MEMOIRS

OF THE

TORREY BOTANICAL CLUB.

VOL. IV.

PUBLISHED FOR THE CLUB.

JUNE, 1893—AUGUST, 1896.

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TORREY BOTANICAL CLUB.

VOL. IV. NO. 1.

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BY

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ISSUED JUNE 10, 1893.

PRICE, - - - - 75 CENTS.

MEMOIRS

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Index to Hepaticarum—Part I.

BY LUCIEN MARCUS UNDERWOOD.

The last general synopsis of the Hepaticæ was published by Gottsche, Nees and Lindenberg, forty-six years ago (No. 315), and with the single exception of a review of the literature of the decade 1847–58 (No. 297), no general bibliography of any considerable period has ever been published. The literature is yearly growing more formidable, and the need of an index is seen in the frequent duplication of names and descriptions. It is desirable, therefore, to take our bearings in order that we know more clearly the nature and extent of our publications. The intended purpose of this index is: (1) To present an author catalogue of the publications relating to this group, supplemented by a topical index for the purpose of more ready reference; (2) An index of all the species described, with a reference of each to the genera recognized at the present time; and (3) A classified arrangement of the species to show our present knowledge of their geographic distribution. The first of these we present herewith. That it is entirely complete we cannot reasonably hope, yet we believe it fairly represents the literature bearing on the subject to the close of the year 1892. We shall gladly receive notice of any omission or needed correction. It is hoped that the further parts will not be long delayed.

While the greater part of the more important literature is in our own possession, access to several rare papers has been possible only through the kindness of the authorities of the library of Columbia College, the Gray Herbarium, and the Royal Herbarium at Kew. In addition, lists of the published papers of prominent living contributors to the literature have been sent to the authors themselves, who have kindly corrected the lists of their publications. For the verification of some of the titles I am further indebted to Prof. A. B. Seymour, of Cambridge, Mass., and Mr. A. W. Evans, of New Haven, Conn.

GREENCASTLE, INDIANA, 6 Feb. 1893.

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(List of 54 Hepaticæ.)

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128a—Catalogue des Hépatiques et des Mousses d'Alsace. Bull. de la Soc. d'Hist. Nat. de Colmar, nouv. ser. i. 1–58 (1892).

Buttner, Richard.

129—Einige Ergebnisse meiner Reise in West Afrika in den Jahren 1884–86, imbesondere des Landmarsches von San Salvador über den

Quango nach dem Stanley-Pool. Mitt. des Afrik. Gesellsch. v. 253 (1889).

(Two new species described by Stephani.)

Buxbaum, Johann Christian. Merseburg, Germany, 5 Oct. 1693. † Wermsdorf bei Merseburg, 17 July 1730.

130—Plantarum minus cognitarum centuriae, complectens plantas circa Byzantium et in Oriente observatas. Centuriae I. et II. 4to. Petropoli (1728).

(Descriptions and figures of 5 species of Hepaticæ under name of "Lichen.")

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131—Zur Entwickelungsgeschichte der Spermatozoiden. Berl. Deutsch. Bot. Gesellsch. v. 120–127, t. VI. (1887).

(Includes notes on Pellia epiphylla.)

132—On the Relationships of the Archegoniata. Bot. Gazette, xvi. 323–333 (1891).

(Discusses the relations of Hepaticæ to Algæ, Musci and Pteridophytes.)

Camus, Fernand. See also *Brin.*

133—Note sur les Mousses et les Hépatiques de l'Isle-et-Vilaine. Rev. Bryol. ix. 33–42 (1882).

134—Sur les Collections bryologiques du Musée régional de Cholet (Maine-et-Loire). Bull. des Sciences, etc., de Cholet (1891).

134 a—Excursion bryologique à la tourbière de la Fontaine du Four dans la forêt de Montmorency. Bull. de la Soc. Bot. de France, xxxviii. 172–179 (1892).

134 b—Sur le Riccia nigrella. Bull. de la Soc. Bot. de France, xxxviii. 212–230 (1892).

134 c—Glanures bryologiques dans le Flore Parisienne. Bull. de la Soc. Bot. de France, xxxviii. 286–294 (1892).

(Notes 37 Hepaticæ.)

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135—Catalogue des Mousses et des Hépatiques récoltees aux environs de Stenay et de Montmédy. 8vo., pp. 40 (1882).

136—Note Bryologique sur les environs d'Anvers. Rev. Bryol. ix. 87–90 (1882); x. 71–73 (1883); xi. 24–26 (1884).

137—Contributions à la flore Bryologique de Belgique. Comptes Rendus des Seances de la Soc. Roy. de Bot. de Belgique, xxv. 41–46 (1886).

138—Sur les Riccia Bischoffii Hüb. et R. nodosa Bouch. Rev. Bryol. xix. 49–53 (1892).

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Carrington, Benjamin. † 18 Jan. 1893.

139—Gleanings among the Irish Cryptogams. Trans. Bot. Soc. Edinb. vii. 370—372, 379—388 (1863).

140—Irish Hepaticæ. Trans. Bot. Soc. Edinb. vii. 441—458, pl. X., XI. (1863).

141—On two Hepaticæ new to Britain; Jungermannia saxicola, J. Bartlingii. Manchester Lit. Phil. Soc. Proc. iv. 186—188 (1867).

142—Hepaticæ in Robert Brown's Florula Discoana. Trans. Bot. Soc. Edinb. ix. 453, 454 (1868).

(List of 10 Greenland Hepaticæ.)

143—Dr. Gray's Arrangement of the Hepaticæ. Trans. Bot. Soc. Edinb. x. 305—309 (1870).

144—On two new British Hepaticæ. Trans. Bot. Soc. Edinb. x. 378—382 (1870).

145—New British Hepaticæ. Grevillea. ii. 85—88, pl. XVIII. (1873).

146—British Hepaticæ, containing descriptions of the native species of Jungermannia, Marchantia and Anthoceros. (Only four parts issued). Pp. 88, pl. I.—XVI. (1874—1876).

147—Notes on new British Hepaticæ. Trans. Bot. Soc. Edinb. xiii. 461–470, Pl. XVII., XVIII. (1879).

Carrington, B., and **Pearson,** W. H.

148—Hepaticæ Britanicæ exsiccatæ. Fasc. i. Nos. 1–75 (1878); Fasc. ii. Nos. 76–150 (1879); Fasc. iii. Nos. 151–215 (1883); Fasc. iv. Nos. 216–290 (1890).

149—List of Hepaticæ collected in Tasmania by Mr. R. A. Bastow, F. L. S. Papers and Proc. Roy. Soc. Tasmania, 1887, 49–52 (1888).

150—Description of new or rare Tasmanian Hepaticæ. Papers and Proc. Roy. Soc. Tasmania, 1887, 1–12 (1888).

151—List of Hepaticæ collected by Mr. Thomas Whitelegge in New South Wales, 1884–5. Proc. Linn. Soc. N. S. W. ii. 1035–1060, pl. XXII.-XXXVII. (1887).

152—A new Hepatic. Jour. of Bot. xxvii. 225, t. CCXC (1889).

Carruthers, William.

153—On the nomenclature of the British Hepaticæ. Jour. of Bot. iii. 297–302 (1865).

(A discussion of the priority of generic names published by S. F. Gray in his "Arrangement of British Plants.")

Caspary, Robert.

154—Einige neue Pflanzenreste aus dem Samlandischen Bernstein. Schrift. der köngl. Phys.-Oecon. Gesellsch. zu Königsberg, xxvi. (1886).

(Describes 17 Hepaticæ found in amber.)

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155—Nouvelle Flore du Péloponnèse et des Cyclades. Fol. pp. 87, tab. 42, Paris (1838).

Chaboisseau, T.

156—Notes sur plusiers espèces observées rivantes ou soumises a la culture. VIII. Sur quelques Hépatiques. Bull. de Soc. Bot. de France, x. 300, 301 (1863).

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157—Nouvelles localites du Sphærocarpus Michelii dans la Sarthe. Rev. Bryol. iv. 19, 20 (1877).

158—Liste des Mousses et des Hépatiques recoltées dans la forêt des Fanges le 16 Juin (1888).

Cobb, N. A.

159—A List of Plants growing wild within thirty miles of Amherst, Mass. 8vo. pp. 51, Northampton (1887).

(Includes list of Hepaticæ.)

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160—Catalogue pour servir d' introduction a une Monographie des Hépatiques de Belgique. Bull. de la Soc. Roy. de Bot. de Belgique, — (1872). [Sep. pp. 56.]

(List of 105 Hepaticæ.)

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161—Description of a new species of Metzgeria. Trans. and Proc. New Zealand Inst. xiii. 368–369 (1881).

(Des ribes M. rugulosa n. sp.)

162—A description of a few new Plants from our New Zealand Forests. *Ibid.* xiv. 329–341 (1882).

(Describes Plagiochila subsimilis and Gymnanthe hirsutum, pp. 340, 341.)

163—Descriptions of a few new indigenous Plants. *Ibid.* xv. 320–339 (1883).

(Describes Symphyogyna biflora and Monoclea Hookeri, pp. 336–339.)

164—A further contribution toward making known the Botany of New Zealand. *Ibid.* xvi. 325–363 (1884).

(Describes 20 Hepaticæ, pp. 349–361.)

165—A Description of some newly-discovered Cryptogamic Plants; being a further Contribution toward making known the Botany of New Zealand. *Ibid.* xvii. 237–265 (1885).

(Describes 7 new species of Hepaticæ, pp. 260–263.)

166—A Description of some newly-discovered Cryptogamic Plants; being a further Contribution toward making known the Botany of New Zealand. *Ibid.* xviii. 219–255 (1886).

(Describes 43 new species of Hepaticæ, pp. 236–255.)

167—A description of some newly-discovered Crytogamic Plants; being a further contribution toward making known the Botany of New Zealand. *Ibid.* xix. 271–301 (1887).

(Describes 40 new species of Hepaticæ, pp. 280–301.)

168—On new indigenous Cryptogams of the Orders Lycopodiaceæ, Musci and Hepaticæ. *Ibid.* xx. 234–254 (1888).

(Describes 21 new species of Hepaticæ, pp. 243–254).

169—A Description of some newly-discovered Cryptogamic Plants; being a further contribution toward making known the Botany of New Zealand. *Ibid.* xxi. 43–80 (1889).

(Describes 72 new species of Hepaticæ, pp. 47–79.)

170—A Description of some newly-discovered indigenous Cryptogamic Plants. *Ibid.* xxii. 452–458 (1890).

(Describes 6 new species of Hepaticæ, pp. 454–457.)

171—A List of New Species of Hepaticæ novae zelandiae, named by F. Stephani, Leipzig. *Ibid.* xxiv. 398–400 (1892).

172—Plain and Practical Thoughts and Notes on New Zealand Botany. *Ibid.* xxiv. 400–409 (1892.)

(Popular account of New Zealand Hepaticæ, their uses, distribution, etc.)

Collins, Frank Shipley. Charlestown, Mass., 6 Feb. 1848. See *Dame, L. L.*

Colmiero, Miguel.

173—Enumeracion de las Criptogamas de Espana y Portugal Parte Primera, Acrogenas, pp. 119. Parte segunda, Talogenas, pp. 260. 8vo. Madrid (1867).

(54 species of Hepaticæ described, pp. 106–119.)

174—Enumeracion y Revision de las Plantas de la Peninsula Hispano, Lusitana e islas Baleares, Vol. i.–v. large 8vo. Madrid (1885–1889.)

(96 species of Hepaticæ described, v. pp. 552–571.)

Colonna, Fabio. Naples, Italy, *circa* 1567. † Naples, 1650.

175—Minus cognitarum rariorumque nostro coelo orientium stirpium Ekphrasis, etc. etc. 4to pp. 340–99, tab. 131. Rome (1616).

(Mentions three Hepaticæ which Lindberg distinguishes as Pellia, Conocephalus and Targionia.)

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Cooke, Mordecai Cubitt. Horning, (Norfolk), England, 12 July 1825.

176—British Hepaticæ, with figures and descriptions of every species. 8vo. pp. 27 (1878).

