1832. The original material consists of a leaf well covered by a brown growth of the hyphomycetous fungus, *Cercospora effusa* (Berk. & Curt.) Ellis & Ev.
- CAECOMA (AECIDIUM) OSMUNDATUM Schw. *Trans. Am. Phil. Soc.* II. 4:294. 1832. On *Osmunda spectabilis* Willd., New York. Not a rust, but is determined as *Mycosyrinx Osmundae* Peck, and considered to be either a member of the Ustilaginales or a Hyphomycete.
- CAECOMA (URED) TEUCRII Schw. *Trans. Am. Phil. Soc.* II. 4:291. 1832. On *Teucrium virginicum* L. (*T. canadense* L.), Bethlehem, Pennsylvania. The original material shows the hyphomycetous fungus, *Cercospora Teucrii* (Schw.) Arth. & Bisby (*C. racemosa* Ellis & Martin).

## ADDITIONS AND CORRECTIONS TO UREDINALES

As the additions and corrections to *Ustilaginales* must in any event be separated by hundreds of pages from the original text, they have been deferred, to follow the corrections and additions, and the host-index, to the *Uredinales*, thus making the entire treatment of *Uredinales* consecutive.

Self-evident errors, and such as may readily be detected by reference to the bibliography or index, are not listed here. In a few cases so many additions have been made to the number of species under a genus that a new key, wholly or in part, has been substituted. Few changes have been made in the descriptions of genera or species, although in some cases a more exact statement could now be given. Unless the name of the host is erroneous it has not been changed to make it agree with recent studies, except in a few instances, even when the synonymy is antiquated. Additional localities for hosts are given near the end of the volume, except in a few instances where the range of the species is greatly extended. The statement regarding distribution has not been changed, except in rare instances, although in a number of cases added hosts have evidently extended the range.

## Page

## 83. UREDINALES.

Omit the word "four" in the 20th line of the diagnosis, and make the last lines of the same sentence read as follows: "each basidium supporting four stalked or sessile basidiospores."

## COLEOSPORIACEAE

BY JOSEPH CHARLES ARTHUR

## 85. COLEOSPORIACEAE.

Substitute the following key to genera:

- |  |                  |
|--|------------------|
| Basidiospores on long sterigmata. Subfamily COLEOSPORIATAE.  | 1. COLEOSPORIUM. |
| Life-cycle with all spore-forms.                             | 1a. SYNOHYCES.   |
| Life-cycle with pycnia, aecia, and telia.                    | 2. GALLOWAYA.    |
| Life-cycle with telia only.                                  | 3. CHRYSOPSORA.  |
| Basidiospores on short sterigmata. Subfamily CHRYSOPSORATAE. |                  |

## 85. COLEOSPORIUM.

Omit the first line in the key.

Insert, after no. 4:

- |                                       |                           |
|---------------------------------------|---------------------------|
| Host belonging to family Oleaceae.    | 4a. <i>C. minutum</i> .   |
| Host belonging to family Loganiaceae. | 4b. <i>C. Spigeliae</i> . |

Replace nos. 12-14 by:

- |   |                             |
|---|-----------------------------|
| Urediniospores coarsely verrucose or tuberculate. |                             |
| Urediniospores small, 22-27 $\mu$ long.           | 12. <i>C. Eupatorii</i> .   |
| Urediniospores large, 26-35 $\mu$ long.           | 13. <i>C. Steviae</i> .     |
| Urediniospores finely verrucose.                  |                             |
| Urediniospores small, 20-28 $\mu$ long.           | 13a. <i>C. aridum</i> .     |
| Urediniospores large, 24-35 $\mu$ long.           | 14. <i>C. Laciniariae</i> . |

Replace no. 15 by:

- |  |                                |
|--|--------------------------------|
| Of the tribe Astereae.                             |                                |
| Urediniospores ellipsoid; wall strongly verrucose. | 15. <i>C. Solidaginis</i> .    |
| Urediniospores oblong; wall finely verrucose.      | 15a. <i>C. delicatulum</i> .   |
| Of the tribe Inulae.                               | 15b. <i>C. Adenocaulonis</i> . |

Replace no. 18 by:

- |   |                               |
|---|-------------------------------|
| Teliospores narrowed at both ends, apical outlines distinct.                                |                               |
| Urediniospores small, 19-27 $\mu$ long, the wall finely verrucose.                          |                               |
| Urediniospores ellipsoid, 14-20 $\mu$ wide, the wall 1.5 $\mu$ thick.                       | 18. <i>C. Helianthi</i> .     |
| Urediniospores broadly ellipsoid, 18-23 $\mu$ wide, the wall 1 $\mu$ thick.                 | 18a. <i>C. inconspicuum</i> . |
| Urediniospores larger, oblong, 16-22 $\times$ 24-32 $\mu$ , the wall tuberculate-verrucose. | 18b. <i>C. Viguierae</i> .    |

Omit no. 21.

86. Add to the key.

Host belonging to family Cichoriaceae.

25. *C. Sonchi-arsensis*.

86. *Coleosporium Bletiae*.

Omit all pertaining to this species. The record was based on scanty material from imported plants. The rust has not persisted, and seems not to have been found a second time in North America. It, therefore, can not be said to form any genuine part of the North American flora.

86. *Coleosporium ribicola*.

Add the synonym: *Peridermium ribicola* Long, *Mycologia* 8: 310. 1916.

Replace the line following the synonymy by:

O. Pycnia amphigenous, scattered, low-conoidal, chestnut-brown, noticeable, sub-corticular, dehiscent by a longitudinal slit, 0.5-1 mm. long by 0.3-0.5 mm. broad, about 0.1 mm. high.

I. Aecia from a limited mycelium, amphigenous, few, flattened laterally, 0.5-1 mm. long by 0.5-1.2 mm. high; peridium colorless, fragile; peridial cells slightly or not overlapping, the outer wall smooth or nearly so, the inner wall finely and moderately verrucose, the lower cells elliptic, oval or lanceolate, 16-24 by 33-50  $\mu$ , with walls 2-3  $\mu$  thick, the upper cells irregularly orbicular, nearly isodiametric, 18-30  $\mu$  in diameter, with walls 2-4  $\mu$  thick; aeciospores elliptic-oblong, oval, or obovate, 20-28 by 30-43  $\mu$ ; wall colorless, 2-3  $\mu$  thick, uniformly verrucose with rather coarse irregular warts, which are tardily deciduous.

ON PINACEAE:

*Caryophytus edulis* (Engelm.) Small (*Pinus edulis* Engelm.), Arizona, Colorado, New Mexico.

Replace the five hosts under Grossulariaceae by:

*Grossularia Cynosbati* (L.) Mill. (*Ribes Cynosbati* L., *R. gracile* Michx.), Wisconsin.  
*Grossularia inermis* (Rydb.) Cov. & Britt. (*Ribes inerne* Rydb., *R. Purpusii* Koehne, *R. ralicola* Greene), California, Colorado, New Mexico, Wyoming.  
*Grossularia leptantha* (A. Gray) Cov. & Britt. (*Ribes leptantha* A. Gray), Colorado, New Mexico.  
*Grossularia pinetorum* (Greene) Cov. & Britt. (*Ribes pinetorum* Greene), New Mexico.  
*Grossularia reclinata* (L.) Mill. (*Ribes Grossularia* L., *R. Uva-crispa* L.), Colorado.  
*Ribes americanum* Mill. (*R. floridum* L'Hér.), Colorado.  
*Ribes aureum* Pursh (*Chrysobotrya aurea* Rydb.), Colorado.  
*Ribes cereum* Lindl., Utah.  
*Ribes coloradense* Coville, Utah.  
*Ribes inebrians* Lindl. (*R. pumilum* Nutt.), Arizona, Colorado, Montana, New Mexico, South Dakota, Utah.  
*Ribes lacustre* (Pers.) Poir. (*Limnobotrya lacustris* Rydb.), Montana.  
*Ribes montigenum* McClatchie (*R. lentum* Cov. & Rose, *Limnobotrya montigena* Rydb.), Colorado, New Mexico.  
*Ribes nevadense* Kellogg, California.  
*Ribes odoratum* Wendl. (*R. longiflorum* Nutt., *Chrysobotrya odorata* Rydb.), Arizona, Colorado, New Mexico.  
*Ribes Wolfii* Rothr., New Mexico.

Add the exsiccati: Barth. *Fungi Columb.* 2920, 3514, 3515, 4812; Barth. *N. Am. Ured.* 305, 306, 602, 709, 1404, 1607, 1809, 1908, 1909, 2807, 3008, 3009; Garrett, *Fungi Utah.* 201.

86. *Coleosporium Mentzeliae*.

Add the host: *Mentzelia cordata* (Kell. & Curr.) Arth. (*Eucnida cordata* Kell. & Curr.), Lower California.

86. *Coleosporium Begoniae*.

Add the host: *Begonia gracilis* Kunth, Mexico (state).

## 87. Insert:

4a. *Coleosporium minutum* Hedge. & Hunt, Mycologia 12: 187. 1920.

*Peridermium minutum* Hedge. & Hunt, Mycologia 9: 242. 1917.

O. Pycnia few, solitary or wanting, tawny to chestnut-brown, 0.2-0.4 mm. wide by 0.3-0.5 mm. long.

I. Aecia largely epiphyllous, scattered, often in a single row, low and inconspicuous, flattened laterally, 0.3-0.7 mm. broad by 0.5-1.2 mm. long and 0.3-0.5 mm. high; peridia very delicate, rupturing longitudinally with finely fimbriated edges which recurve on maturity; peridial cells ovoid, ellipsoid, or rhomboid in face view, slightly overlapping or abutted, 18-28 by 35-70  $\mu$ , with walls 2-4  $\mu$  thick, the outer smooth, the inner finely verrucose; aeciospores ovoid, ellipsoid, or oblong, sometimes pointed at one end; wall colorless, 2-4  $\mu$  thick, verrucose with blunt tubercles 2.5-3.5  $\mu$  long.

## ON PINACEAE:

*Pinus glabra* Walt., Florida.

*Pinus Taeda* L., Florida.

II. Uredinia hypophyllous, scattered on slightly chlorotic areas, roundish, small, 0.1-0.5 mm. across, orange-yellow fading to white, ruptured epidermis inconspicuous; urediniospores globoid or ellipsoid, 15-23 by 18-31  $\mu$ ; wall 1-1.5  $\mu$  thick, thicker above, 2-8  $\mu$ , coarsely verrucose with conic tubercles.

III. Telia hypophyllous, scattered or somewhat gregarious, roundish, small, 0.2-0.4 mm. across, reddish, ruptured epidermis inconspicuous; teliospores cylindrical or somewhat clavate, 18-32 by 30-70  $\mu$ , rounded or obtuse above, obtuse or narrowed below; wall colorless, thin, swelling above, 20-26  $\mu$ .

## ON OLEACEAE:

*Forestiera ligustrina* Poir. (*Adelia ligustrina* Michx.), Florida.

TYPE LOCALITY: Gainesville, Florida, on *Pinus glabra*.

DISTRIBUTION: Central Florida.

4b. *Coleosporium Spigeliae* Arth. Bull. Torrey Club 51: 51. 1924.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, in groups 2-6 mm. across, on slightly discolored areas, the sori 0.3-0.5 mm. apart or somewhat confluent, roundish, 0.3-0.8 mm. in diameter, soon naked, yellowish or nearly colorless, pulverulent, ruptured epidermis inconspicuous; urediniospores irregularly globoid or ellipsoid, 13-18 by 15-23  $\mu$ ; wall colorless, thin, about 0.5  $\mu$ , closely and evenly verrucose.