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177—Plants collected in Alaska and Nanaimo, B. C., July and August 1891. Bull. Torrey Bot. Club, xix. 239—249 (1892).

(List of 13 Hepaticæ, pp. 246–7.)

Corbiere, L.

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179—Muscinees Nouvelles pour les environs de Cherbourg. Rev. Bryol. xii. 58–60 (1885).

180—Mousses et Hépatiques des environs de Blidah (Algerie) récoltées en 1887 par M. Gay. Rev. de Bot. 145–155 (1889).

(List of 14 Hepaticæ.)

181—Les Fossombronia du departement de la Manche. Rev. Bryol. xvii. 1–6 (1890).

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183—Monographia Rhizospermarum et Hepaticarum. 4to. pp. 16, 6 tab. Prag. (1829).

184—Hepaticæ, in Sturm; Deutschlands Flora nach der Natur mit Beschreibungen. Zweite Abtheilung, Heft, i.–xxxi.

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185—Observations sur le Flore Cryptogamique de la Sarth et de la Mayenne. Bull. de la Soc. Linn. de Normandie, 2d ser., v. (1871). [Sep. pp. 19.]

186—Note sur un cas tératologique offert par une Hépatique (Frullania dilatata Nees). Rev. Bryol. iv. 3, 4 (1877).

187—Sur quelque stations du Sphaerocarpus Michelii dans l'ouest de la France. Rev. Bryol. iv. 6, 7 (1877).

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188—Florule du Finistere, contenant des descriptions de 360 especes nouvelles de Sporogames, des nombreuses observations. 8vo. pp. 262, Paris (1867).

(List of Hepaticæ, pp. 173–178).

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189—List of Jungermanniæ, etc., observed in the neighborhood of Dumfries. Phytologist, i. 257–259 (1844).

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190—Catalogue of Musci and Hepaticæ of North America, north of Mexico. 8vo. pp. 24, Natick (1885).

(List of 231 Hepaticæ.)

Curnow, William.

191—The Hepaticæ of West Cornwall. Trans. Penzance Nat. Hist. and Antiq. Soc. 1881–2. [Sep. 5 pp].

192—Additions to the recorded Fauna and Flora of West Cornwall. Trans. Penzance Nat. Hist. and Antiq. Soc. 1883–4.

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193—Geological and Natural History Survey of North Carolina. Part III. Botany, containing a Catalogue of the indigenous and naturalized Plants of the State. 8vo. pp. 156. Raleigh (1867).

(List of 69 Hepaticæ, pp. 75–77.)

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194—Flora of Middlesex County, Massachusetts. 8vo., pp. 201, Malden (1888).

(List of 16 Hepaticæ, pp. 149, 150.)

Darlington, William. West Chester, Pa. 28 April 1782. † West Chester, Pa., 23 April 1863.

195—Flora Cestrica. (Revised Edition) 8vo., pp. 498. Philadelphia (1853).

(Includes 33 Hepaticæ, pp. 422–431.)

Davies, George. † Brighton, England, 6 April 1892.

196—Blyttia Mörkii N. v. E. Grevillea, iv. 76, 77 (1875).

Day, David Fisher. Buffalo, New York, 11 June 1829.

197—A Catalogue of the Native and Naturalized Plants of the City of Buffalo and its Vicinity. Bull. Buffalo Soc. Nat. Sci. iv. 65–279 (1882–3). [Sep. pp. 215.]

(List of 24 Hepaticæ, pp. 165, 166.)

Debat, L.

198—Flore des Muscinées (Sphaignes, Mousses, Hépatiques). 12 mo. 4 pl. Lyon (1874).

DeCandolle, Augustin Pyramus. Geneva, Switzerland, 4 Feb. 1778. † Geneva, 9 Sept. 1841.

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200—Flore française ou descriptions succinctes de toutes les plantes qui croissent naturellement en France, disposées selon une nouvelle méthode d'analyse et précédées par un exposé des principes élementaire de la botanique. 3rd Ed. 8vo., Vol. i.–v. Paris (1805); Vol. vi. (1815).

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(List of 33 Hepaticæ.)

202—Beiträge zur Litteraturegeschichte und Verbreitung der Lebermoose in Böhmen, sammt einigen speciellen Beobachtungen. Verhandl. der k. k. zool.-bot. Gesellsch. (Wien.) xxix. 15–34 (1879).

203—Zur Verbreitung der Lebermoose in Böhmen, sammt einigen speciellen Beobachtungen. Sitz. der kön. böhmenischen Gesellsch. der Wissensch. (Prag). 1880, 104–111 (1881).

204—Die Lebermoose Böhmens. 8vo. pp. 71, Prag (1887).

(Includes 124 Hepaticæ.)

Delamare, E., **Renauld,** F., **et Cardot,** J.

205—Flora Miquelonensis: Enumeration systèmatique avec notes descriptive des Phanèrogames, Cryptogames Vasculaires, Mousses, Sphaignes, Hépatiques et Lichens. 8vo. pp. 79, Lyon (1888).

(List of 37 Hepaticæ.)

Del Amo y Mora, Mariano.

206—Flora cryptogamica de la Peninsula Iberica que contiene de las plantas acotyledoneas que crecen en Espana y Portugal. 8vo. pp. 849, Granada (1870).

(51 species of Hepaticæ described, pp. 623–649.)

Delogne, C. H.

207—Pleuroschisma deflexum Dmrt. et Plagiochila spinulosa Dmrt. Bull. de la Soc. roy. de Bot. de Belgique, xx. 35, 36 (1881).

208—Notes de Cryptogamie. Bull. de la Soc. roy. de Bot. de Belgique, xx. 143–145 (1881).

209—Note sur la decoverte en Belgique du Dialæna Lyellii Dmrt. Comptes rendus des Seances de la Soc. roy. de Bot. de Belgique, xxii. 67, 68 (1883).

210—Note sur Jungermannia cordifolia Hook. Comptes rendus des seances de la Soc. roy. de Bot. de Belgique, xxii. 9, 10 (1883).

Delogne, C. H., et **Durand**, Th.

211—Les hépatiques et les sphaignes de la flore Liegeoise (Supplement). Comptes rendus des seances de la Soc. roy. de Bot. de Belgique, xxii. 58–67 (1883).

212—Tableau comparatif des Muscinées Belges. Bull. de la Soc. roy. de Bot. de Belgique, xxiii. 63–86 (1884).

Delogne, C. H. et **Gravet**, F.

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(Contains 60 species of Hepaticæ exsiccatæ.)

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214—Plantes Cryptogames du Nord de la France. Fasc. i.–xvi. (Nos. 1–800) [continued as] Plantes Cryptogames de France, Fasc. xvii.–xliv. (Nos. 801–2200) (1825–1851):—Edition 2. Plantes Cryptogames de France, Fasc. i.–xxxvii. (Nos. 1–1850) (1836–1851):—Edition 3. Plantes Cryptogames de France, Fasc. i.–xvi. (Nos. 1–800) (1853–1860).
(Contains Hepaticæ among other Cryptogams.)

De Loynes, Paul. Poitiers, France, 31 Oct. 1841.

215—Essai d'un Catalogue des Hépatiques de la Gironde et de quelque localités du Sud-Ouest. Actes de la Soc. Linn. de Bordeaux, xl. 223–269 (1886).

216—Station de Trichocolea tomentella. Actes de la Soc. Linn. de Bordeaux, XLI. li. lii. (1887).

217—Trichocolea tomentella. (Dum.) Actes de la Soc. Linn. de Bordeaux, XLI. xxv. (1887).

218—Découverte du Riccia tumida Lind. dans le Sud-Ouest. Actes de la Soc. Linn. de Bordeaux, XLIII. lv. (1891).

219—Contribution à la flore crytogamique de l'Ouest-Vienne et Deux Sevres. Muscinées. Essai d'une Catalogue (1892).

Delpino, F.

220—Applicazione di nuova criterii per la classificazione delle piante. I. Mem. Accad. Bologna, ser. IV. IX. 221–243 (1888).

221—Simbiosi fra Epatiche fogliose e Rotiferi. Malpighia, IV. 32, tab. V. (1890).

Demont.

222—Decouverte des organes sexuels, du fruit et des semences dans le genre Jungermania dort l'organisation est demeurée entierement inconnue jusqu'a ce jour. 8vo. pp. 16, Paris (1857).

(Places the liverworts among the Ericaceæ.)

DeNotaris, Giuseppe. Milan, Italy, 18 April 1805. † Rome, 22 Jan. 1877. See also *Ardissone, F.*

223—Primitiæ Hepaticologiæ italicæ. Mem. Accad. delle Sci. di Torino, 2d ser. i. 1 tab. 287–361 (1839). [Sep. 4to. pp. 74 (1838).]

224—Jungermanniearum americanarum pugillus. Mem. Accad. delle Sci. di Torino, 2d ser., xvi. 211–238, 4 tab. (1857). [Sep. 4to. pp. 32 (1855).]

225—Appunti per un nuova censimento delle Epatiche Italiane. Mem. Accad. delle Sci. di Torino, 2d ser., xviii. 457–498 (1859); xxii. 353–389 (1865). [Sep. 4to. pp. 44, 5 tab. (1865).]

226–Sunto di osservazioni sul genere Sarcoscyphus. Commentario Soc. Critto. Ital. Genova, i. 72 (1861).

227—Epatiche di Borneo, raccolte dal Dre. O. Beccari nel ragiato di Sarawak durante gli anni 1865–66–67. Mem. Accad. delle Sci. di Torino, 2d ser., xxviii. 267–308, t. i.–xxxv. (1876). [Sep. 4to. 44pp. (1874).]

228—Epatiche di Borneo, raccolte dal Dre. O. Beccari nel ragiato di Sarawak durante gli anni 1865–66–67. Nuovo Giorn. Bot. Ital. viii. 217–251 (1876).

(Describes the new species of the preceding paper.)

Dickie, George.

229—Remarks on the structure and morphology of Marchantia polymorpha. Trans. Bot. Soc. Edinb. i. 107–112 (1844).

230—Notes on Mosses and Hepaticæ collected by Robert Brown, Esq., on the Northwest Coast of America. Trans. Bot. Soc. Edinb. ix. 355–358 (1868).

Dickson, James. Scotland, 1738; † Broad Green, 14 Aug. 1822.

231—Fasciculi (IV.) plantarum cryptogamicarum Britanniæ. 4to. pp. 28, 31, 24, 28, 12 tab. (1785–1801).

Dietrich, David Nathaniel Friedrich. ——— 1800.

232—Deutschlands kryptogamische Gewächse, oder Deutschlands Flora sechster und siebenter Band. Kryptogamie. 2 vols. 8vo., Jena (1843-46).

(Includes 104 Hepaticæ, pp. 115-150, taf. 205-272, colored.)

Dillenius, Johann Jakob. Darmstadt, Germany, 1687. † Oxford, England, 2 April 1747.

233—Historia Muscorum in qua circiter sexcentæ species veteres et novæ ad sua genera relatæ describuntur, et iconibus genuinis illustrantur: cum appendice et indice synonymorum. 4to., pp. xxi. 576, 85 tab. Oxford (1741). [Also reprint, 4to., pp. xvi. 576, 85 tab., Edinburgh (1811).]

Douin.

234—Hépatiques rares trouvées en Eure-et-Loir et régions voisines. Rev. Bryol. xix. 25, 26 (1892).

(List of 29 Hepaticæ.)

Dozy, Franz. Leyden, Holland, 27 Dec. 1807. † Neuwied, 7 Oct. 1856.

235—[Hepaticæ of the flora of Leyden.] Tijds. voor nat. Gesch. en Phys. x. 108-114 (1843).

(List of 14 Hepaticæ.)

236—Plagiochila Sandei Dz. icone illustrata. Accedunt novæ Hepaticarum Javanicarum Species a C. M. van der Sande-Lacoste breviter descriptae. 4to. pp. 16, 1 tab., Hazenberg (1856).

Du Buysson, R. See *Berthoumien, V.*

Dumortier, Barthélemy Charles. Tournay, Belgium, 8 April 1797. † Tournay, 9 July 1878.

237—Commentationes Botanicæ. 8vo. pp. 118, Tournay (1822).

(Contains *Essai d'une Monographie des Jongermannes*, pp. 103-116, in which the genus Jungermania is broken up into a number of genera.)

238.—Sylloge Jungermannidearum Europæ indigenarum, earum genera et species systematice complectens. 8vo. pp. 100, 2 pl. Tournay (1831).

239.—Recueil d' observations sur les Jungermannes, 8vo. pp. 27. Tournay (1835).

240.—Hepaticæ Europæ. Bull. de la Soc. royale de Bot. de Belgique, 5-203 (1874). [Sep. 8vo. pp. 203, 4 pl. Bruxelles (1874).]

(Contains descriptions of 310 Hepaticæ as follows: Jungermaniaceæ, 252. Anthocerotaceæ, 5; Marchantiaceæ, 28; Ricciaceæ, 25.)

Durand, Th. See *Delogne, C. H.*

Duterte, H.

241.—Notes Bryologique sur Alencon et ses environs, etc. Rev. Bryol. xiv. 65–77 (1877).

Edmond, James Williamson.

242.—Notes on the Structure and Measurements of Cells of Hepaticæ. 88–96.

Ehrhart, Friedrich. Holderbank, (Berne), Switzerland, 4 Nov. 1742. † Herrenhausen, Germany, 26 June 1795.

242 a.—Beiträge zur Naturkunde, etc. 7 vol. 8vo. Hannover (1787–92).

(Describes several Hepaticæ.)

Eiben, C. E.

243.—Die Laub-und Lebermoose Ostfriesland. Abhandl. der naturwiss. Verein in Bremen, ix. 423–445 (1887).

(List of 32 Hepaticæ.)

Eichler, B.

243 a.—Katalog der Lebermoose gesammelt in der Umgegend von Miedzyrzec. Pamietnik Fisyjograficzny, xi. 81–84 (1891).

Ekart, Tobias Philipp. Sinan bei Coburg, 21 May 1799. † (?)

244.—Synopsis Jungermanniarum in Germania vicinisque terris hucusque cognitarum. 4to pp. 72, 13 tab. Coburg (1832).

(Contains copies from many of the plates of Hooker's British Jungermanniæ.)

Ekstrand, E. V.

245.—Om groddbildiningar hos de bladiga lefvermossorna, Bot. Notiser, 33–36 (1879).

246.—Anteckningar öfver Skandinaviska Lefvermossor. Bot. Notiser, 36–42 (1879); 44–49 (1880).

247.—Om blommorna hos Scandinaviens bladiga lefvermossor. Bihang till Kongl. Svenska Vet.-Akad. Handl. 6, 1–66 (1880).

Endlicher, Stephen Ladislaus. Pressburg, Austria, 24 June 1804. † Vienna, 28 March 1849.

248.—Genera Plantarum secudum ordines naturales disposita. 4to pp. lx. 1483, Vindobonæ (1836–1850).

Evans, Alexander William. Buffalo, New York, 17 May 1868. See also *Millspaugh, C. F.*

249.—An arrangement of the Genera of Hepaticæ. Trans. Conn. Acad. viii. 262–280 (1892). [Sep. pp. 20.]

250.—A Provisional List of the Hepaticæ of the Hawaiian Islands.

Trans. Conn. Acad. viii. 253–261 (1892). [Sep. pp. 9, Pl. XXII, XXIII.]

(List of 118 species hitherto reported including 10 new species, half of which are credited to Austin MS.)

251.—List of Liverworts from Southern Patagonia. Contr. U. S. Nat. Herb. i. 140–142, Pl. XV. XVI. (1892).

(List of 28 species collected by U. S. Fish Commission; describes Lophocolea apiculata and Schistochila quadrifida as new.)

Falconer, Hugh.

252.—On Athalamia, a new genus of Marchantiaceæ. Trans. Linn. Soc. xx. 397, 398, t. xxix. fig. 1–6 (1851).

Fehlner, C.

253.—Beitrag zur Moosflora von Nieder-Oesterreich. Oesterr. Bot. Zeitschrift, xxxii. 45–51 (1882).

(List of 29 Hepaticæ.)

Fellner, Ferd.

254.—Ueber die Keimung der Sporen von Riccia glauca. Jahresb. der Akad. naturwiss. Vereins in Graz,———— (1875). [Sep. pp. 9, 2 taf.]

Filipowicz, Casimir.

255—Catalogue des Mousses, des Hépatiques et des Lichens du Royaume de Polgne. 8vo., pp. 10 (1881).

(Includes 57 Hepaticæ.)

Fiori, Adriano.

256—Revista statistica dell' Epaticologia Italiana. Primo elenco delle Epatiche de Modenese e Reggiano. Malpighia, vi. 41–49, tav. III. (1892).

(Gives map showing distribution of species.)

Fiorini-Mazzanti, Contessa Elisabetta.

257—Florula del Colosseo. Atti dell' Acad. Pontif. di Nuovo Lincei. (1874–78). [Sep. pp. 81.]

(Includes 4 species of Hepaticæ.)

Fitt, G.

258—Notes on Sphærocarpus terrestris. Lond. Jour. Bot., 287–289, t. IX. (1847).

Focke, W. O.

259—Die Moosflora des niedersachsisch-friesischen Tieflandes. Abhandl. der naturwissensch. Verein zu Bremen, vi. (1879).

(List of 51 Hepaticæ.)

260—Versuch einer Moosflora der Umgegend von Bremen. Abhandl. der naturwissensch. Verein zu Bremen, ix. 165–184 (1887).

(List of 46 Hepaticæ.)

Forster, George. Nassenhuben bei Danzig, Germany, 26 Nov. 1754. † Paris, France, 11 Jan. 1794.

261—Fasciculus plantarum magellanicarum, et plantae atlanticae, ex insulis Madeira, St. Jacobi, Adscensionis, St. Helena et Fayal reportae. Comment. Soc. Gött. ix. 13–74 (1787). [Sep. 4to. pp. 64.]

Fries, Elias Magnus. Femsjo in Smoland, Sweden, 15 Aug. 1794. † Upsala, 8 Feb. 1878.

262—Stirpium agri Femsoniensis index, observationibus illustrata. 8vo. pp. 100, Lundae (1825–26).

263—Summa vegetabilium Scandinaviae, sive enumeratio systematica et critica plantarum quum cotyledonearum tum nemearum, inter mare occidentale et album, inter Eidoram et Nordkap hactenus lectarum indicata simul distributione geographica. 8vo. pp. viii. 572, Holmiae (1846–49).

Frost, Charles Christopher. Brattleboro, Vt., 11 Nov. 1805. † Brattleboro, Vt., 16 Mar. 1880.

264—Catalogue of Cryptogamous or Flowerless Plants of Vermont. Archives of Science and Trans. Orleans Co. Soc. Nat. Hist. i. 78–81, 111–117, 152, 153, 192–195, 234–240, 249–252 (1871).

(List of 45 Hepaticæ. pp. 194, 195.)

Funck, Heinrich Christian. ———, 1771. † Gefrees, Germany, 14 April 1839.

265—Kryptogamische Gewächse des Fichtelgebirges. 4to. Leipzig (1806–38).

(Exsiccatæ of Cryptogams Nos. 1–865, including several Hepaticæ.)

Gagliardi.

266—Epatiche raccolte nei diutorini del Calvario di Domodossola durante l'hiverno 1875–76. Atti dell' Acad. Pontif. di Nuovo Lincei, xxxvi. (1883). [Sep. pp. 4.]

Garcke, Friedrich August. Braunrode, Germany, 25 Oct. 1819.

267—Flora von Halle. Zweiter Theil, Kryptogamen. 8vo. pp. xii. 276, Berlin (1856).

Gardiner, William. † Dundee, Scotland, 21 June 1852.

268—Flora of Forfarshire. 8vo. pp. xxiv. 308, London (1848).

(Includes an account of the Hepaticæ.)

Gay, J. See *Montagne, C.*

Geheeb, A.

269—Beitrag zur Moosflora des westlichen Siberiens. Flora, lxii. 471–480 (1879).

(List of 3 Hepaticæ.)

270—Neue Beiträge zur Moosflora von Neu-Guinea. Bibliotheca Botanica, xiii. —— (1889).

(Description of Lepidozia Lawesii n. sp. by Stephani.)

Genth, C. F. F. Platte bei Wiesbaden, Germany, July 1810. † Nastötten, 13 Aug. 1837. See also *Hübener, J. W. P.*

271—Flora des Herzogthum Nassau und der obern, so wie untern Rheingegenden von Speier bis Köln. Erster Theil, Kryptogamie. 8vo. pp. xii. 439, Mainz (1836).

Gillot, X.

272—Liste des Cryptogames récoltées en Corse pendant la session extraordinaire de 1877. Bull. de la Soc. Bot. de France, xxv. 131–136 (1878).

(List of 10 Hepaticæ.)

273—Liste des Muscinées récoltées en Corse pendant la session extraordinaire de la Société Botanique de France. Rev. Bryol. v. 8–10 (1878).

(List of 8 Hepaticæ.)

Giordano, G. C.

274—Muschi del reale orto botanico raccolti del Prof. V. Cesati. Rendi dell' Accad. delle Sci. fis. e Mat. (Napoli), xxiv. 77–79 (1885).

(List of 10 Hepaticæ.)

Girgensohn, G. C.

275—Ubersicht der bis jetzt bekannten Laub- und Lebermoose der Ostsee-provincen. Archiv fur der Naturk. Liv.-Esth.- und Kurlands, i. 63–74 (1855).

276—Naturgeschichte der Laub- und Lebermoose Liv-, Esth- und Kurlands. Dorpater Archiv. ii. 1–488 (1860). [Sep. 8vo., pp. 488, Dorpat (1860).]

Godman, Frederick DuCane. See *Mitten, W.*

Goebel, Karl. Billigheim, Germany, 8 March 1855.

277—Ueber das Wachsthum von Metzgeria furcata und Aneura. Arb. des Bot. Inst. in Würzburg, ii. 285–290, 1 Taf. (1879).

278—Zur Embryologie der Archegoniaten. Arb. des Bot. Inst. in Würzburg, ii. 437–451 (1880).

279—Zur vergleichenden Anatomie der Marchantieen. Arb. des Bot. Inst. in Würzburg, ii. 529–535 (1880).

280—Die Muscineen, in *Schenk*: Handbuch der Botanik, ii. 315–401 (1882).

281—Grundzuge der Systematik, und speciellen Pflanzenmorpholozie. 8vo., Leipzig (1882).

(Muscineen, 152–205.)

282—Muscineae, in Encyclopedia Britannica, Ninth Edition, xvii. 65–74 (1884).

283—Outlines of Special Morphology and Classification of Plants. 8vo. Oxford (1887).

(English translation of No. 281. Gives general account of Muscineae, pp. 140–144, and of the Hepaticæ, pp. 144–163.)

284.—Morphologische und biologische Studien: Ueber epiphytische Farne und Muscineen. Ann. du Jard. Bot. de Buitenzorg, vii. 1–73, Pl. I–XV (1887).

(Discusses function of "auriculæ" in Hepaticæ, etc.)

285.—Ueber die wasserbehälter epiphytischer Lebermoose. Pflanzenbiologische Schilderungen I, ———— Marburg (1889).

(Discusses the germination of Lejeunea, and the auricles of Jungermaniaceæ.)

286.—Ueber die Jugendstände der Pflanzen. Flora, lxxii. 1–45 (1889).

(Discusses the development of Hepaticæ, especially the Jungermaniaceæ, pp. 14–64.)

287.—Morphologische und biologische Studien: IV. Ueber javanische Lebermoose. Ann. du Jard. Bot. de Buitenzorg, ix. 1–40, Pl. I.–V. (1891).

(1. Treubia insignis. 2. Calobryum Blumii. 3. Colura ornata. 4. Eine javanische Plagiochila mit Wassersachen. 5. Kurzia crenacanthoidea.)

Godelinais, Abbe de la.

288—Mousses et Hépatiques d'Ille-et-Vilaine. Rev. Bryol. viii. 104–111 (1881); ix. 6–9 (1882).

(List of 64 Hepaticæ.)

Gonse, E.