III. Telia unknown.

## ON LOGANIACEAE:

*Spigelia Humboldtiana* Cham. & Schlecht., Guatemala; Salvador.

TYPE LOCALITY: Near Ahuachapán, Salvador, on *Spigelia Humboldtiana*.

DISTRIBUTION: Central America.

87. *Coleosporium apocynaceum*.

Add the synonym: *Peridermium apocynaceum* Hedge. & Hunt, Mycologia 12: 183. 1920.

Replace the line below the synonymy by:

O. Pycnia amphigenous, in one row on each side of the leaf, conspicuous, opening by a longitudinal slit, chestnut-brown, 0.4-0.8 mm. wide by 0.6-1.4 mm. long, and 0.1-0.2 mm. high; pycniospores 2-3 by 4-7  $\mu$ .

I. Aecia chiefly hypophyllous, from a limited mycelium, flattened laterally, 0.3-0.5 mm. wide by 2-20 mm. long, and 0.3-0.5 mm. high; peridium thin, fragile, rupturing circumscissilely, the margins recurved, lacerate or fringed; peridial cells ellipsoid or cylindrical, 18-33 by 25-63  $\mu$ , slightly overlapping, readily separating, the outer wall 3-6  $\mu$  thick, verrucose, the inner somewhat thinner, verrucose with cylindrical tubercles 2-6  $\mu$  long; aeciospores ovoid or ellipsoid, 16-23 by 22-42  $\mu$ ; wall 3-6  $\mu$  thick, verrucose with blunt tubercles 2-6  $\mu$  long.

## ON PINACEAE:

*Pinus caribaea* Morelet (*P. Elliottii* Engelm., *P. heterophylla* Sudw.), Florida.

*Pinus palustris* Mill. (*P. australis* Michx.), Florida.

*Pinus Taeda* L., Florida.

87. *Coleosporium Plumierae*.

Replace this name by: *Coleosporium domingense* (Berk.) Arth. Am. Jour. Bot. 5: 329. 1918.

Add the synonyms: *Uredo domingensis* Berk. Ann. Mag. Nat. Hist. II. 9: 200. 1852.  
*Uredo plumieriicola* P. Henn. Hedwigia 43: 161. 1904.

Add the hosts:

*Plumiera emarginata* Griseb., Cuba.  
*Plumiera Krugii* Urban, Porto Rico.  
*Plumiera lutea* Ruiz & Pav., Guatemala.  
*Plumiera obtusa* L., Cuba; Bahamas; Mona Island.  
*Plumiera* sp., Panama.

Substitute the type locality: Santo Domingo, on unknown plant [*Plumiera*, possibly *P. rubra*].

Add the exsiccati: Kellerm. Fungi Sel. Guat. 13.

87. *Coleosporium Ipomoeae*.

Add the synonym: *Peridermium Ipomoeae* Hedgc. & Hunt, Mycologia 9: 239. 1917.

Replace the line following the synonymy by:

O. Pycnia amphigenous, scattered or arranged in rows, on light- or yellow-green spots, dark-olivaceous, 0.1–0.35 mm. broad by 0.3–0.65 mm. long.

I. Aecia hypophyllous, usually in single rows, flattened laterally, 0.9–2.3 mm. long by 0.3–0.6 mm. high; peridial cells elliptic or rhomboid in face view, mostly overlapping, 16–26 by 18–47  $\mu$ , with walls 2–5  $\mu$  thick, the outer wall smooth, the inner wall closely and finely verrucose; aeciospores ovoid or ellipsoid, 16–20 by 22–27  $\mu$ ; wall colorless, verrucose with somewhat deciduous tubercles 1–2  $\mu$  in diameter and 1–3  $\mu$  high.

## ON PINACEAE:

*Pinus caribaea* Morelet (*P. Elliottii* Engelm., *P. heterophylla* Sudw.), Florida.  
*Pinus chichuachuana* Engelm., Arizona.  
*Pinus echinata* Mill. (*P. mitis* Michx.), Alabama, Arkansas, Georgia, North Carolina, Pennsylvania, South Carolina, Tennessee, Texas, Virginia.  
*Pinus palustris* Mill. (*P. australis* Michx.), Florida, South Carolina.  
*Pinus rigida* Mill., Maryland, Pennsylvania.  
*Pinus serotina* Michx., Florida, South Carolina.  
*Pinus Taeda* L., Alabama, Arkansas, Florida, Georgia, North Carolina, South Carolina, Virginia.

Add the telial hosts:

*Ipomoea angustifolia* Jacq., Porto Rico.  
*Ipomoea digitata* L. (cult.), Mississippi.  
*Ipomoea fistulosa* Mart., Salvador.  
*Ipomoea glabriuscula* House, Guatemala.  
*Ipomoea hirsutula* Jacq. f. (*I. mexicana* A. Gray), Guanajuato.  
*Ipomoea littoralis* Blume, Porto Rico.  
*Ipomoea microsepala* Benth. (*I. Nelsoni* Rose), Jalisco.  
*Ipomoea muricata* R. & S., Guatemala.  
*Ipomoea mutabilis* Lindl., Cuba.  
*Ipomoea Petri* Donn-Smith (*I. sericophylla* Peter not Meissn.), Guatemala.  
*Ipomoea purga* Hayne, Costa Rica.  
*Ipomoea ruber* (Vahl) Millsp., Porto Rico.  
*Ipomoea stolonifera* (Cyrill.) Poir., Cuba; Porto Rico.  
*Ipomoea tiliacea* (Willd.) Choisy (*I. fastigiata* Sweet), Porto Rico.  
*Ipomoea trichocarpa* Ell. (*I. carolina* Pursh not L.), Florida, Texas.  
*Pharbitis barbiger* (Sims) G. Don (*Ipomoea barbiger* Sims), Mississippi.  
*Rivea speciosa* Sweet, Cuba.

Add the exsiccati: Barth. Fungi Columb. 2816, 2817, 2919, 3010, 4214, 4519, 4617, 4810; Barth. N. Am. Ured. 304, 708, 908, 1107, 1305, 1403, 2009, 2110, 2306, 2307, 2405, 2505, 2506, 2709, 2805, 2806, 2906, 3006, 3007; Rav. Fungi Am. 488; Rav. Fungi Car. 4: 99.

88. *Coleosporium Viburni*.

Add the hosts:

*Viburnum pubescens* (Ait.) Pursh, Wisconsin.  
*Virburnum* sp., Costa Rica; Guatemala.

Add: EXSICCATI: Barth. N. Am. Ured. 1006.



88. *Coleosporium Campanulae*.

Add the host, under Pinaceae: *Pinus resinosa* Ait., Michigan.

Add the hosts, under Campanulaceae:

*Campanula aparinoides* Pursh, Wisconsin.

*Campanula divaricata* Michx., Kentucky.

*Campanula persicifolia* L., California.

Add the exsiccati: Barth. Fungi Columb. 2508; Seym. & Earle, Econ. Fungi 224.

Insert: ILLUSTRATIONS: Briosi & Cavara, Fungii Par. 103; Ber. Deuts. Bot. Ges. 20: pl. 17, f. 1, 2; Grove, Brit. Rust Fungi f. 246; Ann. Rep. Conn. Exp. Sta. 1907: pl. 25, 32, f. 2<sup>2</sup>.

89. *Coleosporium Vernoniae*.

Replace this name by: *Coleosporium carneum* (Bosc) H. S. Jackson, Proc. Ind. Acad. 1917: 312. 1918.

Insert the synonyms: *Tubercularia carnea* Bosc, Ges. Nat. Freunde Berlin Mag. 5: 88. 1811. *Peridermium oblongisporium Ravenelii* Thüm. Mitth. Forstl. Vers. Oesterr. 2: 316. 1880. *Peridermium Ravenelii* Kleb. Ber. Deuts. Bot. Ges. 8<sup>2</sup>: 69. 1890. *Aecidium Ravenelii* Dietel, in E. & P. Nat. Pfl. 1<sup>1</sup>\*\*\*: 78. 1897. *Peridermium carneum* Seym. & Earle, Econ. Fungi 550. 1899. *Aecidium carneum* Farlow, Bibl. Index 1: 25. 1905. *Aecidium Vernoniae-mollis* Mayor, Mém. Soc. Neuch. Sci. Nat. 5: 570. 1913.

Replace the line following the synonymy by:

O. *Pycnia* chiefly epiphyllous, one to many in a single row on either side of the leaf, at first reddish-orange, becoming chestnut-brown, 0.1–0.2 mm. wide by 0.6–1.4 mm. long, and 0.4–1 mm. high.

I. *Aecia* amphigenous, one to many in single rows, flattened laterally, usually irregularly rectangular or truncate, occasionally irregularly triangular in side view, 0.4–0.9 mm. wide by 1.5–8.4 mm. long, and 1.8–4 mm. high; peridium sometimes vertically striate, rupturing by a longitudinal slit, the margin irregular; peridial cells rhomboidal in cross section, usually considerably overlapping, 20–38 by 33–45  $\mu$ , the walls 4–8  $\mu$  thick, the inner wall and sometimes the outer wall closely and moderately verrucose; aeciospores obovoid or ellipsoid, 16–25 by 25–38  $\mu$ ; wall thick, 3–9  $\mu$ , often thicker above, closely and coarsely verrucose.

## ON PINACEAE:

*Pinus caribaea* Morelet (*P. Elliottii* Engelm., *P. heterophylla* Sudw.), Florida, Georgia, Mississippi.

*Pinus echinata* Mill. (*P. mitis* Michx.), Arkansas, Florida, Georgia, Missouri, North Carolina, South Carolina, Tennessee, Texas, Virginia.

*Pinus glabra* Walt., Florida.

*Pinus nigra* Arnold (*P. austriaca* Höss.), Ohio.

*Pinus palustris* Mill. (*P. australis* Michx.), Florida, Mississippi, South Carolina.

*Pinus ponderosa* Dougl., District of Columbia, Ohio.

*Pinus rigida* Mill., Connecticut, District of Columbia, Maryland, North Carolina, Ohio, Pennsylvania, Virginia.

*Pinus scopulorum* (Engelm.) Lemmon (*P. ponderosa scopulorum* Engelm.), Ohio.

*Pinus serotina* Michx., Florida, Georgia, South Carolina.

*Pinus Taeda* L., Alabama, Arkansas, Florida, Georgia, Mississippi, North Carolina, South Carolina, Texas, Virginia.

Omit Kansas after *Vernonia Baldwinii*.

Add the telial hosts:

*Lachnorhiza piloselloides* A. Rich., Cuba.

*Vernonia Blodgettii* Small, Florida, North Carolina, South Carolina.

*Vernonia illinoensis* Gleason, Indiana.

*Vernonia insularis* Gleason, Bahamas.

*Vernonia oligantha* Greene, Florida, Louisiana.

*Vernonia pulchella* Small, Georgia.

*Vernonia tomentosa* (Walt.) Ell., District of Columbia.

Change the latter part of the distribution to read: southward to Florida, the Bahamas and Texas; also in South America.

Insert: ILLUSTRATION: Mém. Soc. Neuch. Sci. Nat. 5: 570, f. 77.