289—Catalogue des Muscinées de la Somme. Mem. de la Soc. Linn. du Nord de la France, iv. (1885).

(List of 35 Hepaticæ.)

290—Additions au Catalogue des Muscinées de la Somme. Mem. de la Soc. Linn. du Nord de la France, vii. (1886–88). [Sep. pp. 11.]

Gottsche, Carl Moritz. Altona bei Hamburg, Germany, 3 July 1808. † Altona, 28 Sept. 1892. See also *Hampe, E.; Lindenberg, J. B.; Lehmann, J. G. C.; Polakowsky, H.; Schiffner, V.; Underwood, L. M.*

291—Anatomisch-physiologische Untersuchungen über Haplomitrium

Hookeri N. v. E. mit Vergleichung andere Lebermoose. Acta Acad. Caes. Leop. Carol. Nat. Cur. xx. 267–398, t. xiii.—xx. (1843).

292—Ueber die Fructification der Jungermanniae Geocalyceae. Acta Acad. Caes. Leop. Carol. Nat. Cur. xxi. 419–466, t. xxx.—xxxii. (1845).

293—Muscorum Hepaticarum species novae Javanenses. Batavia Nat. Tijdschr., iv. 573–576 (1853). *Also* in *Zollenger:* Systematisches Verzeichniss der im indischen Archipel. in den Jahren, 1842–48 gesammelten so wie der aus Japan empfangenen Pflanzen. 8vo., pp. xiv., 160, 67, Zurich (1854–5.)

294—Hepaticæ Australasiæ a Dre. Ferd. Müller lectae. Linnæa, xii. 547–561 (1856).

295—Pugillus Novarum Hepaticarum e recensione Herbarii Musei Parisiensis, congestus. Ann. des Sc. Nat., 4th ser., viii. 318–348, t. ix.–xvi. (1858).

296—Ueber das Genus Monoclea. Bot. Zeitung, xvi. 281–287, 289–292, t. vii., viii. (1858).

297—Uebersicht und kritische Würdigung der seit dem Erscheinen der Synopsis Hepaticarum bekannt gewordenen Leistungen in der Hepaticologie. Beilage zu Bot. Zeitung, xvi. 1–48 (1858).

298—Die Leistungen der Belgier in der Hepaticologie seit, 1835. Beilage zu Bot. Zeitung, xvi. 49–54 (1858).

299—Eine veilleicht neue Art der Gattung Ricciella Braun. Bot. Zeitung, xvii. 88—92 (1859).

300—Hepaticologische Notizen. Bot. Zeitung, xix. 1—4 (1861).

301—Hepaticæ, in Specimen Floræ Cryptogamei septem insularum. (Corcyra, etc.) Verhandl. der k. k. zool.–bot. Gesellsch. xi. 416 (1861).

302—Hepaticæ, in *Triana et Planchon:* Prodromus Floræ Novo-Granatensis. Ann. des Sc. Nat. 5th ser. 1, 95—198, t. xvii.–xx. (1864).

302 a—Carrington's Irish Cryptogams. Hedwigia, v. 8–14 (1866).

303—Ueber die Cuticula der Scapania-Arten.. Hedwigia, v. 17—23 (1866).

304—De Mexikanske Levermosser, efter Prof. Fr. Liebmanns Samling. Dansk. Vid. Selsk. Skrift. vi. 97—380, t. i.–xx. (1867). (Sep. pp. 284.)

305—Eine neue Jungermannia (J. Mildeana). Verhandl. der k. k. zool.–bot. Gesellsch. xvii. 623—626 (1867).

306—Einige Bemerkungen zu Thom. Jensen: Conspectus Hepaticarum Daniæ, eller Beskrevelse af de Danske Halvmosser. Hedwigia, vi. 49–59, 65–77 (1867).

(Includes notes on many species, and a revision of the European species of Pellia.)

307—Neuere Untersuchungen uber die Jungermanniæ Geocalyceæ. Abhandl. des Naturw. Vereins in Hamburg, vii. 39—66, t. (1880).

308—Hepaticæ in *Müller:* Fragmenta Phytographiæ Australiæ, xi. 53–69 (1880).

309—Hepaticæ, in Reliquiæ Rutenbergianæ. Abhandl. der naturwissensch. Verein in Bremen, vii. 338–365 (1882).

(Describes 37 new Hepaticæ from Madagascar.)

310—Ueber die in Bernstein eingeschlossenen Lebermoose. Berichte der Gesellsch. für Bot. in Hamburg, i, 1–5 (1886).

(23 species of Hepaticæ in amber. *Cf.* Bot. Cent. xxv. 95–7, 121–3).

311—Ueber Lebermoose von Ceylon. Gesellsch. für Bot. in Hamburg, ii. 33, 34 (1886).

312—Ueber Lebermoose, mitgebracht von der Expedition der Gazellė. Gesellsch. fur Bot. in Hamburg, ii. 34 (1886).

313—Ueber Bildungsabweichungen bei der Entwickelung des Sporogons der Lejeunien. Gesellsch. fur Bot. in Hamburg, i. 15 (1886).

314—Die Lebermoose Sudgeorgiens. Die deutschen Polar expedition, ii. 449–454, t. i.–viii. (1890).

Gottsche, C. M., **Lindenberg**, J. B., et **Nees** ab **Esenbeck**, C. G.

315—Synopsis Hepaticarum. 8vo., pp. 834. Hamburghi, (1844–1847).

Gottsche, C. M., et **Rabenhorst**, L.

316—Hepaticæ Europæ (exsiccatæ). Decas 1–66, (No. 1–660), Dresden, 1862–1879.

(Dr. Gottsche's connection with this elaborate series commenced with the issue of Decades 3–4, No. 21.)

Gravet, F. See *Delogne, C. H.*

Gray, Samuel Frederick. England, 1780. † 1836.

317—A Natural Arrangement of British Plants according to Jussieu, DeCandolle, etc. 2 vols. 8vo. London (1821).

(Contains the first extensive breaking up of the genus Jungermania, following the divisions made by Hooker in his *British Jungermanniæ.*)

Griffith, William. Ham Common, England, 4 March 1810; † Malacca, India, 9 Feb. 1845.

318—Notulæ ad plantas Asiaticas. Part II. On the higher Cryptogamous Plants, 8vo., with Atlas 4to. Calcutta (1849).

(General remarks on Hepaticæ, pp. 285–298; Descriptions of several new genera and species, pp. 299–352. The work was written in part as early as 1835, but was published posthumously.)

Grilli.

319—Alcune Muscinee ed alcuni Licheni Marchigiani. Nuovo Giorn. Bot. Ital. xxiii. 508 (1891).

(Includes 7 Hepaticæ.)

Grönland, Johannes.

320—Memoire sur la Germination de quelque Hépatiques. Ann. des Sc. Nat. 4th ser., i. 5–29, t. i.–vi. (1854). [Sep. pp. 25].

Grönlund, Christian.

321—Beitrag zur Kentniss der Flora von Islånd. ii. Hepaticæ et Musci. Bot. Tidskrift, 2 R. iii. 1–22 (1874).

(List of 55 Hepaticæ.)

322—Islands Flora. 8vo., Copenhagen (1881).

(Includes 62 species of Hepaticæ.)

Gronovius, Jan Fredrik. Leyden, Holland, 1690. †Leyden, 1762.

323—Flora Virginica, etc. 2 vol. 8vo. (1739–43).

(Mentions one hepatic under the name of "Lichen terrestris pileatus," which Lindberg identifies as Fimbraria tenella; the first reported from America.)

Guignard, Leon.

324—Sur la formation des Anthérozoides des Hépatiques, des Mousses et des Fougéres. Comptes rendus de l'Acad. des Sc. cviii. 463.

325—Development et constitution des Anthérozoides. Rev. gen. de Botanique, i. pt. 1–4 (1889).

(Pellia, Fossombronia, Anthoceros, Marchantia, Conocephalus, etc.)

Haberlandt, G.

326—Ueber das Längenwachsthum und den Geotropismus der Rhizoiden von Marchantia und Lunularia. Oesterr. Bot. Zeitschr., xxxix. 93–98 (1889).

327—Die Lebermoose Deutschland. 8vo., pp. 90, 12 Taf. col., Gera (1885).

Haines, Mary Parry. Cinnaminson, N. J., 24 Dec. 1826. †Richmond, Ind., 8 Dec. 1884.

328—List of Ferns, Mosses, Hepaticæ and Lichens collected in Wayne County, Indiana. Rep. Geol. Survey, viii.–x, 235–239 (1879).

(List of 20 Hepaticæ, p. 238).

Hall, Elihu. Virginia, June, 1822. †Athens, Illinois, Sept. 1882. See *Wolf, J.*

Haller, Albert von. Bern, Switzerland, 16 Oct. 1708. †Bern, 12 Dec. 1777.

329—Enumeratio methodica stirpium Helvetiæ indigenarum. 2 vol., folio, pp. 36,794, 24 tab. (1742).

(Includes 3 Hepaticæ identified by Lindberg as Jungermania ventricosa, Aneura palmata and Anthoceros multifidus.)

Hampe, Ernst. Furstenberg an den Weser, Germany, 5 July 1795; † Helmstedt (near Blankenburg), 23 Nov. 1880.

330—Bericht uber die Hepaticæ welche Hr. Moritz in Columbien sammelte und dem königlichen Herbarium in Schoneberg uber lieferte nach der Synopsis Hepaticarum und den Moritzschen Nummern aufgefuhrt. Linnæa, xx. 321–326 (1847).

(Includes 3 new species of Hepaticæ.)

331—Enumeratio Hepticarum, quæ in Sectione ii. Plantarum Chilensium et in plantarum Peruvianis A. W. Lechler collectis et a R. J. Hohenacker editis occurrunt. Linnæa, xi. 552–556 (1854).

(List of 29 Hepaticæ, 6 new species.)

Hampe, Ernst, et **Gottsche**, C. M.

332—Expositio Hepaticarum Portoricensium quas collegit Schwanecke, hortulanus. Linnæa, ix. 337–358 (1852).

Hanry.

333—Catalogue des Mousses et Hépatiques de Provence. 8vo., pp. 22, Aix (1867).

Hansel, Vinzez.

334—Ueber die Keimung der Preissia commutata N. v. E. Sitzungsb. der kais. Akad. der Wissensch. (Wien), lxxiii. 89–97 (1876). [Sep. pp. 9, 1 Taf.]

Hart, H. Ch.

334a—On the Botany of Sinai and South Palestine. Trans. Roy. Irish Acad. xxviii. 373–452 (1885).

(List of 4 Hepaticæ, p. 451, determined by Mitten.)

335—Localities for Irish Hepatics and Mosses. Jour. of Bot. xxiv. 360–362 (1886).

(List of 10 Hepaticæ.)

Hartman, Carl Johan. Gefle, Sweden, 14 April 1790. † Stockholm, 27 Aug. 1849.

336—Handbok i Skandinaviens Flora, innefattande Sveriges och Norriges Vaxter, till och med Mossorna. 8vo., pp. 32, lxiii. 488, 2 tab. (1820).

(Succeeding editions have been published, 1832, 1838, 1843, 1849, 1854, 1864.)

Hazslinszky, F.

337—A magyar bivodalum mossfloraja. Kgl. Ung. Naturw. Gessell. (Budapesth), (1885).

(Handbook of Hungarian Bryophytes includes 123 species of Hepaticæ.)

Hedwig, Johann. Kronstadt in Siebenburgen, Germany, 8 Oct. 1730. †Leipzig, 18 Feb. 1799.

338—Theoria generationis et fructificationis plantarum cryptogamicarum. 4to., pp. 164, 37 tab. Petropoli (1784).

339—Theoria generationis et fructificationis plantarum cryptogamicarum Linnæi retractata et aucta. 4to. pp. xii. 268, 42 tab. Lipsiæ (1798).

Heeg, M.

340—Niederösterreichische Lebermoose. Ein Beitrag zur Kenntniss derselben. Verhandl. zool.–bot. Gesellsch. (Wien). xli. 567–573 (1891).

(Adds 38 Hepaticæ to the known list of the region.)

Hegelmaier, F.

341—Ueber die Moosvegetation des schwäbischen Jura. Württembergischenaturwissensch. Jahreshefte, xxix. 145–254 ( ).

(Includes 80 Hepaticæ.)

Hemsley, W. Botting.

342—Reports on Botany of the Bermudas, Ascension Is., St. Helena, etc. Challenger Reports. Part I. 92, 93; Part II. 43–45, 105, 176–178, 202, 203.

(Lists of known species; new species by Mitten.)

Henfrey, Arthur. Aberdeen, Scotland, 1 Nov. 1819. † Turnham Green, near London, 7 Sept. 1859.

343—On the development of the spores and elaters of Marchantia polymorpha. Trans. Linn. Soc. xxi. 103–110, t. xi. (1853).

Henriquez, J.

344—Hepaticas colhidas em Portugal. Boletin da Soc. Brot. iv. 234–249 (1886).

(List of 81 species. Synopsis of Genera. Descriptions of 5 species by Stephani and Lindberg.)

Herpell, G.

345—Die Laub–und Lebermoose in der Umgegend von St–Goar. Vehl. der nat. ver. der preuss. Rhinl. und westph. 27 Jahrg., iii Folge, vii. (1870). [Sep. pp. 25.] *Ibid.* 34 Jahrg. V Folge, iv. (1877). [Sep. pp. 35.]

Herter, L.

346—Beitrage zur Moosflora Württembergs. Jahresh. des Ver. für vaterl. Naturkunde in Württ. 175–220 (1887).

(List of 92 Hepaticæ.)

Heuffler, Ludwig, Ritter von. Innspruck, Tyrol, 26 Aug. 1817.

347—Specimen Florae cryptogamae Vallis Arpasch Carpatae Transilvani. Folio, pp. 66, 7 Taf. Vienna (1853).

(Includes 28 Hepaticæ.)

Hill, John. Peterborough, England, 1716. †London, 22 Nov. 1775.

348—A general Natural History. Vol. II. A history of Plants. Folio, pp. xxvi., 642, London (1751).

(Describes 19 Hepaticæ.)

Hitchcock, Edward. Deerfield, Mass., 24 May 1793. †Amherst, Mass., 27 Feb. 1864.

349—Catalogue of the Plants growing without Cultivation in the State of Massachusetts. Report on Geol. of Mass., 599–649 (1833). [Also Sep. pp. 54, Amherst (1835).]

(List of 24 Hepaticæ.)

Höfer, Fr.

350—Beitrag zur Cryptogamenflora von Niederösterreich. Verhandl. der zool. bot. Gesellsch. (Wien.), xxxvii. 379, 380 (1887).

Hoffman, George Franz. Marktbreit, Bavaria, 31 Jan. 1761. † Moscow, Russsia, 17 March 1826.

351—Deutschlands Flora. Zweiter Theil für das Jahr 1795. Kryptogamie. 12mo., pp. 100, 200, 14 tab. col. Erlangen (1795).

Hofmeister, Wilhelm. Leipzig, Germany, 18 May 1824; † Lindenau (near Leipzig), 12 Jan. 1877.

352—Vergleichende Untersuchungen der Keimung, Entfaltung und Fruchtbildung höherer Kryptogamen. 4to. pp. viii. 179, 33 Taf. Leipzig (1851).

(The foundation of exact knowledge of the development of the Hepaticæ and higher groups; Illustrates Anthoceros lævis et A. punctatus, t. I.–III. Pellia epiphylla, t. IV. fig. 9–30, t. V., t. VI., f. 1–12. Metzgeria furcata, t. IV., fig. 1–8. Aneura pinguis et A. multifida, t. VI., fig. 13–30. Blasia pusilla, t. VI., fig. 31–36. Fossombronia pusilla, t. VI., fig. 37–48. Frullania dilatata, t. VII., t. VIII., fig. 1–9. Cephalozia bicuspidata, t. IX., fig. 1–20. C. divaricata, t. VIII., fig. 56–64. Radula complanata, t. VIII., fig. 10–32. Riccia glauca, t. X. and Marchantiaceæ, t. XI., XII.)

353—Zur Morphologie der Moose. Bericht der köngl. Sachsischen Gesellsch, der Wissensch. 94–106, t. 4–7 (1854).

(Describes development of Riella Reuteri.)

354—Zusetze und Berichtigungen zu den 1851 veröffenlichen Untersuchungen der Entwickelung höherer Kryptogamen. Prings. Jahrb. iii. 259–292 (1861).

(Additional points in development of Anthoceros lævis, pp. 259–262.)

355—On the germination, development and fructification of the Higher Cryptogamia. (Translated by Frederick Currey.) 8vo. pp. 491, London (1862).

(A translation and revision of the three preceding papers.)

Hoffmeister, W.

356—Beiträge zur Kryptogamenflora der Umgegend Osnabrücks. Jahresb. des naturw. Ver. zu Osnabrück, vii. 138–143 (1889).

Holle, G. von.

357—Ueber das Zellenblaschen der Lebermoose. 8vo. pp. 26, 1 Taf. Heidelberg (1857).

Holler, A.

358—Die Moosflora der Ostrachalpen. Ein Beitrag zur Bryogeographie des Algäu. Jahresb. des Naturw. Ver. für Schwaben und Neuberg in Augsburg, xxix. 118–270 (1887).

(List of 62 Hepaticæ.)

Holmes, Edward M.

359—The Cryptogamic Flora of Kent. Jour. of Bot. 43–54 (1878).

(List of 48 Hepaticæ.)

Hooker, Joseph Dalton. Halesworth (Suffolk), England, 30 June 1817.

360—Handbook of the New Zealand Flora. 2 vol. 8vo. pp. lxviii. 798, London (1864–67).

(Describes about 200 species of Hepaticæ, pp. 497–549.)

361—Jungermannia Bertoana. Bot. Miscellany, ii. 148–150, t. lxxviii. (1831).

Hooker, Joseph Dalton, and **Taylor**, Thomas.

362—Hepaticæ Antarcticae: being characters and brief descriptions of the Hepaticæ discovered in the southern circumpolar regions during the voyage of H. M. Discovery Ships, Erebus and Terror. Lond. Jour. of Bot. iii. 366–400, 454–481 (1844).

(Descriptions of Hepaticæ largely from Falkland Islands and Cape Horn.)

363—Hepaticæ Antarcticae supplementum, or specific characters with brief descriptions of some additional species of the Hepaticæ of the Antarctic Regions, New Zealand and Tasmania, together with a few from the Atlantic Islands and New Holland. Lond. Jour. of Bot. iv. 79–97 (1845).

364—Hepaticæ, in Flora Antarctica. Botany of the Antarctic voyage of H. M. discovery ships Erebus and Terror, in the years 1839–43. ii. 423–446, London (1847).

(Hepaticæ of Fuegia, the Falklands and Kerguelen Islands.

Hooker, William Jackson. Norwich, England, 6 July 1785. † Kew, 12 Aug. 1865.

365—British Jungermanniæ, being a history and description with coloured figures of each species of the genus and microscopical analyses of the parts. Folio, 88 tab. col., London (1816).

(This classic work will stand as the foundation of exact description and delineation.)

366—Plantæ cryptogamicæ quas in plaga orbis novi æquinoctiali collegerunt Alexander von Humboldt et Aimé Bonpland. Adjectis tabulis species quasdem novas minusve cognitas (Muscorum frondosorum et hepaticorum) exhibentibus nec non Alexandri de Humboldt notationibus quibusdam plantarum geographiam spectantibus. 4to. 4 tab. col., London (1816).

367—Musci Exotici, containing figures and descriptions of new or little known foreign mosses and other cryptogamic subjects. 8vo. Vol. i., tab. 1–96 (1818); Vol ii. tab. 97–176 cum textu. London (1820).

(Contains numerous plates of Hepaticæ.)

368—Flora Scotica, or a description of Scottish plants arranged both according to the artificial and natural methods. 2 vol. 8vo. pp. x. 292, 297, London (1821).

(Includes the Hepaticæ, pp. 109–120.)

Hooker. William Jackson, and **Taylor,** Thomas.

369—Muscologia Britannica, containing the mosses of Great Britain and Ireland, systematically arranged. 2d Ed. 8vo. pp. 272, 36 tab., London (1827).

(Contains the Hepaticæ, pp. 211–241.)

Hooker, William Jackson, and **Wilson,** W.

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372—Hepaticologia Germanica, oder beschreibung der deutschen Lebermoose. 8vo., pp. 314, Mannheim (1834).

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373—Deutschlands Lebermoose exsiccata.

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374—Catalogue des Muscinées récoltées aux Antilles Francaises. I. Hépatiques. Rev. Bryol. ii. 1–5 (1875).

375—Hepaticologia Gallica, flore analytique et descriptive des Hépatiques de France et de Belgique, accompagnée de planches représentant chaque espèce de grandeur naturelle et ses principaux caractères grossis. 8vo., pp. 102, 13 pl. Caen (1881).

376—Catalogue analytique des Hépatiques du Nord-Ouest. Bull. de la Soc. Linn. de Normandie, ——, 134–157 (1881). [Sep. 24 pp.]

377—Hepaticæ Galliæ, (Exsiccatæ). Fascicules I.–VIII., Nos. 1–200.

(Issued by the collaboration of many other bryologists.)

378—Hépatiques des Antilles récoltées par Husnot et determinées par Gottsche.

(A series of 48 species exsiccatæ.)

379—Le genre Riella. Rev. Bryol. xix. 44–46 (1892).

380—Note sur les Riccia. Rev. Bryol. xix. 58 (1892).

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381—Die märkischen Lebermoose. Bot. Zeitung, vii. 481–485 (1849).

(List of 49 Hepaticæ.)

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(Describes 108 Hepaticæ.)

383—Hepaticæ Europæ. Bot. Zeitung, xxxv. 49–59, 65–74, 81–93, 97–111 (1877).

(Review of Dumortier's work.)

384—Die Europaischen Radula-Arten. Flora, lxiv. 353–362, 385–400 t. vii. viii. (1881). [Sep. pp. 24.]

385—Monographie der Lebermoosgattung Physiotum. Hedwigia, xxv. 49–87, t. i.–x. (1886).

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385a—Kryptogamen Badens. Fasc. i.–xx. (?–1870).

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386—Porella Levieri, Jack et Stephani n. sp. Flora, lxxi, 496–498 (1888).

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(22 new Hepaticæ from South America and the Philippines.)

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389—Die Moosflora Elbings. Westpreus. bot.-zool. Vereins zu Elbing, iv. 28–39 (1881).

(List of 35 Hepaticæ.)

389a—Die Moosflora Elbings. Schrift. der naturf. Gesellsch. in Danzig. v. 45–56 (1882).

(List of 37 Hepaticæ.)

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391—Conspectus Hepaticarum Daniæ, eller Beskrivelse af de dansk halvmosser. Bot. Tidsskrift, i. 56–166 (1866).

(Describes 78 Hepaticæ).

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394—Muscorum species novae. Verhandl. des zool.-bot. Verein in Wien. xx. 167, 168 (1870). [Also Hedwigia, ix. 33, 34 (1870).]

(Describes Jung. Reichardti Gottsche *in litt.*)

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396—Nogle nye Skandinaviske Moser. Bot. Notiser 227–229 (1888).

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Kiaer, F. C.

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409—Flore cryptogamique des Flandres. 2 vol. 8vo., pp. 521, 490, Gand et Paris (1867). [Posthumous.]

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(List of 44 Hepaticæ, pp. 222–244.)

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(List of 12 Hepaticæ.)

415—Bericht über meine Bereisung der Lautenburger Gegend. Schrift. der naturf. Gesellsch. in Danzig, v. 57–77 (1882).

(List of 79 Hepaticæ.)

416—Bericht über die botanischen Reisen im neustädter Kreise im Sommer 1882. Mittheil. des westpreuss. bot.-zool. Vereins, vi. 18–28 (1883).

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417—Botanische Reisen im Kreise Karthaus in den Monaten Juni, Juli und August 1884. Schrift. der naturf. Gesellsch. Danzig, vi. 64–84 (1886).

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(Includes the Hepaticæ, pp. 101–116.)