Add the exsiccati: Barth. N. Am. Ured. 1408, 1409, 1503, 1727, 1728, 1730, 1819, 1920, 2012, 2023, 2113, 2122, 2206, 2214, 2319, 2320, 2407, 2408, 2511, 2616, 2715, 2716, 2811, 2812, 3010; Barth. Fungi Columb. 2511, 2618, 2715, 2822, 2823, 2824, 3043, 3518, 4814; Ellis, N. Am. Fungi 1026a, b; Rab.-Wint. Fungi Eur. 3315b; Szym. & Earle, Econ. Fungi 224, 550.

89. *Coleosporium Elephantopodis*.

Add the synonyms: *Peridermium intermedium* Arth. & Kern, Bull. Torrey Club 33: 416. 1906. *Peridermium Elephantopodis* Hedge. & Hahn, Mycologia 12: 190. 1920.

Replace the line following the synonymy by:

O. Pycnia chiefly epiphyllous, one to many in one or two rows, at first orange-yellow, becoming golden-brown, 0.3–0.6 mm. wide by 0.3–1 mm. long, and 0.1–0.2 mm. high.

I. Aecia amphigenous, one to few in two short rows, flattened laterally, irregularly triangular or rectangular in side view, 0.3–0.9 mm. wide by 1.1–1.9 mm. long, and 1–3.6 mm. high; peridium often vertically striate, rupturing by a longitudinal slit, the margin notched; peridial cells rectangular in cross-section, slightly or not overlapping, 20–40 by 32–72  $\mu$ , the walls very thick, 6–12  $\mu$ , the inner wall closely verrucose; aeciospores globose, obovoid, or ellipsoid, 14–24 by 20–32  $\mu$ ; walls 3–6  $\mu$  thick, slightly or not at all thicker above, closely and coarsely verrucose.

ON PINACEAE:

*Pinus caribaea* Morelet (*P. Elliottii* Engelm., *P. heterophylla* Sudw.), Florida.

*Pinus echinata* Mill. (*P. mitis* Michx.), Arkansas, Georgia, Maryland, Missouri.

*Pinus palustris* Mill. (*P. australis* Michx.), Florida, Louisiana, Mississippi, North Carolina, South Carolina.

*Pinus rigida* Mill., North Carolina.

*Pinus serotina* Michx., Florida, South Carolina.

*Pinus Taeda* L., Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, Tennessee, Texas.

In the hosts listed under Carduaceae, place *Elephantopus scaber* L. as a synonym to *E. mollis* H.B.K., with localities, and add: *Elephantopus elatus* Bertol., Georgia, Mississippi; and *Elephantopus hypomalacus* Blake, Costa Rica; Guatemala; Salvador.

Add the exsiccati: Barth. Fungi Columb. 2815, 4518, 4616, 4809; Barth. N. Am. Ured. 3, 906, 907, 1105, 1606, 2007, 2108, 2201, 2303, 2304, 2503, 2707, 2804, 3005; Rab.-Wint. Fungi Eur. 3315a; Sydow, Ured. 2391; Thüm. Myc. Univ. 953.

Insert: ILLUSTRATION: Mém. Soc. Neuch. Sci. Nat. 5: 552, f. 61.

90. *Coleosporium Eupatorii*.

Add the host: *Eupatorium Oerstedianum* Benth., Costa Rica

Add: ILLUSTRATION: Mém. Soc. Neuch. Sci. Nat. 5: 552, f. 62.

90. *Coleosporium Steviae*.

Insert the synonym: *Aecidium Carpochaetes* Sydow, Ann. Myc. 1: 20. 1903.

Change the description of the urediniospores to read: coarsely verrucose with deciduous tubercles.

Add the hosts:

*Carpochaete Grahmi* A. Br., San Luis Potosí,

*Stevia clinopodioides* Greenman, Mexico (state).

*Stevia lucida* Lag., Guatemala.

*Stevia subpubescens* Lag., Guatemala.

*Stevia tomentosa* Lag., Mexico (state).

Add: EXSICCATI: Barth. N. Am. Ured. 1207, 1407.

90. Insert:

13a. *Coleosporium aridum* H. S. Jackson; Arth. Bull. Torrey Club 51:

52. 1924.

O and I. Pycnia and aecia unknown.

II. Uredinia hypophyllous, scattered or gregarious, small, roundish, 0.2–0.3 mm. across, orange-yellow fading to pale-yellow, early naked, ruptured epidermis noticeable;

urediniospores globose or ellipsoid, 16–20 by 20–28  $\mu$ ; wall colorless, 1–1.5  $\mu$  thick, closely, finely, and uniformly verrucose.

III. Telia unknown.

ON CARDUACEAE:

*Coleosanthus californicus* (T. & G.) Kuntze (*Brickellia californica* A. Gray), California.

TYPE LOCALITY: Andreas Cañon in the Mojave desert, Riverside County, California, on *Coleosanthus californicus*.

DISTRIBUTION: Known only from the type locality.

#### 90. *Coleosporium* Lacinariariae.

Insert the synonym: *Peridermium fragile* Hedgc. & Hunt, *Mycologia* 9: 241. 1917.

Replace the first line of the description by:

O. Pycnia amphigenous, few or singly on somewhat paler spots, 0.4–0.5 by 0.5–0.9 mm., dark-olive to blackish.

I. Aecia hypophyllous, solitary or few, small and inconspicuous, 0.4–0.5 mm. high by 0.8–2 mm. long; peridium flattened laterally, rupturing longitudinally with irregularly notched edges; peridial cells ovoid or ellipsoid in face view, frequently pointed at both ends, somewhat overlapping, 17–25 by 37–46  $\mu$ , the wall 4–8  $\mu$ , the inner wall verrucose with crowded papillae 1.1–1.9 by 4.1–5.6  $\mu$ ; aeciospores ovoid or ellipsoid, 18–22 by 25–34  $\mu$ ; wall 2–3  $\mu$  thick, closely verrucose with irregularly arranged rows of more or less deciduous tubercles 1.7–3.2  $\mu$  long.

ON PINACEAE:

*Pinus palustris* Mill. (*P. australis* Michx.), Florida.

*Pinus rigida* Mill., District of Columbia, New Jersey.

Add the hosts, under Carduaceae:

*Lacinaria elegans* (Walt.) Kuntze, Florida.

*Lacinaria elegantula* Greene, Alabama.

*Lacinaria gracilis* (Pursh) Kuntze, Florida.

*Lacinaria laxa* Small, Florida.

*Lacinaria Nashii* Small, Florida.

*Lacinaria pilosa* (Ait.) Heller, Georgia.

*Lacinaria scariosa* (L.) Hill (*Liatris squarrosa* Michx.), Arkansas, Georgia, Tennessee.

*Lacinaria tenuifolia* (Nutt.) Kuntze, Florida.

Add: EXSICCATI: Barth. *Fungi Columb.* 2818; Barth. *N. Am. Ured.* 2406, 2507.

#### 90. *Coleosporium* Solidaginis.

Add the synonyms: *Peridermium Pini-densiflorae* P. Henn. *Bot. Jahrb.* 28: 263. 1900.

*Peridermium montanum* Arth. & Kern, *Bull. Torrey Club* 33: 413. 1906. *Coleosporium*

*Pini-Asteris* Orishimo, *Bot. Mag. Tokyo* 24: 4. 1910. *Coleosporium Asterum* Sydow, *Ann. Myc.* 12: 109. 1914.

Add the hosts, under Pinaceae:

*Pinus Banksiana* Lamb. (*P. divaricata* Sudw.), Wisconsin; Manitoba.

*Pinus contorta* Dougl. (*P. Murrayana* Balf.), Colorado, Montana, Oregon, Washington; Alberta.

*Pinus echinata* Mill. (*P. mitis* Michx.), Alabama, Arkansas, Delaware, District of Columbia, Georgia, Maryland, Mississippi, North Carolina, Pennsylvania, South Carolina, Tennessee, Virginia.

*Pinus pungens* Michx. f., Maryland, Pennsylvania.

*Pinus resinosa* Ait., Minnesota, New Hampshire, Pennsylvania, South Carolina, Vermont.

*Pinus scopulorum* (Engelm.) Lemmon (*P. ponderosa scopulorum* Engelm.), Montana.

*Pinus Taeda* L., Alabama, Georgia, North Carolina, South Carolina, Virginia.

*Pinus Thunbergii* Parl., Maryland.

*Pinus virginiana* Mill. (*P. inops* Soland.), Pennsylvania, Virginia.

Omit, under Carduaceae, the two species of *Euthamia* and their distribution, and also Wisconsin after *Aster Eatoni*, and add:

*Aster acuminatus* Michx., Maryland, New York.

*Aster ascendens* Lindl., Colorado, Idaho.

*Aster amplissimus* Greene, Oregon.

*Aster commutatus* (T. & G.) A. Gray (*A. incanopilosus* Sheldon), Nebraska.

*Aster crassulus* Rydb., Colorado.

- Aster Cusickii* A. Gray, Oregon.  
*Aster Douglasii* Lindl., Montana, Oregon, Washington.  
*Aster foliaceus* Lindl., Washington.  
*Aster Fremonitii* (T. & G.) A. Gray, Montana.  
*Aster Geyeri* (A. Gray) Howell, Colorado, Idaho, Washington.  
*Aster Hallii* A. Gray, Oregon.  
*Aster hirsuticaulis* Lindl., North Carolina.  
*Aster junceus* Ait., Ontario.  
*Aster kentuckyensis* Small, Alabama.  
*Aster Lowrieanus* Porter, Virginia.  
*Aster Menziesii* Lindl., California.  
*Aster meritus* A. Nelson, Montana.  
*Aster Porteri* A. Gray, Colorado.  
*Aster Pringlei* (A. Gray) Britt., Pennsylvania.  
*Aster Tweedyi* Rydb., Colorado.  
*Brachyactis frondosa* (Nutt.) A. Gray (*Aster frondosus* T. & G.), Colorado.  
*Chrysopsis caudata* Rydb., Colorado.  
*Chrysopsis hirsutissima* Greene, Colorado.  
*Chrysopsis horrida* Rydb., Colorado.  
*Chrysopsis mariana* (L.) Ell., Florida.  
*Chrysopsis scabrella* T. & G., Florida.  
*Chrysopsis villosa* (Pursh) Nutt., Colorado, Nebraska.  
*Erigeron inornatus* A. Gray, California.  
*Erigeron peregrinus* (Pursh) Greene, Alaska.  
*Grindelia oregana* A. Gray, Washington.  
*Grindelia squarrosa* (Pursh) Dunal, Colorado, Wisconsin.  
*Gutierrezia texana* (DC.) T. & G., Texas.  
*Heterotheca subaxillaris* (Lam.) Britt. & Ru. by, Florida.  
*Machaeranthera viscosa* Rydb., Colorado.  
*Oligoneuron canescens* Rydb. (*Solidago rigida humilis* Porter), Nebraska.  
*Psilactis asteroides* A. Gray, New Mexico.  
*Pyrocoma lanceolata* (Hook.) Greene (*Aplopappus lanceolatus* T. & G.), Montana.  
*Solidago altissima* L., Indiana, Iowa, Kentucky, Nebraska, New Jersey, Pennsylvania, Tennessee, Wisconsin.  
*Solidago austrina* Small, Georgia.  
*Solidago Bootii* Hook., Tennessee.  
*Solidago brachyphylla* Chapman, Georgia.  
*Solidago caurina* Piper, Oregon.  
*Solidago cellidifolia* Small, Arkansas.  
*Solidago Chapmanii* A. Gray, Florida.  
*Solidago concinna* A. Nelson, Colorado, Montana.  
*Solidago confinis* A. Gray, California.  
*Solidago Curtisii* T. & G., North Carolina, Tennessee, Virginia.  
*Solidago decumbens* Greene, Colorado.  
*Solidago elongata* Nutt., Idaho, Oregon, Washington.  
*Solidago erecta* Pursh (*S. speciosa angustata* T. & G.), District of Columbia, Georgia, Indiana, Maryland, New Jersey, New York, North Carolina, Tennessee, Virginia.  
*Solidago fistulosa* Mill., Florida, Mississippi, New Jersey.  
*Solidago gilvocanescens* (Rydb.) Smyth, North Dakota, South Dakota.  
*Solidago hispida* Muhl., Arkansas, Georgia, Michigan, North Carolina.  
*Solidago mollis* Bartl., Nebraska.  
*Solidago multiradiata* Ait., Manitoba.  
*Solidago odora* Ait., Georgia, Massachusetts, New Jersey, North Carolina, Virginia.  
*Solidago oreophila* Rydb., Colorado.  
*Solidago petiolaris* Ait., Arkansas, Missouri.  
*Solidago radula* Nutt., Missouri.  
*Solidago rigidiuscula* (T. & G.) Porter, Arkansas.  
*Solidago rupestris* Raf., North Carolina, Virginia.  
*Solidago speciosa* Nutt., Maryland, New York, North Carolina, Tennessee, Virginia.  
*Solidago squarrosa* Muhl., Maryland, New Jersey, New York, Pennsylvania, West Virginia.  
*Solidago stricta* Ait., Florida.  
*Solidago tortifolia* Ell., Florida.  
*Solidago uniligulata* (DC.) Porter, Maine.  
*Solidago Vaseyi* Heller, Tennessee.

Insert: ILLUSTRATIONS: Ann. Rep. Conn. Exp. Sta. 1907: *pl. 26, 27, 32, f. 1'*.

Omit from the exsiccati "Carleton, Ured. Am. 44," and add: Barth. Fungi Columb. 2382, 2510, 2541, 2616, 2617, 2713, 2714, 2819, 2820, 2821, 2921, 2922, 2923, 3011, 3012, 3013, 3217, 3311, 3418, 3516, 3517, 3614, 3905, 3906, 4011, 4112, 4113, 4215, 4312, 4313, 4520, 4618, 4813, 4911, 4912, 5008, 5009, 5074; Barth. N. Am. Ured. 5, 105, 209, 307, 308, 404, 405, 406, 603, 604, 710, 711, 712, 802, 909, 1005, 1108, 1205, 1206, 1306, 1307, 1405, 1406, 1608, 1708, 1709, 1810, 1811, 1812, 1910, 2010, 2011, 2112, 2203, 2204, 2205, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2508, 2509, 2510, 2615, 2710,

2711, 2712, 2713, 2714, 2808, 2809, 2810, 2907, 2908, 2909; Brenckle, Fungi Dak. 77, 276, 276a, 305, 305a, 355, 355a; D. Griff. W. Am. Fungi 173; Rav. Fungi Car. 3: 96; Thaxter, Rel. Farl. 215a; Seym. & Earle, Econ. Fungi 480; Sydow, Ured. 2448; Thüm. Myc. Univ. 1443.

## 92. Insect:

15a. *Coleosporium delicatulum* (Arth. & Kern) Hedgc. & Long,  
Phytopathology 3: 250. 1913.

*Peridermium delicatulum* Arth. & Kern, Bull. Torrey Club 33: 412. 1906.

O. Pycnia amphigenous, few, scattered, conspicuous, brownish, dehiscent by a longitudinal slit, deep-seated, large, 0.3–0.4 mm. broad by 0.5–1 mm. long, low-conoidal, 80–100  $\mu$  high.

I. Aecia amphigenous, from a limited mycelium, numerous, in rows on discolored spots occupying part of a leaf, erumpent from longitudinal slits 1–5 mm. long extending along one side, the epidermis recurved; peridium delicate, inconspicuous, scarcely protruding above the ruptured epidermis; peridial cells isodiametric, slightly or not overlapping, 20–25  $\mu$  long, the walls transversely striate, the inner wall 4–5  $\mu$  thick, finely verrucose, the outer wall slightly thinner, smooth; aeciospores ovoid or cuboidal, 19–21 by 21–28  $\mu$ ; wall colorless, 2.5–3  $\mu$  thick, finely verrucose.

## ON PINACEAE:

*Pinus rigida* Mill., Connecticut, Massachusetts.  
*Pinus Taeda* L., Florida, Texas.

II. Uredinia amphigenous, irregularly scattered, round, 0.3–0.5 mm. in diameter, soon naked, yellow or orange-yellow fading to white, ruptured epidermis inconspicuous; uredinospores oblong or ovoid, 13–19 by 20–30  $\mu$ ; wall thin, about 1  $\mu$ , closely and finely verrucose.

III. Telia amphigenous, scattered irregularly, single or in confluent groups of three or four, 0.3–0.5 mm. across, elevated, waxy, at first reddish-orange; teliospores with wall swelling to 25–30  $\mu$  above; contents orange-yellow fading to colorless, terete, 16–26 by 60–90  $\mu$ , rounded or truncate above and below.

## ON CARDUACEAE:

*Euthamia graminifolia* (L.) Nutt. (*Solidago lanceolata* L.), Connecticut, Delaware, District of Columbia, Indiana, Kansas, Maine, Massachusetts, Missouri, New Hampshire, New Jersey, New York, Pennsylvania, West Virginia.  
*Euthamia gymnospermoides* Greene (*Solidago gymnospermoides* Fernald), Texas.  
*Euthamia leptocephala* (T. & G.) Greene (*Solidago leptocephala* T. & G.), Texas.  
*Euthamia minor* (Michx.) Greene (*Solidago minor* Fernald), Florida.  
*Euthamia tenuifolia* (Pursh) Greene (*Solidago tenuifolia* Pursh, *E. caroliniana* Greene), Florida, New Hampshire, New York.

TYPE LOCALITY: St. Augustine, Florida, on *Pinus* [*Taeda* L.].

DISTRIBUTION: Maine to eastern Kansas, and southward to Florida and eastern Texas.

EXSICCATI: Barth. Fungi Columb. 2509; Barth. N. Am. Ured. 517, 720, 2302, 3004; Carleton, Ured. Am. 44; Thaxter, Rel. Farl. 215b.

15b. *Coleosporium Adenocaulonis* H. S. Jackson, Brooklyn Bot. Gard. Mem.

1: 202. 1918.

O and I. Pycnia and aecia unknown.

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

III. Telia unknown.

## ON CARDUACEAE:

*Adenocaulon bicolor* Hook., Oregon.

TYPE LOCALITY: Corvallis, Oregon, on *Adenocaulon bicolor*.

DISTRIBUTION: Known only from the type locality.

92. *Coleosporium Madiae*.

Add the synonyms: *Coleosporium arnicale* Arth. N. Am. Flora 7: 94. 1907. *Peridermium californicum* Arth. & Kern, Mycologia 6: 118. 1914.

Replace the first line below the synonymy by:

O. Pycnia amphigenous, large, 0.4–0.7 mm. broad by 0.5–1 mm. long, low-conoidal, about 90  $\mu$  high.

I. Aecia amphigenous, few, scattered on scarcely discolored spots, large, tongue-shaped, 0.7–1.5 mm. long by 0.8–1.2 mm. high; peridial cells ellipsoid in face view, usually rounded at both ends, overlapping, 29–35 by 50–87  $\mu$ , the walls colorless, 5–7  $\mu$  thick, the inner wall rather coarsely and closely verrucose with slightly irregular papillae; aeciospores broadly ellipsoid, 25–29 by 40–45  $\mu$ ; wall 3–4.5  $\mu$  thick, moderately and rather coarsely verrucose.

## ON PINACEAE:

*Pinus radiata* D. Don (*P. insignis* Dougl.), California.

Add the telial hosts:

*Centromadia pungens* (H. & A.) Greene (*Hemizonia pungens* T. & G.), California.

*Harpaecarpus exiguus* (Smith) A. Gray (*Madia exigua* Greene), Oregon.

?*Hemizonella Durandi* A. Gray (*Hemizonia Durandi* A. Gray), Washington.

*Hemizonia citriodora* (Greene) A. Gray (*Madia citriodora* Greene), Oregon.

*Hemizonia congesta* DC., California.

*Madaria elegans* (D. Don) DC. (*Madia elegans* D. Don), California.

*Madia glomerata* Hook., Oregon.

*Madia ramosa* Piper, Oregon.

Add the exsiccati: Barth. Fungi Columb. 4714, 4811, 4910; Barth. N. Am. Ured. 1707, 1808, 2111.

93. *Coleosporium Helianthi*.

Add the synonym: *Peridermium Helianthi* Hedgc. & Hunt, Mycologia 9: 240. 1917. Omit *Coleosporium Viguierae* and *C. Verbesinae*, with their citations.

Replace the first line below the synonymy by:

O. Pycnia amphigenous, few or solitary, brownish-olive, applanate, large, 0.2–0.5 mm. wide by 0.3–0.6 mm. long.

I. Aecia amphigenous, few in open groups or solitary, on slightly discolored areas, flattened becoming tongue-shaped, 0.5–1.2 mm. long by 0.8–1.8 mm. high, rupturing longitudinally with coarsely toothed edges; peridial cells ovoid or ellipsoid in face view, 13–25 by 27–43  $\mu$ , rhombic or rhomboidal in section, 26–29 by 30–45  $\mu$ , the wall colorless, the outer wall 3–4  $\mu$  thick, transversely striate, smooth, the inner wall slightly thicker, 4–5  $\mu$ , rather evenly and finely verrucose; aeciospores globose or broadly ellipsoid, sometimes pointed below, 15–20 by 20–28  $\mu$ ; wall colorless, 2.5–3.5  $\mu$  thick, rather uniformly and evenly verrucose, the tubercles 1–2  $\mu$  long.

## ON PINACEAE:

*Pinus virginiana* Mill. (*P. inops* Soland.), North Carolina, South Carolina, Virginia.

Omit all species of *Coreopsis*, *Verbesina*, and *Viguiera* with their distributions, and add the telial hosts:

*Helianthus divaricatus* L., New York, North Carolina, Tennessee.

*Helianthus hirsutus* Raf., West Virginia.

*Helianthus microcephalus* T. & G., Georgia, Maryland, South Carolina, Tennessee.

*Helianthus occidentalis* Riddell, Louisiana.

*Helianthus scaberrimus* Ell., Oklahoma.

*Helianthus strumosus* L., Missouri.

*Helianthus tuberosus* L., Illinois.

Change the distribution to read: Northern Louisiana to South Carolina and northward to central Illinois and southern New York.

Omit from the exsiccati "Seym. & Earle, Econ. Fungi Suppl. B22."

Add the exsiccati: Barth. Fungi Columb. 4909; Barth. N. Am. Ured. 1106, 1402, 2008, 2202, 2305, 2504, 2614, 2708.

## 93. Insert:

18a. *Coleosporium inconspicuum* (Long) Hedge. & Long, *Phytopathology*  
3: 250. 1913.

*Peridermium inconspicuum* Long, *Mycologia* 4: 283. 1912.