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427—Monographie des Hepatiques de la Moselle, suivie d'une methode analytique des genres et des especes. 8vo. pp. iv. 44, Metz (1837); 2d Ed. pp. 51, Metz (1863).

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(List of 93 Polish Hepaticæ).

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430—Der Führer in die Lebermoose und die Gefässkryptogamen. 8vo., pp. 141, 7 taf. Berlin (1875).

(Includes 40 genera and 143 species of Hepaticæ).

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(Includes 19 Hepaticæ, Vol. i., pp. 40–45).

Kuntze, Otto.

431a—Revisio Generum Plantarum, etc. 8vo. pp. 1011, Leipzig, etc. (1891).

(Includes revision of the genera of Hepaticæ, pp. 829–840 based largely on the changes produced by S. F. Gray. The new genus Stephanina is substituted for Radula, and numerous species are transferred to modern genera.)

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432—Novae Hollandiæ plantarum specimen. 2 vol., 4to., pp. 112, 130, 265 ta. (1804–6).

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433—Tableau encyclopedique et methodique des trois regnes de la nature. Botanique. Illustration des genres. 3 vol., 4to., pp. xvi. 496, 551, 728. Paris (1791–1823).

(Includes the Hepaticæ, pp. 476–480.)

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434—Simple aperçu sur les Mousses et les Hépatiques du Mont Dore. Rev. Bryol. ii. 37–43 (1875). Supplement, *Ibid.* v. 33–43 (1878).

(Catalogue of speciės with stations.)

435—Mousses et Hépatiques de la Haute-Vienne. Rev. Bryol. ii. 49–101 (1875).

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436—Hepaticæ, in Meddelelser om Grönland. Tredie Hefte. 407–421, Kjobenhavn (1887).

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441—Sur l' origine des Spores et des Elateres chez les Hépatiques. Comptes Rendus,——, 1391–1403 (1885).

442—Sur le developpement du Sporogone de Frullania dilatata. Bull. Soc. Bot. de France, ser. 2, vii. 187–191 (1885).

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(Describes about 200 species of Hepaticæ from all parts of the world; those of Pugillus viii. were described by Gottsche, and those of Pugillus x. should be read in the light of Gottsche's criticisms in Bot. Zeitung xvi.)

446—Hepaticæ Capenses. Linnæa ix. 421–427 (1834).

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448—Plantae Preissianae, sive enumeratio plantarum, quas in Australasia occidentali et meridionali-occidentali annis 1830–41 collegit Ludwig Preiss. 2 vol. 8vo., Hamburg (1844–48).

(18 Hepaticæ enumerated, Vol. ii., pp. 120–130.)

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451—Ueber endogene Sprossbildung bei Lebermoosen. Bot. Zeitung, xxx. 33–41 (1872).

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454—Zur Morphologie der Metzgeria furcata. Mittheil. des naturw. Vereins für Steirmark, 2 tab. (1872). [Sep. 12 pp.]

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463—Die Inflorescenzen der Marchantiaceen. Sitzb. der. Akad. der Wissensch. (Wien), lxxxi. 123–143 (1880). [Sep. pp. 21.]

464—Ueber die Marchantiaceengattung Dumortiera. Flora, lxiii. 307–312 (1880).

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(The most important and comprehensive contribution to the morphology of the Hepaticæ.)

466—Die Stellung der Fruchtsacke bei den geocalyceen Jungermannieen. Sitzb. der Akad. der Wissensch. (Wien.), lxxxiii. 515–521 (1881). (Sep. 7 pp.)

467—Ueber Bau und Entwickelung einiger Sporen. Ber. der deutscher Bot. Gesellsch. i. 247–256 (1883).

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469—Wasserausscheidung an den Archegonständen von Corsinia. Flora, lxviii. 327–330 (1885).

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472—Recherches sur la distribution géographique des Muscinées dans le Département de l'Orne, et Catalogue methodique des espèces récoltées dans cette région. Rev. de Botanique, iv. 6–60 (1885). [Sep. pp. 60].

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(Discusses distribution over geologic outcrops.)

Lett, H. W.

474—Report on the Mosses, Hepatics and Lichens of the Mourne Mountain district. Proc. Roy. Irish Acad. 3d ser., i. 265–325 (1890).

(List of 54 Hepaticæ.)

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(General account of Hepaticæ with synopses of some genera, etc.)

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476—Una varieta nuova inermis della Riccia atromarginata Lev. Nuovo Giorn. Bot. Ital. xxii. 288 (1890).

477—Crittogame dell' Alta Birmannia, raccolte dal Sig. Leonardo Fea. Nuovo Giorn. Bot. Ital. xxiii. 600–602 (1891).

(List of 10 Hepaticæ; describes 1 new species.)

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478—Sur un genre nouveau d'Hépatiques, Lejeunia. Ann. Gen. des Sci. Phys. (Bruxelles) vi. 372–374. t. 96 (1820).

479—Plantae Cryptogamicæ Ardennes (1830–37).

(Includes 13 Hepaticæ, Nos. 10, 11, 110, 111, 209–213, 309–312.)

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480—Flora Scotica: or a systematic arrangement in the Linnæan method of the native plants of Scotland and the Hebrides. 2 vol. 8vo. pp. xlii. 1151, 35 tab. London (1777).

(Includes the Hepaticæ pp. 719–800.)

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482—Lebermoose, in *Cohn:* Kryptogamen-Flora von Schlesien. 1227–352, 429–444 (1877).

(Includes 134 Hepaticæ.)

483—Schlesische Lebermoose. Hedwigia, xv. 17–19 (1876).

484—Die Lebermoose der hohen Tatra. Jahresb. der Schles. Gesellsch. liv. 143–152 (1877).

(List of 100 Hepaticæ.)

485—Zur Lebermooseflora der hohen Tatra. Hedwigia, xvi. 59–62 (1877).

486—Die deutschen Sauteria-Formen. Flora, lxiii. 90–93 (1880).

487—Neue und kritische Lebermoose. Jahresb. der Schles. Gesellsch. lvii. 311–317 (1880).

488—Ueber Gymnomitrium adustum N. v. E. Flora, lxiv. 71–76 (1881).

489—Neue Arten und Formen der Gattung Sarcoscyphus Corda. Jahresb. der Schles. Gesellsch. lviii. 179–184 (1881).

490—Neue Muscineen für Schlesien. Jahresb. der Schles. Gesellsch. lviii. 184–186 (1881).

491—Eine verschollene Jungermannia (J. Marchica). Flora, lxv. 45–48 (1882).

492—Ueber verschollene Jungermannien. Jahresb. der Schles. Gesellsch. lix. 313, 314 (1882).

493—Neue Bürger der schlesischen Moosflora, B. Lebermoose. Jahresb. der Schles. Gesellsch. lx. 242, 243 (1883).

494—Einige neue Arten und Formen bei den Laub-und Lebermoosen. Jahresb. der Schles. Gesellsch. lxi. 204–226 (1884).

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495—Skandinaviska florans novitier: Sphagum laxifolium C. Mull. och Radula aquilegia Tayl. Bot. Notiser, 121–124 (1856).

496—Ueber das Vorkommen von aetherischen Oelen in Lebermoose. Flora, xlv. 545, 546 (1862).

497—Etheriska oljors forek ommande i Lefvermossor. Pharmaceutisk Tidskrift, 49, 50 (1863).

498—Granskning af Mossorna ati Vaillant's Botanicon parisienne. Öfvers. af Kongl. Vet.-Akad. Förhandl. xx. (1863). [Sep. 6 pp.]

499—Anomodon apiculatus, Br. et Sch. et Fimbriaria Lindenbergii, Corda novae flora Scandinaviae cives. Bot. Notiser, 125–127 (1865).

500—Sauteria seriata, Lindb. dioica (?) pedunculis in medio frondis serratis. Hedwigia, v. 33, 34 (1866).

501—Jungermania polaris n. sp. Öfvers. af Kongl. Vet.-Akad. Förhandl. xxiii. 560 (1866).

502—Förteckning öfver Mossor insamlade under de Svenska Expeditionerna till Spitzbergen 1858 och 1861. Öfvers. af Kongl. Vet.-Akad. Forhandl. xxiii. (1867). [Sep. 14 pp.]

503—Några till den Skandinaviska floran räknade Lefvermossor angående hvilkas dels utbredning dels plats i systemet, enligt hvad han auság origtiga åsigter gjort sig gallande. Medd. af Soc. pro Fauna et Flora Fenn. i. 96–97 (1876).

504—En för den Skandinaviska floran ny Lefvermossa, Harpanthus scutatus. Medd. af Soc. pro Fauna et flora Fenn. i. 98 (1876).

505—Iakttag elser rörande slägtena Riccia, Preissia, Metzgeria, Radula. Medd. af Soc. pro Fauna et Flora Fenn. i. 105–107 (1876).

506—Siva senaste undersökningar af Lefvermoos-slägtena Lejeunea, Lophocolea och Jungermania. Medd. af Soc. pro Fauna et flora Fenn. i. 108–109 (1876).

507—Sauteria alpina i Norden till hörande två skilda arter. Medd. af Soc. pro Fauna et Flora Fenn. i. 112–113 (1876).

508—Monographia Metzgeriæ. 8vo., pp. 48, 2 pl. Helsingfors, 1877.

509—Utredning af de under namm af Sauteria alpina sammanblandade former. Bot. Notiser, 73–78 (1877).

510—Riccia bicarinata n. sp. Rev. Bryol. iv. 41–42 (1877).

511—En liten profbit på nammförbistring. Not. ur Sällsk. pro Fauna et Flora Fenn. ix. (1867). [Sep. pp. 18].

(Notes on nomenclature; synonymy of Pallavicinia.)

512—Musci Novi Scandinavici. Not. ur Sällsk. pro Fauna et Flora Fenn. x. 255–299 (1868).

(List of Scandinavian Marchantiaceæ; notes on synonymy.)

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514—Utredning af Skandinaviens Porella-Former. Acta Soc. Sc. Fenn. ix. 329–345 (1869).

515—Revisio critica iconum in opere Flora Danica muscos illustrantium. Acta Soc. Sc. Fenn x. (1871).

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518—On Zoopsis H. f. et Tayl. Jour. Linn. Soc. xiii. 188–203 (1872).

519—Remarks on Mesotus Mitt. Jour. Linn. Soc. xiii. 182–185 (1873).

520—Manipulus Muscorum Secundus. Not. pro Fauna et Flora Fenn. xiii. 353–418 (1874).

521—Pallavicinia v. Flotowi och Aneura latifrons. Not. pro Fauna et Flora Fenn. xiii. 487 (1874).

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524—Hepaticologiens Utveckling fran äldsta tider till och med Linne. 4to., pp. 51 Helsingfors (1877).

525—On Riccia spuria Dicks. Jour. of Bot., n. ser., vii. 55 (1878).

526—Två för Finksa floran nya mossor samt om Leptoscyphus Mitt. Medd. äf Soc. pro Fauna et Flora Fenn. iii. 170, 171 (1878).

527—Cephalozia obtusiloba, n sp. Medd. af Soc. pro Fauna et Flora Fenn. iii. 172 (1878).

528—Om Jungermania julacea L., J. nivalis Sw. och J. setiformis Ehrh. Medd. af Soc. pro Fauna et Flora Fenn. iii. 172, 173 (1878).

529—Eit nytt slägte Peltolepis. Medd. af Soc. pro Fauna et Flora Fenn. iii. 174, 175 (1878).

530—Fyra för Finkska floran nya Lefvermosser. Medd. af Soc. pro Fauna et Flora Fenn. iii. 183, 184 (1878).

531—Cephalozia catenulata, Porella platyphylloides, etc. Medd. af Soc. pro Fauna et Flora Fenn. iii. 187–189 (1878).

532—En utredning af några Riccia-arten synonymi; Cesia obtusa n. sp.; Diplophyllum taxifolium; Madotheca simplicior, etc. Medd. af Soc. pro Fauna et Flora Fenn. iii. 189–191 (1878).

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538—Riccia ciliata i Finland. Medd. af Soc. pro Fauna et Flora Fenn. vi. 188, 189 (1881).

539—En för floran ny Lefvermossa, Nardia condensata. Medd. af Soc. pro Fauna et Flora Fenn. vi. 192, 193 (1881).