O. Pycnia chiefly hypophyllous, few or many, low-conoidal, dehiscent by a longitudinal slit, 0.2–0.3 mm. broad, 0.3–0.7 mm. long by 85–120  $\mu$  high.

I. Aecia amphigenous from a limited mycelium, one to several on slightly discolored spots, erupt from a narrow slit, flattened laterally, 0.3–0.7 mm. long by 0.3–0.9 mm. high; peridium colorless, fragile, evanescent; peridial cells oblong or lanceolate-oblong in face view, somewhat overlapping, 19–27 by 32–55  $\mu$  in face view, the wall 3–4  $\mu$  thick, the inner wall closely verrucose; aeciospores ellipsoid or obovoid, 15–18 by 21–30  $\mu$ ; wall colorless, thin, 2–3  $\mu$ , minutely verrucose.

ON PINACEAE:

*Pinus echinata* Mill. (*P. mitis* Michx.), Georgia.

*Pinus palustris* Mill. (*P. australis* Michx.), South Carolina.

*Pinus virginiana* Mill. (*P. inops* Soland.), District of Columbia, Kentucky, Maryland, Virginia.

II. Uredinia hypophyllous, scattered irregularly, round, 0.3–0.5 mm. in diameter, golden-yellow fading to white, soon naked, pulverulent, ruptured epidermis noticeable; urediniospores broadly ellipsoid or globoid, 19–23 by 23–26  $\mu$ ; wall thin, 1  $\mu$ , finely and closely verrucose.

III. Telia hypophyllous, scattered irregularly, roundish, 0.3–0.5 mm. across, orange-yellow fading to pale-yellow, pulvinate, waxy; teliospores with wall swelling 20–29  $\mu$  thick above, outline of the spores distinct, the contents bright orange-red fading to colorless, oblong or somewhat clavate, 16–24 by 65–75  $\mu$ , obtuse or somewhat narrowed above, usually acuminate below.

ON CARDUACEAE:

*Coreopsis major* Walt., North Carolina, South Carolina, Tennessee, Virginia.

TYPE LOCALITY: Glen Echo, Maryland, on *Pinus virginiana*.

DISTRIBUTION: The Alleghany Mountains and eastward from Maryland to South Carolina.

EXSICCATI: Barth. N. Am. Ured. 2109, 2404.

18b. *Coleosporium Viguierae* Dietel & Holway; Holway, Bot. Gaz. 24:  
34. 1897.

*Coleosporium Verbesinae* Dietel & Holway; Holway, Bot. Gaz. 31: 337. 1901.

O and I. Pycnia and aecia unknown.

II. Uredinia amphigenous, scattered or gregarious, on discolored spots 0.5–1 cm. across, small, round, 0.5–1 mm. in diameter, pulverulent, yellowish fading to whitish, ruptured epidermis usually conspicuous; urediniospores ellipsoid or oblong, 16–22 by 24–32  $\mu$ ; wall colorless, thin, 1–1.5  $\mu$ , rather coarsely tuberculate-verrucose, tubercles longer on one end and side of spore, usually with a smooth spot near one end.

II. Telia hypophyllous, scattered irregularly or sometimes gregarious, often crowded, 0.5–1 mm. across, orange-yellow fading to pale-yellow, pulvinate; teliospores with apical wall swelling 20–30  $\mu$ , oblong or clavate, 16–22 by 50–70  $\mu$ , rounded at both ends or truncate above.

ON CARDUACEAE:

*Phaethusa laciniata* (Poir.) Small (*Verbesina laciniata* Poir.), Florida.

*Verbesina apleura* Blake, Guatemala.

*Verbesina gigantea* Jacq., Guatemala; Jamaica.

*Verbesina guatemalensis* Rob. & Greenm., Salvador.

*Verbesina Holwayi* B. L. Robinson, Guatemala.

*Verbesina montanoifolia* Rob. & Greenm., Michoacan.

*Verbesina myriocephala* Schultz-Bip., Costa Rica.

*Verbesina nicaraguensis* Benth., Costa Rica.

*Verbesina perymenioides* Schultz-Bip., Guatemala.

*Verbesina pinnatifida* Cav., Jalisco.

*Verbesina scabriuscula* Blake, Guatemala.

*Verbesina sublobata* Benth., Guatemala.

*Verbesina texana* Buckl., Texas.

*Verbesina turbacensis* H.B.K., Guatemala.

*Verbesina virgata* Cav., Oaxaca, Mexico (state), Morelos.

*Viguiera helianthoides* H.B.K. (*V. dentata* Spreng.), Hidalgo, Mexico (state), Puebla.

*Ximenesia exauriculata* (Rob. & Greenm.) Rydb., Arizona.

*Zexmenia helianthoides* A. Gray, Jalisco.

TYPE LOCALITY: Near Tula, Hidalgo, Mexico, on *Viguiera helianthoides*.

DISTRIBUTION: Southern Florida and southern Texas, southward through Mexico and Central America, and in Jamaica.

EXSICCATI: Barth. N. Am. Ured. 4, 539; Sydow, Fungi Exot. 115.

93. *Coleosporium Terebinthinaceae*.

Add the synonym: *Peridermium Terebinthinaceae* Hedge. & Hunt, Mycologia 9: 240. 1917.

Replace the line below the synonymy by:

O. Pycnia amphigenous, solitary or few, usually in short rows, blackish-brown, flattened, 0.2–0.3 mm. broad by 0.3–0.6 mm. long, in section about 128  $\mu$  in diameter by 55  $\mu$  high.

I. Aecia hypophyllous, solitary or few on scarcely discolored spots, flattened laterally, 0.7–1.3 mm. long by 1.1–2 mm. high, opening by a longitudinal rupture, leaving erose edges; peridial cells colorless, in face view ovoid or ellipsoid, often angular, 19–30 by 39–66  $\mu$ , in section rhomboidal, slightly or not overlapping, the walls colorless, the outer wall 1.5–2  $\mu$  thick, smooth, the inner wall 5–7  $\mu$  thick, closely and strongly verrucose, with somewhat deciduous papillae 2.5–4  $\mu$  long; aeciospores ellipsoid or ovoid, 18–22 by 29–36  $\mu$ ; wall colorless, 2–3.5  $\mu$  thick, closely and strongly verrucose, with somewhat deciduous papillae 1–2.5  $\mu$  long.

ON PINACEAE:

*Pinus echinata* Mill. (*P. mitis* Michx.), Alabama, Georgia, North Carolina, South Carolina.

*Pinus serotina* Michx., South Carolina.

*Pinus Taeda* L., Alabama, South Carolina.

Add the telial host: *Silphium perfoliatum* L., Indiana, Missouri.

Add: EXSICCATI: Barth. Fungi Columb. 4619; Barth. N. Am. Ured. 713, 1109, 2318; Seym. & Earle, Econ. Fungi Suppl. B22.

94. *Coleosporium arnicale*.

Omit all pertaining to this species, as it is represented under *C. Madiae*, the host being erroneously determined.

94. *Coleosporium paraphysatum*.

Add the hosts:

*Liabum hypochlorum* Blake, Guatemala.

*Liabum sublobatum* B. L. Robinson, Guatemala.

94. *Coleosporium occidentale*.

Add the hosts:

*Senecio arnicoides* DC., California.

*Senecio canus* Hook., Wyoming.

*Senecio Fendleri* A. Gray (*S. Nelsoni* Rydb., *S. rosulatus* Rydb.), Colorado, Wyoming.

*Senecio serra* Hook., Wyoming.

*Senecio triangularis* Hook., Montana, Oregon.

*Senecio Uintahensis* (A. Nelson) Greenman, Utah.

95. Insert:

25. *Coleosporium Sonchi-arvensis* (Pers.) Lév.; Berk. Outl. Brit. Fungol.

333. 1860.

*Uredo Sonchi-arvensis* Pers. Syn. Fung. 217. 1801.

*Uredo tuberculosa* Schum. Enum. Pl. Saell. 2: 229. 1803.

*Uredo Sonchi* Schum. Enum. Pl. Saell. 2: 229. 1803.

*Uredo fulva* Schum. Enum. Pl. Saell. 2: 229. 1803.

*Coleosporium Sonchi* Schroet, Beitr. Biol. Pf. 3: 57. 1879.

*Peridermium Fischeri* Kleb. Zeits. Pflanzenkr. 5: 71. 1895.

O. Pycnia chiefly epiphyllous, 0.5–1 mm. long, 0.2–0.3 mm. broad.

I. Aecia amphigenous, few, flattened laterally, 0.5–2 mm. long, 0.5–1 mm. high, irregularly dehiscent; peridial cells in face view broadly ellipsoid, 18–34 by 35–65  $\mu$ ,



slightly overlapping, the outer wall smooth, but appearing punctate, the inner wall finely verrucose; aeciospores broadly ellipsoid, more or less angular, 18–25 by 25–35  $\mu$ ; wall colorless, rather thin, about 2  $\mu$  thick, closely and moderately verrucose.

## ON PINACEAE:

*Pinus sylvestris* L., Wisconsin.

II. Uredinia hypophyllous, irregularly scattered, round or oblong, 0.4–0.6 mm. across, soon naked, pulverulent, ruptured epidermis evident; urediniospores globoid or broadly ellipsoid, 14–21 by 18–30  $\mu$ ; wall colorless, about 1.5  $\mu$  thick, finely and densely verrucose.

III. Telia hypophyllous, scattered or somewhat aggregate and confluent, waxy, roundish, 0.4–0.6 mm. in diameter; teliospores cylindrical-clavate, 15–18 by 60–100  $\mu$ , rounded above, rounded or somewhat narrowed below; wall colorless, thin, thickened above up to 18  $\mu$ .

## ON CICHORIACEAE:

*Sonchus asper* (L.) Hill, Wisconsin.

TYPE LOCALITY: Europe, on *Sonchus arvensis*.

DISTRIBUTION: Locally in Wisconsin; also in Europe.

ILLUSTRATIONS: Cooke, *Rust Smut Mildew pl. 8, f. 178, 179*; DeBary, *Brandpilze pl. 2, f. 10*; Grove, *Brit. Rust Fungi f. 244*.

## 95. Inært:

1a. *SYNOMYCES* Arthur, gen. nov.

Cycle of development includes (pycnia ?), aecia and telia; autoecious. All sori subepidermal.

Aecia erumpent, definite. Peridium colorless with verrucose walls. Aeciospores globoid to oblong, with colorless wall, strongly verrucose with somewhat deciduous tubercles.

Telia indehiscent except through weathering, waxy, roundish. Teliospores sessile, one-celled (by early division of the contents appearing four-celled); wall smooth, colorless, thickened and gelatinous above.

Type species, *Coleosporium Reichei* Dietel (on *Stevia* sp.).

1. *Synomyces Reichei* (Dietel) Arthur.

*Coleosporium Reichei* Dietel, *Ann. Myc.* 21: 341. 1923.

O. Pycnia unknown.

I. Aecia hypophyllous, numerous, scattered singly or in small groups of two to six, cylindrical, 0.2–0.5 mm. high; peridium firm, whitish, margin lacerate; peridial cells oblong or rhombic, 25–30 by 30–45  $\mu$ , slightly overlapping, the outer wall thin, minutely verrucose, the inner wall 6–8  $\mu$  thick, densely and prominently verrucose-tuberculate; aeciospores globoid or depressed-globoid, 20–29 by 23–31  $\mu$ ; wall colorless, thin, 1  $\mu$ , densely verrucose by columnar projections to 5  $\mu$  long on one side, shorter to nearly smooth on the opposite side.

III. Telia hypophyllous, scattered or in small irregular groups, minute, waxy, reddish; teliospores cylindrical or clavate, 22–25 by 70–90  $\mu$ ; wall golden-brown, thin, 1  $\mu$  or less, swelling above to 25  $\mu$ .

## ON CARDUACEAE:

*Stevia* sp., Mexico (state).

TYPE LOCALITY: Near Tres Marias, Mexico, on *Stevia* sp.

DISTRIBUTION: Known only from the type locality.

95. *Gallowaya Pini*.

Reduce this name to synonymy, and substitute: *Gallowaya pinicola* Arth. *Bull. Torrey Club* 48: 36. 1921.

Add to the synonym as given: Not *C. Pini* Lagerh. 1889.

95. Insert:

3. **CHRYSOPSORA** Lagerh. Ber. Deuts. Bot. Ges. 9: 345. 1891.

Cycle of development includes pycnia and telia, both being subepidermal.

Pycnia globoid or flask-shaped, with slightly protruding or obsolescent ostiolar filaments.

Telia dehiscent, in concentric circles, elevated. Teliospores pedicellate, two-celled (by subsequent division of the contents appearing eight-celled); wall smooth, colorless, gelatinous, of uniform thickness.

Type species, *Chrysopsora Gynoxidis* Lagerh. (on *Gynoxis pulchella*).

1. **Chrysopsora Cestri** (Dietel & Henn.) Arth. Bull. Torrey Club 51: 53. 1924.

*Puccinia Cestri* Dietel & Henn.; P. Henn. Hedwigia 41: 295. 1902.

O. Pycnia epiphyllous, in small, crowded groups, usually 5-10 each, hemispheric in surface view, globoid in section, prominent, large, 200-225  $\mu$  in diameter; ostiolar filaments none.

III. Telia hypophyllous, in crowded annular groups 2-10 mm. in diameter, forming concentric circles, each ring 0.5-1 mm. thick, soon naked, orange-yellow fading to white, somewhat waxy and finely pulverulent by the abundant production of basidiospores, ruptured epidermis noticeable; teliospores cylindric, 10-15 by 32-100  $\mu$ , not adhering laterally, rounded above; wall colorless, uniformly thin, about 1  $\mu$ , smooth; pedicel colorless, of same diameter as spore, or slightly narrower, 30-50  $\mu$  long.

ON SOLANACEAE:

*Cestrum aurantiacum* Lindl., Panama.

*Cestrum* sp., Costa Rica.

TYPE LOCALITY: Serra da Cantareira, São Paulo, Brazil, on *Cestrum* sp.

DISTRIBUTION: Central America; also in South America.

**UREDINACEAE**

By JOSEPH CHARLES ARTHUR

97. **UREDINACEAE.**

In the first line after the words "definite crust or column" insert "(except in *Olivea*)"; and in the third line before the word "sessile" insert "or superficial (*Olivea*)."

97. Substitute the following key to genera:

Pycnia and other sori subcuticular or originating between the epidermis and mesophyll; telia indehiscent; teliospores compacted into dense layers forming a crust; aecia when present without peridium; uredinia when present without peridium, or with an imperfect one of paraphyses, the spores borne singly on pedicels. Subfamily UREDINATAE.

Teliospores in a single layer.

Life-cycle with all spore-forms, so far as known.

Uredinia with paraphyses intermixed with the spores.

Uredinia with paraphyses forming an imperfect peridium.

Life-cycle only with telia.

Teliospores in more than one layer.

Pycnia, uredinia, and telia subcuticular, aecia originating between the epidermis and mesophyll; teliospores following in the uredinial sori, arising from a somewhat branched hymenium, delicate, not compacted, one-celled; aecia when present without peridium, but with protective hyphae and host-tissue; uredinia with strongly incurved paraphyses forming a cage, spores borne singly on pedicels. Subfamily OLIVEATAE.

Pycnia subcuticular, other sori originating between the epidermis and mesophyll, or the telia within the epidermal cells; telia indehiscent, teliospores divided by vertical partitions or one-celled, forming imperfect layers; aecia when present with cylindrical peridium, rupturing irregularly above; uredinia when present usually with peridium, spores borne singly on pedicels, or apparently so. Subfamily PUCCINIASTRATAE.

Life-cycle with all spore-forms.

1. MELAMPSORA.
- 1a. APLOPSORA.
- 1b. NECIUM.
2. PHAKOPSORA.

3. OLIVEA.

- Teliospore-wall colored.  
 Urediniospores echinulate throughout.  
 Urediniospores echinulate except apex.
- Teliospore-wall colorless; urediniospores echinulate.
- Life-cycle with pycnia, aecia, and telia; teliospore-wall colored.
- Pycnia subcuticular or subepidermal, other sori originating between the epidermis and mesophyll, or the telia within the epidermal cells or between cells of mesophyll; telia indehiscent, teliospores divided by vertical partitions or one-celled, forming imperfect layers; aecia with cylindric peridium, rupturing above, aeciospores colorless; uredinia dimorphic, usually with peridium, spores either somewhat catenulate or borne singly on pedicels, or apparently so. Subfamily UREDINOPSATAE.
- Pycnia subcuticular, but often depressed and seemingly subepidermal; urediniospores in one form pointed, in the other obovate.
- Pycnia subepidermal.  
 Urediniospores either pointed and smooth, or obovate and spinulose.
- Urediniospores in both forms obovate, smooth or verrucose.
- Pycnia and other sori originating beneath the epidermis; telia erumpent, teliospores catenulate, with colorless wall, compacted laterally; aecia when present with somewhat flattened peridium, rupturing apically; uredinia when present with delicate peridium (rarely wanting) and catenulate spores. Subfamily CHRYSOMYXATAE.
- Life-cycle with all spore-forms.
- Life-cycle with telia and possibly pycnia.
- Pycnia and other sori originating beneath the epidermis; telia erumpent, with or without peridia, teliospores catenulate, compacted laterally, often adhering and extruded into long columns, one-celled, or two-celled by transverse septum, wall colorless or colored; aecia when present with inflated peridium, more than one cell thick above; uredinia when present with peridium, spores borne singly on pedicels. Subfamily CRONARTIATAE.
- Life-cycle with all spore-forms, so far as known.  
 Telial column conspicuous, becoming horny.  
 Uredinal peridium cellular.  
 Uredinal peridium paraphysate.  
 Telial column very short, becoming pulverulent at apex.  
 Life-cycle with only pycnia and telia.  
 Teliospores one-celled.  
 Telia in columns; peridium none or rudimentary.  
 Telial column long; teliospores somewhat fusiform.  
 Telial column short.  
 Teliospores catenulate, globose.  
 Teliospores in transverse layers.  
 Telia not extruded.  
 Telia compact; peridia none.  
 Telia pulverulent; peridia evanescent.  
 Teliospores two-celled; peridia persistent.
- Pycnia and other sori originating beneath the epidermis; telia erumpent, without peridia, teliospores one-celled, elongate, sessile and not agglutinate, the wall colorless; aecia when present with hyphal layer in place of a peridium; uredinia unknown. Subfamily CHRYSOCELISATAE.
- Pycnia, aecia and uredinia unknown. Telia originating beneath the epidermis, erumpent, without peridia, teliospores one-celled, borne singly on pedicels, with colorless walls, pulverulent. Subfamily BOTRYORHIZATAE.
97. UREDO.

Exchange the generic name UREDO and its citation with the first name and citation in the synonymy. After the synonymy insert the following note:

It has been found during the interim since 1907, when the part of the North American Flora containing this genus was published, that it is very difficult and confusing to maintain the genus UREDO in its restricted sense, it having had and still has so large a use in its broad sense, and consequently the next oldest name, MELAMPSORA, is now substituted. This name accords with common usage.

Substitute the following key:

Host of telia and uredinia belonging to family Salicaceae.

Of the genus Populus.

Urediniospores smooth on the thickened sides.

Urediniospores ellipsoid, large, 26-35  $\mu$  long.

Urediniospores globose, small, 18-24  $\mu$  long.

Urediniospores without smooth spots.

4. PUCCINIATRUM.
5. MELAMPSORIDIUM.
6. MELAMPSORELLA.
7. CALYPTOSPORA.

8. UREDINOPSIS.

9. MILEZIA.

10. HYALOPSORA.

11. MELAMPSOROPSIS.

11a. CHRYSOMYXA.

12. CRONARTIUM.

12a. CROSSOPSORA.

13. CEROTELIUM.

14. CIONOTRHX.

14a. ENDOPHYLLOIDES.

15. ALVEOLARIA.

16. BAEDROMUS.

17. ENDOPHYLLUM.

18. PUCCINIOSIRA.

19. CHRYSOCELIS.

20. BOTRYORHIZA.

1. *M. Medusae*.

2. *M. Abietis-canadensis*.

- Urediniospores rather large, 23–32  $\mu$  long.  
 Urediniospores very large, 32–48  $\mu$  long.
- Of the genus *Salix*.  
 Urediniospores large, 17–24  $\mu$  long; wall thick.  
 Urediniospores small, 12–20  $\mu$  long.  
 Urediniospore-wall thick, 2–3.5  $\mu$ .  
 Urediniospore-wall medium-thick, 1.5–2  $\mu$ .  
 Urediniospore-wall thin, 1–1.5  $\mu$ .
- Host of telia and uredinia belonging to family Linaceae.  
 Host of telia and uredinia belonging to family Euphorbiaceae.  
 Uredinia large, mostly 0.5–1 mm. long; paraphyses few.  
 Uredinia small, mostly less than 0.5 mm. long; paraphyses numerous.
- Urediniospore-wall thick, 2–3  $\mu$ .  
 Teliospore-wall not or only slightly thickened above.  
 Teliospore-wall decidedly thickened above.  
 Urediniospore-wall thinner, 1.5–2  $\mu$ .
3. *M. albertensis*.  
 4. *M. occidentalis*.  
 5. *M. Bigelowii*.  
 6. *M. confluens*.  
 7. *M. Humboldtiana*.  
 8. *M. arctica*.  
 9. *M. Lini*.  
 10. *M. monticola*.  
 11. *M. Euphorbiae*.  
 12. *M. Euphorbiae-Gerardiana*.  
 13. *M. Piscariae*.

98. *Uredo Medusae*.

Reduce this name to synonymy, and substitute for it the name now under synonymy. Substitute, under Pinaceae, for the line giving host: *Larix laricina* (DuRoi) Koch (*L. americana* Michx.), Connecticut, Michigan, New York; Nova Scotia.

Change size of urediniospores to read "16–23 by 26–35  $\mu$ ."

Omit, under Salicaceae, *Populus angustifolia*, *P. grandidentata* and *P. trichocarpa*, with their localities, and also omit "Montana" under *P. balsamifera*, substituting for it "Connecticut, New Hampshire," and the same under *P. candicans*, substituting for it "Massachusetts, West Virginia," and also the same and "Ohio" under *P. tremuloides*, substituting for them "Arizona, Connecticut, Michigan, New York, Pennsylvania, Texas."

Add the telial host:

*Populus Wislizeni* (S. Wats.) Sarg., New Mexico.