540—Nardia intricata n. sp.; Riccardia fuscovirens n. sp. etc. Medd. af Soc. pro Fauna et Flora Fenn. vi. 193–199 (1881),

541—Två för landets floran nya Lefvermossor. Medd. af Soc. pro Fauna et Flora Fenn. vi. 230, 231 (1881).

542—Tvenne for Skandinavien nya Lefvermossor. Medd. af Soc. pro Fauna et Flora Fenn. vi. 232 (1881).

543—Cephalozia media n. sp. Medd. af Soc. pro Fauna et Flora Fenn. vi. 241, 242 (1881).

544—Monographia præcursoria Peltolepidis, Sauteriæ et Cleveæ. Acta Soc. pro Fauna et Flora Fenn. ii. No. 3, 1–15 (1882).

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546—Historiska data rorande vas kannedom om Mossporensgroning. 8vo. pp. 11. Helsingfors (1884).

547—Sandea et Myriorrhynchus, nova Hepaticarum genera. Acta Soc. pro Fauna et Flora Fenn. ii. No. 5, 1–9 (1884).

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549—Sur la Morphologie des Mousses. Rev. Bryol. xiii., 49–60, 87–94, 100–109 (1886).

550—En för floran ny Lefvermossa, Cephalozia lacinulata. Medd. af Soc. pro Fauna et Flora Fenn. xiii. 208 (1886).

551—Prof på egendomlig geografisk utbredning (Anthelia nivalis). Medd. af Soc. pro Fauna et Flora Fenn. xiii. 232 (1886).

552—Jungermania Kaurini och J. Marchica. Medd af Soc. pro Fauna et Flora Fenn. xiii. 233 (1886).

553—Bidrag till Nordens Moosflora, I. Medd. af Soc. pro Fauna et Flora Fenn. xiv. 63–67 (1887).

554—De planta masculo Pleuroziæ purpureæ. Rev. Bryol. xiv. 17–19 (1887).

555—Hepaticæ novæ Lusitanicæ. Rev. Bryol. xiv. 19–21 (1887).

Lindberg, S. O. et **Arnell,** H. W.

556—Musci Asiae Borealis. Beschreibung der von den Schwedischen Expeditionen nach Sibirien in den Jahren 1875 und 1876 gesammelten Moose mit Berücksichtigung aller früheren bryologischen Angaben für das russische Nord-Asien. Erster Theil, Lebermoose. Kongl. Svenska Vet.-Akad. Handl. xxiii. No. 5, 1–69 (1889).

(Includes 98 Hepaticæ; several new species.)

Lindberg, S. O., et **Lackstrom,** E. F.

557—Hepaticæ Scandinavicæ exsiccatae. Fasc. I. Nos. 1–25. 14 pp. text. Helsingfors (1874).

Lindenberg, Johann Bernhard Wilhelm. † Bergedorf, Germany, 6 June 1851. See also *Gottsche, C. M.*

558—Synopsis Hepaticarum Europaearum. Nova Acta Acad. Caes. Leop. xiv. Suppl. pp. 126, 2 tab. Bonn (1829).

559—Ueber die Lebermoos-Gattungen, Corsinia und Grimaldia. Flora, xvi. 161–176 (1833).

560—Monographie der Riccien. Nova Acta Acad. Caes. Leop. xviii. 361–504, tab, xix.–xxxvii. (1836).

(The last general monograph of this group.)

Lindenberg, J. B. W., et **Gottsche,** C. M.

561—Species Hepaticarum. 4to. 67 tab. col. Bonn (1839–51).

(Contains elaborate monographs of Plagiochila, Fasc. I.–V. pp. xxix. 164, 33 tab.; Lepidozia, Fasc. VI., VII. pp. 78, 12 tab.; Mastigobryum, Fasc. VIII.–XI. pp. xii. 117, 22 tab.)

562—Plantæ Kegelianæ; expositio Hepaticarum Surinamensium. Linnæa, viii. 625–639 (1851).

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563—Hepaticæ Oerstedianæ. Linnæa, viii. 300–304, 640, 641 (1851).

(List of Hepaticæ collected in Jamaica and Costa Rica.)

Lindsay, W. Lander.

564—List of Mosses and Hepaticæ collected in Otago, New Zealand. Trans. Bot. Soc. Edinburgh, ix. 22–27 (1868).

Linnæus, Carl. Rashult in Småland, Sweden, 23 May 1707. † Upsala, 10 Jan. 1778.

565—Systema Naturæ, sive regna tria naturæ systematicæ proposita per classes, ordines, genera et species. (1735), Ed. X. (1758–59). Ed. XII. (1766–68); Ed. XIII. (1788–93).

566—Genera Plantarum, etc. (1737); Ed. III. (1752).

567—Species plantarum, etc. 2 vol. 8vo. pp. 1200, Holmiæ (1753).

(Contains 44 species of Hepaticæ, pp. 1131–1140; divided among Jungermania 27 species, Targionia 1 species, Marchantia 7 species, Blasia 1 species, Riccia 4 species, Anthoceros 3 species; Porella with 1 species is classed with the Musci.)

Loitlesberger, K.

568—Beitrag zur Kryptogamenflora Oberösterreichs. Sitzungsb. der zool.-bot. Gesellsch. (Wien), xxxix. 287–292 (1889).

Lojacono-Pojero, M.

569—Primo elencho Epaticologia di Sicilia. Il Naturalista Siciliano, viii. 211–220, 240–247 (1889).

(List of 37 Hepaticæ including two new species of Riccia.)

Lucas, C.

570—Neue Beiträge zur Moosflora der Provinz Brandenburg. Deutsche Botanishe Monatschrift, 101–105, 185–188 (1885).

(List of 50 Hepaticæ.)

Luerssen, Christian.

571—Handbuch der systematischen Botanik. Erster Band, Kryptogamen. 8vo., Leipzig (1879).

(General account of the Hepaticæ, p. 376; Structure of the orders; Genera represented in Germany with brief account of the more common species.)

Lützow, C.

572—Berichte über die botanische Untersuchung eines Theiles des neustädter Kreises. Mittheil. des westpreuss. bot.-zool. Vereins, iv. 71–103 (1881). Also under same title in Schrift. der naturfor. Gesellsch. in Danzig, v. 88–120 (1882).

573—Bericht über die im Sommer 1881 fortgesetzte botanische Untersuchung des Kreises Neustädt. Westpreussen. Jahresb. des westpreuss. bot.-zool. Vereins, v. 164–197 (1882).

574—Von den botanischen Excursionen pro 1885–1885 zu verzeichende Moose. Schrift. der naturf. Gesellsch. in Danzig, vi. 115–117 (1886).

(List of 22 Hepaticæ.)

Macchiati, M.

575—Catalogo delle piante raccolto nei diutorni di Reggio-Calabria dal Settembre 1881 al Febrajo 1883. Nuovo Giorn. Bot. Ital. xvi. 59–100 (1884).

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576—Contribuzione alla flora briologica nei diutorni di Cuneo. Nuovo Giorn. Bot. Ital. xvii. 320–329 (1885).

(List of 14 Hepaticæ.)

577—Prima contribuzione alla flora del Viterbese. Atti della Soc. del Nat. di Modena, ser. iii., vii. 7–61 (1888).

(List of 10 Hepaticæ.)

Mackay, James Townsend. † Dublin, Ireland, 15 Feb. 1862. See *Taylor, Thomas.*

Malpighi, Marcello. Crevalcuore, (near Bologna), Italy, 10 March 1628. † Rome, 29 Nov. 1694.

578—Anatome Plantarum. Pars altera. Folio, pp. 93, 39 tab. (1679.)

(Figures one hepatic, identified by Lindberg as Lunularia.)

Marchal, E.

579—Materiaux pour la flore cryptogamique de la Belgique. Comptes Rendus des seances de la Soc. Roy. de Bot. de Belgique, xxii. 29–35, 77–89, 96–101 (1883).

(List of 67 Hepaticæ.)

Marchant, Jean. ———, France, about 1650. † Paris, 1738.

580—Observations touchant la nature des Plantes, et de quelques-unes de leur parties cachies ou inconnues. Mem. de l' Acad. des Sc. 99–108 (1711).

Martelli, U.

581—Sulla Lejeunea inconspicua Rd. Nuovo Giorn. Bot. Ital. xx. 343 (1888).

582—Una nuova specie di Riccia. Nuovo Giorn. Bot. Ital. xxi. 290–292 (1889).

Martius, Karl Friedrich Philipp von. Erlangen, Germany, 17 April 1794. † München, 13 Dec. 1868.

583—Flora cryptogamica Erlangensis, sistens vegetabilia e classe ultima Linn. in agro Erlangensi hucusque detecta. 8vo. pp. lxxviii. 508, 6 tab. Nuremberg (1817).

584—Flora Brasiliensis. Vol. I.: Pars prior: Algæ, Lichenes, Hepaticæ. 8vo. pp. iv. 390. Stuttgart et Tubingen (1833).

(Hepaticæ, by Nees von Essenbeck, pp. 293–390.)

Martrin-Donos, Victor, Compte de, et **Jeaubernat,** E.

585—Florule du Tarn, ou Enumération des plantes, qui croissent spontanément dans le départment du Tarn. Deuxieme Partie: Vegetaux cellulaires. 8vo. pp. xxix., 278. Paris (1867).

(Includes the Hepaticæ, pp. 157–176.)

Massalongo, Caro. Verona, Italy, 25 March 1852. See also *Bescherelle, E., Bottini, A.*

586—Enumerazione delle Epatiche finora conosciute nelle provincie Venete. Nuovo Giorn. Bot. Ital. ix. 1—20 (1877).

587—Epatiche rare e critiche delle provincie Venete. Atti della Soc. Veneto-Trent. di Sc. Nat. V. ——— t. i. ii. (1877). [Sep. 16 pp.]

588—Hepaticologia Veneta, ossia monografie delle Epatiche conosciute nelle provincie Venete. ———, 3 tav. Padova, 1879.

589—Duae species novæ e genere Lejeunia quas circa Buenos Ayres legit C. Spegazzini. Nuovo Giorn. Bot. Ital. xiii. 122–124, t. iv. (1881).

590—Sur la decouverte du Dumortiera irrigua (Wils.) Nees en Italie. Rev. Bryol. xi. 6, 7 (1884).

591—Epatiche raccolte alla Terra del Fuoco dal Dott. C. Spegazzini nell' anno 1882. Nuovo Giorn. Bot. Ital. xvii. 201—277, 17 tav. (1885).

592—Repertorio della Epaticologia Italica. Ann. del R. Ist. Bot. di Roma, ii. 87–155, t. VII–IX (1886). [Sep. pp. 71.]

593—Hepaticæ Italiæ-Venetæ exsiccatæ. 4 fasc. (Nos. 1—120) (1878–1881).

594—Appunti Statistici sull' Epaticologia Italica con relative indicationi fitografiche. Atti del Congr. Nazionale di Bot. Crittog. in Parma, 1887. (Sep. pp. 16.)

595—Osservazioni critiche sulle specie e varietà di Epatiche Italiane create dal DeNotaris. Ann. del Ist. Bot. di Roma, iii. t. xix. (1888). (Sep. pp. 15.)

596—Nuova specie di Lejeunea scoperta dal Dott. C. Rossetti in Toscana. Nuovo Giorn. Bot. Ital. xxi. 485–487 (1889).

597—Illustrazione di una nuova varietà di Frullania dilatata (L.) Dmrt. Nuovo Giorn. Bot. Ital. xxi. 518–521 (1889).

598—Nuova abitazione della Lejeunea Rossettiana Mass. Nuovo Giorn. Bot. Ital. xxii. 295–296 (1890).

599—Di due Epatiche da aggiungersi alla Flora Italica. Nuovo Giorn. Bot. Ital. xxii. 549–550 (1890).

Massalongo, C. et **Carestia**, A.

600—Epatiche delle Alpi Pennine. Nuovo Giorn. Bot. Ital. xii. 306–366, t. viii.–xi. (1880).

601—Epatiche delle Alpi Pennine ulteriori osservazioni ed aggiunte. Nuovo Giorn. Bot. Ital. xiv. 212–258, t. x.–xiv. (1882).