Omit from the exsiccati: Kellerm. Ohio Fungi 144, 145; change Griff. W. Am. Fungi "369" to read "29," and add: Barth. Fungi Columb. 2843, 3640, 3821, 3822, 4641, 4737, 4940; Barth. N. Am. Ured. 9, 316, 614, 912, 1011, 1121, 1122, 1212, 2021, 2121, 2212, 2331, 2414, 2415, 2624, 2726, 2727, 2728, 2918; Brenckle, Fungi Dak. 79; Thaxter, Rel. Farl. 230.

99. *Uredo confluens*.

This species, and the two following, *Uredo alpina* and *Uredo Rostrupiana* (*M. arctica*), in order to conform to the order given in the new key, are renumbered and redescribed below. Insert, in their place:

2. *Melampsora Abietis-canadensis* (Farl.) C. A. Ludwig, Phytopathology 5: 279. 1915.

*Caeoma Abietis-canadensis* Farl. Proc. Am. Acad. 20: 323. 1885.

*Peridermium fructigenum* Arth. Bull. Torrey Club 37: 578. 1910.

*Caeoma Tsugae* Spaulding, Science II, 33: 194, hyponym. 1911.

*Melampsora Populi-Tsugae* J. J. Davis, Trans. Wis. Acad. 19: 676. 1919.

O. Pycnia amphigenous and coniferous, scattered, punctiform, yellowish- or reddish-brown, noticeable, subcuticular, discoidal or conoidal, 50–125  $\mu$  broad by 32–40  $\mu$  high; ostiolar filaments none.

I. Aecia amphigenous, and on young stems and cones, thickly scattered, often crowded, oblong, 0.3–0.5 mm. broad by 0.7–1.5 mm. long, subepidermal, soon naked, dingy-white, somewhat pulverulent, ruptured epidermis noticeable; aeciospores broadly ellipsoid or obovate, rather small, 13–18 by 17–26  $\mu$ ; wall colorless, 1–2  $\mu$  thick, finely and closely verrucose.

## ON PINACEAE:

*Tsuga canadensis* (L.) Carr. (*Abies canadensis* Michx.), Connecticut, Massachusetts, New York, Wisconsin; Nova Scotia, Quebec.

II. Uredinia amphigenous or only hypophyllous, scattered, roundish, small, 0.1–0.3 mm. across, early naked, pulverulent, orange-yellow fading to pale-yellow, ruptured

epidermis inconspicuous; paraphyses intermixed with the spores, capitate, smooth, 40–70  $\mu$  long, the heads 15–23  $\mu$  broad, the wall 3–5  $\mu$  thick, or twice as thick above, peripheral paraphyses thinner-walled and more clavate; urediniospores broadly ellipsoid or globoid, 13–18 by 18–24  $\mu$ , occasionally flattened laterally; wall colorless, uniformly 1.5–2  $\mu$  thick, or up to 5  $\mu$  on the flattened side, sparsely and evenly verrucose, or sometimes with a smooth spot on the flattened and thickened side.

III. Telia amphigenous, or only hypophyllous, scattered, sometimes confluent, irregularly roundish, small, 0.2–0.4 mm. across, somewhat elevated, reddish-brown, becoming darker, subepidermal; teliospores prismatic, 9–12 by 30–40  $\mu$ ; wall smooth, cinnamon-brown, uniformly 1  $\mu$  thick, or slightly thickened above.

## ON SALICACEAE:

*Populus alba* L. (*P. Bolleana* Mast.) (cult.), California, Oregon, Rhode Island, Washington; Ontario.

*Populus canadensis* Ait., Connecticut, Massachusetts, Michigan.

*Populus grandidentata* Michx., Connecticut, Indiana, Michigan, New York, Ohio; Nova Scotia, Quebec.

*Populus heterophylla* L., Indiana.

*Populus occidentalis* (Rydb.) Britton (*P. Sargentii* Dode), Colorado, Iowa.

*Populus tremuloides* Michx., Connecticut, Indiana, Maine, New Hampshire, Ohio, Vermont; Ontario, Quebec.

TYPE LOCALITY: Chebacco Lake, Essex County, Massachusetts, on *Abies canadensis*.

DISTRIBUTION: Nova Scotia and Connecticut westward to Wisconsin and Iowa. The uredinal stage on *Populus alba*, placed here with considerable doubt, occurs in the northeastern and northwestern parts of the country; also in South America.

ILLUSTRATION: Bull. Penn. Agric. Exp. Sta. 160: f. 7, 8.

EXSICCATI: Barth, N. Am. Ured. 111, 2325, 2417, 2418, 2517; Ellis & Ev. N. Am. Fungi 1882; Kellerm. Ohio Fungi 144, 145; Thaxter, Rel. Farl. 209.

3. *Melampsora albertensis* Arth. Bull. Torrey Club 33: 517. 1906.

*Uredo albertensis* Arth. N. Am. Flora 7: 101. 1907.

*Caeoma occidentale* Arth. Bull. Torrey Club 34: 591. 1907.

*Caeoma Pseudotsugae-Douglasii* Tubeuf, Nat. Zeits. Forst. Landw. 12: 91. 1914.

*Melampsora Pseudotsugae* Tubeuf, Nat. Zeits. Forst. Landw. 12: 91. 1914.

O. Pycnia amphigenous, scattered, minute, inconspicuous, subcuticular, honey-yellow, hemispheric, 65–100  $\mu$  broad by 23–32  $\mu$  high.

I. Aecia hypophyllous, sparsely arranged in two rows on yellow spots occupying part or all of a leaf, roundish to oblong, 0.3–0.4 mm. wide by 0.3–1 mm. or more long, soon naked, orange-yellow when fresh; aeciospores broadly ellipsoid, 20–24 by 27–32  $\mu$ ; wall colorless, moderately thin, 1.5–2.5  $\mu$ , closely and finely verrucose.

## ON PINACEAE:

*Pseudotsuga mucronata* (Raf.) Sudw. (*P. Douglasii* Carr., *P. taxifolia* Britton, *Abies Douglasii* Lindl.), Colorado, Idaho, Montana, Oregon, Utah, Washington, Wyoming; British Columbia.

II. Uredinia hypophyllous, numerous, scattered, round, 0.2–0.4 mm. across, early naked, pulverulent, pale-yellow, ruptured epidermis evident; paraphyses intermixed with the spores, clavate, 9–15 by 67–90  $\mu$ , the wall colorless, 3–5  $\mu$  thick, the stipe solid; urediniospores broadly ellipsoid, 15–22 by 23–32  $\mu$ , usually flattened laterally and appearing oblong and narrower; wall colorless, 1.5–2  $\mu$  thick, much thickened on the flattened side, 2.5–3.5  $\mu$ , evenly and sparsely verrucose, with smooth spots.

III. Telia hypophyllous, or sometimes amphigenous, small, irregular, often confluent, usually crowded in more or less extensive, fused, cereous areas about the uredinia, subepidermal, waxy, orange-brown; teliospores prismatic, 10–13 by 29–39  $\mu$ ; wall golden-brown, smooth, thin, about 1  $\mu$ , thicker above, 2–3  $\mu$ , with an evident apical pore.

## ON SALICACEAE:

*Populus acuminata* Rydb., Colorado.

*Populus angustifolia* James, Colorado.

*Populus balsamifera* L., Colorado, Washington.

*Populus mexicana* Westm., Lower California.

*Populus occidentalis* (Rydb.) Britton (*P. Sargentii* Dode), Colorado, Montana.

*Populus tremuloides* Michx. (*P. aurea* Tidestrom, *P. vancouveriana* Trel.), Colorado, Idaho, Montana, New Mexico, Oregon, Utah, Washington, Wyoming; Alberta, British Columbia.

TYPE LOCALITY: Moraine Lake, Laggan, Alberta, on *Populus tremuloides*.

DISTRIBUTION: Colorado and Wyoming to Oregon and British Columbia, and in northern Lower California.

EXSICCATI: Barth. Fungi Columb. 2737, 2939, 3713, 4329, 4642, 5033; Barth. N. Am. Ured. 511, 512, 610, 911, 1311, 1511, 1721; Garrett, Fungi Utah. 205.

4. *Melampsora occidentalis* H. S. Jackson, Phytopathology 7: 354. 1917.

O and I. Pycnia and aecia unknown.

II. Uredinia chiefly hypophyllous, scattered, roundish, 0.5–1.5 mm. across, early naked, somewhat pulverulent, orange-yellow fading to pale-yellow, ruptured epidermis conspicuous; paraphyses numerous, intermixed with the spores, capitate or clavate, 42–77  $\mu$  long, the heads 16–24  $\mu$  broad, the wall colorless, 2.5–3  $\mu$  thick, sometimes twice as thick above; urediniospores ellipsoid, oblong or pyriform, 16–29 by 32–48  $\mu$ , slightly flattened laterally; wall colorless, 2–3  $\mu$  thick, or up to 7  $\mu$  on the flattened sides, moderately and prominently echinulate, without smooth spots.

III. Telia chiefly hypophyllous, scattered, or often crowded and confluent about the uredinia, irregularly round, small, 0.2–0.5 mm. across, slightly elevated, subepidermal, waxy, light cinnamon-brown becoming blackish-brown; teliospores prismatic, 10–20 by 40–64  $\mu$ ; wall cinnamon-brown, smooth, 1–2  $\mu$  thick, darker and thicker above, 3–5  $\mu$ , the apical pore evident.

ON SALICACEAE:

*Populus acuminata* Rydb., Montana, Wyoming; British Columbia.

*Populus angustifolia* James, California, Montana, Washington, Wyoming.

*Populus balsamifera* L., Idaho, Montana, Washington, Wisconsin; British Columbia.

*Populus canadensis* Michx., Montana.

*Populus dilatata* Ait. (*P. nigra italica* DuRoi, *P. pyramidalis* Salisb., *P. italica* Moench), California.

*Populus hastata* Dode, Montana.

*Populus trichocarpa* T. & G., California, Idaho, Montana, Oregon, Washington;

British Columbia.

TYPE LOCALITY: Corvallis, Benton County, Oregon, on *Populus trichocarpa*.

DISTRIBUTION: Northern Wyoming westward to southern California and British Columbia, with one collection from central Wisconsin.

EXSICCATI: Barth. Fungi Columb. 3143, 3915, 4034, 4332, 4434, 4435, 4548; Barth. N. Am. Ured. 806, 1315, 2920, 3021; D. Griff. W. Am. Fungi 369.

100. *Uredo Bigelowii*.

Reduce this name to synonymy, and substitute for it the name in the first line beneath.

Add, under Pinaceae, the hosts:

*Larix decidua* Mill. (*L. europaea* DC.), New York.

*Larix laricina* (DuRoi) Koch (*L. americana* Michx.), Maine, Michigan, New York,

Vermont, Wisconsin.

*Larix occidentalis* Nutt., Oregon.

Substitute, under Salicaceae, the hosts:

*Salix alaxensis* (Anders.) Cov., Alaska.

*Salix amygdaloides* Anders., Colorado, Idaho, Indiana, Iowa, Kentucky, Kansas,

Michigan, Montana, Nebraska, New Mexico, New York, Ohio, South Dakota,

Washington, Wisconsin, Wyoming; Ontario.

*Salix arbusculoides* Fisch., Alaska.

*Salix arctica* Pallas, Alaska.

*Salix Barclayi* Anders., Alaska.

*Salix Barrattiana* Hook., Alberta.

*Salix bella* Piper, Montana, Washington.

*Salix brachycarpa* Nutt., Wyoming.

*Salix caudata* Nutt. (*S. lasiandra caudata* Sudw., *S. Bakeri* Seem., *S. lasiandra Fend-*

*leriana* Bebb, *S. Fendleriana* Auth. not Anders.), California, Idaho, Montana,

Oregon, Utah, Washington, Wyoming.

*Salix curtiflora* Anders. (*S. pseudocordata* Anders.), Oregon.

*Salix discolor* Muhl. (*S. eriocephala* Michx., *S. prinoides* Pursh), Indiana, Maine,

Michigan, Minnesota, New Hampshire, New York, Wisconsin.

*Salix exigua* Nutt. (*S. luteosericea* Rydb.), Colorado, Idaho, Montana, Nevada,

New Mexico, Utah, Washington, Wyoming.

*Salix fluviatilis* Nutt., Oregon.

*Salix Geyeriana* Anders., Colorado, Idaho, Nevada, Oregon.

*Salix glaucops* Anders., Colorado, Idaho; Alberta.

*Salix irrorata* Anders., Colorado, Idaho.

*Salix laevigata* Bebb, California.

*Salix lasiandra* Benth. (*S. Lyallii* Heller, *S. lasiandra Lyallii* Sarg.), California,

Washington.

- Salix Lemmoni* Bebb, California.  
*Salix ovalifolia camdensis* C. K. Schneid., Alaska.  
*Salix pentandra* L., New York, Pennsylvania.  
*Salix Piperi* Bebb, Oregon, Washington.  
*Salix pseudomyrsinites* Anders., Colorado, Idaho, Montana, Oregon, Utah, Washington.  
*Salix pulchra* Anders., Alaska.  
*Salix reticulata* L., Alaska.  
*Salix Scouleriana* Barratt (*S. flavescens* Nutt., *S. brachystachys* Benth.), California, Oregon, Utah, Washington, Wyoming.  
*Salix sitchensis* Sanson, Alaska, Oregon; British Columbia.  
*Salix tenerrima* Henderson (*S. exigua tenerrima* C. K. Schneid.), Idaho.  
*Salix vestita* Pursh (*S. Fernaldii* Blankinship) Alberta.

Change, under *exsiccati*, Clements, Crypt. Form. Colo. "148" to "603," Griff. W. Am. Fungi "341" to "45," Sydow, Ured. "1099" to "2343."

Omit the *exsiccati*: Ellis, N. Am. Fungi 1484, Ellis & Ev. Fungi Columb. 355, 1937, 2041, Kellerm. Ohio Fungi 46, 166.

Add the *exsiccati*: Barth. Fungi Columb. 2533, 2735, 3141, 3333, 3528, 3637, 3715, 3716, 3914, 4033, 4236, 4330, 4432, 4547, 4639, 4736; Barth. N. Am. Ured. 8, 214, 315, 410, 611, 613, 718, 1008, 1118, 1209, 1210, 1507, 1508, 1509, 1510, 1617, 1722, 1814, 1916, 2020, 2120, 2327, 2518, 2520, 2521, 2916, 2917; Brenckle, Fungi Dak. 176; Garret, Fungi Utah. 178.

101. *Uredo albertensis*.

See 3. *Melampsora albertensis*, above.

101. Insert, before *Uredo Lini*, the 3 following species, in part given on pages 99 and 100 as nos. 2, 3, and 4:

6. *Melampsora confluens* (Pers.) H. S. Jackson, Brooklyn Bot. Gard. Mem. 1: 210. 1918.

*Uredo confluens* Pers. Obs. Myc. 1: 98. 1796.  
*Caeoma Ribesii* Link, in Willd. Sp. Pl. 6: 26. 1825.  
*Caeoma Ribis-alpini* Wint. in Rab. Krypt. Fl. 1: 258. 1881.  
*Caeoma confluens* Schroet. Krypt. Fl. Schles. 3: 376. 1887.  
*Melampsora Ribesii-purpureae* Kleb. Jahrb. Wiss. Bot. 35: 667. 1901.  
*Melampsora Ribesii-auritae* Kleb. Jahrb. Wiss. Bot. 35: 668. 1901.  
*Melampsora Ribesii-grandifoliae* O. Schneider, Centr. Bakt. 15: 233. 1905.  
*Uredo Ribesii-purpureae* Arth. Résult. Sci. Congr. Bot. Vienne 338. 1906.  
*Melampsora Ribesii-Salicum* Bubák, Arch. Nat. Land. Böhmen 13: 200. 1908.

O. Pycnia chiefly epiphyllous, in small groups, crowded, punctiform, subepidermal, spheroidal becoming conoidal, 125–200  $\mu$  broad by 55–75  $\mu$  high.

I. Aecia hypophyllous, in small crowded groups on somewhat discolored spots, round, 0.3–0.8 mm. across, often confluent, soon naked, applanate, bright yellow fading to pale-yellow, ruptured epidermis noticeable; aeciospores globose or broadly ellipsoid, 15–20 by 18–26  $\mu$ ; wall colorless, moderately thick, 1.5–3  $\mu$ , finely and closely verrucose.

ON GROSSULARIACEAE:

- Grossularia divaricata* (Dougl.) Cov. & Britt. (*Ribes divaricatum* Dougl.), British Columbia.  
*Grossularia inermis* (Rydb.) Cov. & Britt. (*Ribes inermis* Rydb., *R. saxosum* Hook., *R. vallicola* Greene), Utah.  
*Grossularia leplantha* (A. Gray) Cov. & Britt. (*Ribes leplanthum* A. Gray), Utah.  
*Ribes aureum* Pursh (*Chrysobotrya aurea* Rydb.), Utah.  
*Ribes lacustre* (Pers.) Poir. (*Limnobotrya lacustris* Rydb.), Oregon, Washington; British Columbia.  
*Ribes nevadense* Kellogg, California.  
*Ribes petiolare* Dougl., Utah, Wyoming.  
*Ribes triste* Pall., Yukon.

II. Uredinia chiefly hypophyllous, usually on noticeably yellow spots, scattered or in groups, round, small, 0.5–1 mm. across, soon naked, pulvinate, pale orange-yellow fading to yellowish-white, ruptured epidermis inconspicuous; paraphyses capitate or clavate, 40–70  $\mu$  long, the heads 16–25  $\mu$  broad; urediniospores globose or broadly ovoid, small, 14–18 by 12–20  $\mu$ ; wall colorless, thick, 2–3.5  $\mu$ , sparsely and evenly verrucose-echinulate, the pores indistinct.

III. Telia chiefly hypophyllous, scattered or in groups, often covering the entire surface, round, small, 0.3–0.5 mm. across, brownish, covered with the epidermis; teliospores irregularly prismatic, rounded at both ends, 7–11 by 20–35  $\mu$ ; wall light-brown, smooth, thin, 1  $\mu$  or less, not thickened above.

## ON SALICACEAE:

*Salix argophylla* Nutt., Idaho, Oregon.

*Salix glauca* L., Yukon.

*Salix lasiolepis* Benth. (*S. lasiolepis Bigelowii* Bebb, *S. Bigelowii* Torr.), Arizona, California, Oregon, Washington.

*Salix lutea* Nutt. (*S. lutea platyphylla* Ball), California, Idaho, Montana, Oregon, Utah, Wyoming.

*Salix Mackenziana* (Hook.) Barratt, Washington.

*Salix monticola* Bebb, Colorado.

*Salix pennata* Ball, Washington

*Salix perrostrata* Rydb., Arizona, Colorado, Idaho, Nebraska, New Mexico, Montana, Oregon, Wyoming; British Columbia.

*Salix pseudomonticola* Ball, Montana.

*Salix Scouleriana* Barratt (*S. flavescens* Nutt., *S. brachystachys* Benth.), Alaska, California, Colorado, Idaho, Oregon, Montana, New Mexico, Utah, Washington; British Columbia.

*Salix sitchensis* Sanson, Oregon, Washington.

*Salix subcoerulea* Piper (*S. pachnophora* Rydb.), Colorado, Idaho, Montana, New Mexico, Utah, Washington, Wyoming.

*Salix tristis* Ait., Minnesota.

*Salix Watsoni* (Bebb) Rydb. (*S. cordata Watsoni* Bebb), Colorado, New Mexico, Wyoming, Utah.

TYPE LOCALITY: Europe, on *Ribes alpinum*.

DISTRIBUTION: Wyoming to central California and northward in the mountains to central Yukon; also in Europe.

EXSICCATI: Barth. Fungi Columb. 2532, 2736, 3142, 3714, 3717, 3718, 4032, 4937; Barth. N. Am. Ured. 314, 717, 1009, 1010, 1211, 1312, 1417, 1815, 2818, 2819; Clements, Crypt. Form. Colo. 148; Garrett, Fungi Utah. 71, 206; D. Griff. W. Am. Fungi 341.

7. *Melampsora Humboldtiana* Spig. An. Mus. Nac. Buenos Aires 23:  
28. 1912.

*Melampsora americana* Arth. Bull. Torrey Club 47: 465. 1920.

*Melampsora americana* Jørstad, Rep. Sci. Res. Norw. Exped. Nov. Zembyla 18: 11. 1923.

O. Pycnia hypophyllous, scattered among the aecia, broadly conic or hemispheric, yellowish or light-brown, rather inconspicuous, subcuticular but extending into and disintegrating the epidermal cells beneath, 80–150  $\mu$  broad by 50–95  $\mu$  high; ostiolar filaments none.

I. Aecia hypophyllous, scattered over part or all of the leaf on yellowish areas, oval or oblong, 0.3–0.8 mm. long, soon naked, pulverulent, at first orange, becoming pale-yellow, ruptured cuticle barely noticeable; aeciospores globoid or ellipsoid, 12–18 by 16–23  $\mu$ ; wall colorless, 1.5–2.5  $\mu$  thick, closely and finely but noticeably verrucose.

## ON PINACEAE:

*Abies balsamea* (L.) Mill., Michigan, Wisconsin, Vermont; Nova Scotia.

*Abies concolor* Lindl. & Gord., Colorado.

*Abies grandis* Lindl., Idaho, Oregon, Washington.

*Abies lasiocarpa* (Hook.) Nutt., Washington.

II. Uredinia hypophyllous, irregularly scattered, usually on yellow spots, round, either very small, 0.1–0.2 mm. across, and pale, or large, 0.2–0.5 mm. across, pulvinate, orange fading to pale-yellow, ruptured epidermis inconspicuous; paraphyses capitate or clavate-capitate, 20–30  $\mu$  broad in upper part, 30–60  $\mu$  long, in strongly capitate forms the wall 4–5  $\mu$  thick, obliterating the lumen of stalk, thicker at apex, 6–9  $\mu$ , in clavate forms the wall 1–2  $\mu$  thick, thicker above, 2–5  $\mu$ , colorless, smooth; urediniospores globoid or broadly ellipsoid, small, 13–16 by 15–20  $\mu$ ; wall colorless, moderately thin, 1.5–2  $\mu$ , closely and finely verrucose.

III. Telia hypophyllous, scattered, irregularly roundish, 0.2–0.4 mm. across, reddish-brown, subepidermal, indehiscent; teliospores oblong or prismatic, rounded at both ends, 7–12 by 30–32  $\mu$ ; wall light-brown, thin, 1  $\mu$  or less, slightly or not thickened above, smooth.













New York Botanical Garden Library  
3 5185 00275 8827