602—Trois éspeces d'Hépatiques nouvelles pour la région des Alpes Pennines. Rev. Bryol. x. 102–103 (1883).

Matthieu, C.

603—Flore générale de la Belgique, contenant la description de toutes les plantes qui croissent dans ce pays. 2 vols. 8vo. Bruxelles (1853).

Mattirolo, Oreste.

604—Contribuzione alla biologia delle Epatiche. Movimenti igroscopici nel tallo delle Epatiche Marchantieæ. Malpighia, II. 181–223, 2 tav. (1888).

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606—Radula voluta Tayl. in Scotland. Jour. of Bot. xxvii. 51 (1889).

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607—Notes on some new or rare Irish Hepaticæ. Proc. Roy. Dublin Soc. iii. 17–21, Pl. V., VI. (1881).

608—Hepaticæ of Wicklow. Jour of Bot. xxvii. 11, 12 (1889).

609—Hepaticæ of Loughbray, County Wicklow. Jour. of Bot. xxviii. 356–361 (1890).

McIvor, William Graham.

610—Hepaticæ Britannicæ, or Pocket Herbarium of British Hepaticæ. Small 8vo. New Brentford (1847).

(Collection of 136 species, the specimens mostly small.)

Meissner.

611—Hepaticæ Javanicæ a Zollingero collectæ. Bot. Zeit. vi. 462, 463 (1848).

Merrett, Chr.

612—Pinax rerum naturalium britannicarum. (1667).

(Mentions one hepatic, identified by Lindberg as Anthoceros punctatus.)

Meyen, Franz Julius Ferdinand. Tilsit, Germany, 28 June 1804. † Berlin, 2 Sept. 1840.

613—Neues System der Pflanzenphysiologie. 3 vol. 8vo. Berlin (1837-9).

(General account of the Hepaticæ; first figure of antherozoids—those of Aneura pinguis, iii. t. xii. f. 39, 40.)

Michaux, Andre. Versailles, France, 7 March 1746. † Madagascar, 13 Nov. 1802.

614—Flora Boreali Americanæ. 2 vol. 8vo. Paris (1803).

(Describes 13 Hepaticæ, vol. ii., pp. 276-280.)

Mitcheli, Pier' Antonio. Florence, Italy, 11 Dec. 1679. † Florence, 1 Jan. 1737.

615—Nova plantarum genera. 4to., pp. 234, 108 tab., Florence (1729).

(Contains figures and descriptions of about 50 Hepaticæ; establishes the genera Targionia, Sphærocarpus, Lunularia, Marsilia [Pellia Raddi], Anthoceros, Blasia and Riccia.)

Micheletti, L.

616—Elenco di Muscinee raccolte in Toscana. Nuovo Giorn. Bot. Ital. xxiii. 561-575 (1891).

(List of 19 Hepaticæ.)

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617—Zur Kenntniss von Anthoceros und Blasia. Bot. Zeitung, ix. 629, 630 (1851).

618—Chamæceros fertilis Milde, ein neues Genus aus der Familien der Anthoceroteen. Bot. Zeitung, xiv. 767 (1856).

619—Chamæceros fertilis Milde, novum Genus e Familia Anthoceroteum. Nova Acta Acad. Cæs. Leop. xxvi. 167-174, t. XII. (1857).

620—Rechtfertigung des Genus Chamæceros gegen Herrn Professor Lehmann. Bot. Zeitung, xv. 199-201 (1857).

621—Ueber das Genus Notothylas Sulliv. Bot. Zeitung, xvii. 33-40, 41-47, 49-55, Pl. II. (1859).

622—Ueber eine neue Jungermannia (J. Mildeana). Jahresb. Schles. Gesellsch. xlv. 103 (1867).

Millspaugh, Charles Frederic. Ithaca, N. Y., 20 June 1854.

623—Flora of West Virginia. Bull. No. 24, West Va. Agric. Exper. Sta. II. 313-538 (1892).

(Includes list of 28 Hepaticæ, pp. 495-498, with description and plate of Plagiochila Virginica, Evans, n. sp.)

Mirbel, Charles Francois. Paris, France, 27 March 1776. † Champerret, 12 Sept. 1854.

624—Recherches anatomiques et physiologiques sur le Marchantia polymorpha, pour servir à l'histoire du tissu cellulaire, de l'epiderme et des stomates. Mus. Hist. Nat. Nouv. Mem. i. 93–130 (1832): Ann. Sci. Nat. xxv. 73–87 (1832); Mem. Acad. Sci. xiii. 337–373 (1835).

624a—Complement des observations sur le Marchantia polymorpha, suivi de recherches sur les métamorphoses des utricules et sur l'origin, les développments et la structure de l'anthére et du pollen des végétaux phanérogames. Guillemin, Arch. Bot. i. 97–124 (1833); Mem. Acad. Sci. xiii. 375–436 (1835).

624b—Rapport sur un mémoire de M. Montagne concernant les organes mâles du genre Targionia. Comptes Rendus, vii. 113, 117 (1838).

Mitten, William. Hurstpierpoint (Sussex), England, 30 Nov. 1819. See also *Hart, H. C., Hemsley, W. B.*

625—A List of all the Mosses and Hepaticae hitherto observed in Sussex. Ann. Nat. Hist. viii. 305–324, 362–370 (1851).

626—Catalogue of Cryptogamic Plants collected by Wm. Jameson in the vicinity of Quito. Lond. Jour. Bot. iii. 49–57, 351–361, (Hèpaticae, 357–361) (1851).

627—Hepaticae of Isthmus of Pamama, in *Seeman:* Voyage of H. M. S. Herald, 1845–51, 245–246. London, 1852–7.

628—Hepaticae, in Flora Novae Zelandiae: Botany of Antarctic Voyage of H. M. Discovery ships Erebus and Terror in the years 1839–1843, ii. 125–172 (1855).

629—A List of the Musci and Hepaticæ collected in Victoria, Australia, by Dr. F. Müller. Jour. of Bot. viii. 265–266 (1856).

630—A List of Hepaticæ collected by the Rev. Charles Parish at Moulmein. Jour. of Bot. viii. 353–357 (1856).

631—Hepaticæ, in Flora Tasmaniæ: Botany of Antarctic Voyage of H. M. Discovery ships Erebus and Terror in the years 1839–1843, ii. 221–241 (1860).

632—Musci et Hepaticæ Vitienses. Bonplandia, ix. 365—367 (1861); x. 19 (1862).

633—Hepaticæ Indiæ Orientalis. Jour. Linn. Soc. v. 89—128 (1861).

634—On some new species of Musci and Hepaticæ in the Herbarium of Sir W. J. Hooker, collected in Tropical Africa chiefly by the late Dr. Vogel and Mr. Barter (1860). Linn. Soc. Trans. xxiii. 51—58 (1862).

635—On the Musci and Hepaticæ from the Cameroons Mountains and from the River Niger. Jour. Linn. Soc. vii. 147—169 (1863).

636—A new Genus of Hepaticæ. Jour. Linn. Soc. vii. 243–244 (1864).

637—Contributions to the Flora of the Atlantic Islands. Jour. Linn. Soc. viii. 1–10 (1865).

638—The Bryologia of the Survey of the 49th Parallel of Latitude. Jour. Linn. Soc. viii. 12–55 (1865).

639—On some species of Musci and Hepaticæ additional to the Floras of Japan and the Coast of China. Jour. Linn. Soc. viii. 148–158 (1865).

(Describes Solenostoma radicillosum and Chilcscyphus planus new.)

640—Hepaticæ, in *Seeman:* Flora Vitiensis, 404–419 (1865–1873).

641—Hepaticæ, in *Godman:* Natural History of the Azores, 316–328 (1870).

(Includes 68 species with descriptions of Chiloscyphus denticulatus n. sp. 320, Nowellia n. g. 321, Exormotheca n. g. 325, with E. pustulosa n. sp. 326, the last from Madiera.)

642—The Musci and Hepaticæ collected by H. N. Moseley, M. A., Naturalist to H. M. S. "Challenger." Jour. Linn. Soc. xv. 59–73 (1877).

643—A list of the Musci and Hepaticæ collected in Kerguelen's Island by the Rev. A. E. Eaton, A. M. Jour. Linn. Soc. xv. 193–197 (1877).

644—List of Hepaticæ colleeted by the Rev. A. E. Eaton at the Cape of Good Hope (August and September, 1874). Jour. Linn. Soc. xvi. 187–196 (1878).

645—Hepaticæ, in Botany of Kerguelen Island: Transit of Venus Expedition (1874), 32–37.

646—The Collections from Rodriquez.–Hepaticæ. Phil. Trans. London, clxviii. 396–401. 3 tab. (1879).

647—Enumeration of the Plants hitherto collected in Kerguelen Island by the "Antarctic," "Challenger," and "British Transit of Venus" Expeditions. III. Hepaticæ. Phil. Trans. London, clxviii. 40–45 (1879).

648—Some new species of the Genus Metzgeria. Jour. Linn. Soc. xxii. 241–243 (1887).

649—The Mosses and Hepaticæ collected in Central Africa by the Right Rev. James Hannington, Bishop of Mombesa, F. L. S., F. G. S., etc., with some others, including those gathered by Mr. H. H. Johnston on Kilimanjaro. Jour. Linn. Soc. xxii. 298–328, Pl. XV.–XIX. (1887).

650—Musci of Roraina Expedition of 1884. Trans. Linn. Soc. ii. 296, 297 (1887).

651—An Enumeration of all species of Musci and Hepaticæ recorded from Japan. Trans. Linn. Soc., 2d ser., iii. 153–206, t. LVIII. (1891).

652—Hepaticæ, in Hemsley: Report on the Botany of Juan Fernandez, the S. E. Moluccas and the Admiralty Is. Challenger Exped., Bot. i. 84–89, 213, 262, 263 (1885).

653—An Enumeration of the Musci and Hepaticæ collected in Portugal, 1842–50, by Dr. Fried. Welwitsch, with brief notes and observations. ——— ——— 13–24 ( ).

(Includes 29 Hepaticæ. Separate only seen.)

654—Hepaticæ, in *Melliss:* St. Helena. (Not seen.)

Mohl, Hugo von. Stuttgart, Germany, 8 April 1805. † Tübingen, 1 April 1872.

655—Einige Bemerkungen über die Entwickelung und den Bau der Sporen der cryptogamischen Gewächse, Flora, xvi. 33–46, 49–63, 65–78 (1833).

656—Ueber die Entwickelung der Sporen von Anthoceros lævis. Linnæa, xiii. 273–290, t. V (1839).

637—Ueber den Bau des Chlorophylls. Bot. Zeitung, xiii, 105–107 (1855).

(Includes notes on Anthoceros lævis.)

Mohr, Daniel Matthias Heinrich. † Kiel, 26 Aug. 1808. See *Weber, F.*

Montagne, Jean François Camille. Vaudoy (Seine et Marne), France, 15 Feb. 1784. † Paris, 5 Jan. 1866. See also *Bory de St. Vincent, J. B. M., Nees von Esenbeck, C. G.*

658—Enumeration des Mousses et des Hépatiques récueillies par M. Leprieur dans la Guiane centrale, et description de plusieurs nouvelles especes de ces deux familles. Ann. des Sc. Nat., 2d ser., iii. 193–219, t. iii. iv. (1835).

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660—Des organes mâles du Genre Targionia, decouvert sur une espéce nouvelle du Chili. Comptes Rendus, vi. 197, 198; vii. 113–117 (1838); Ann. des Sc. Nat., 2d ser., ix. 100–114 (1838).

661—Hepaticæ, in Première Centurie de Plantes cellulaires exotiques ou indigènes nouvelles. Ann. des Sc. Nat., 2d ser., ix. 38–49 (1838).

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664—Sertum Patagonicum. Cryptogames de la Patagonie. 4to. pp. 19, 7 tab col., Paris (1839).

(Forming a portion of D'Orbigny's *Voyage dans l'Amerique Meridionale.*)

665—Florula Boliviensis. Cryptogames de la Bolivia, récueillies par Alcide D'Orbigny. 4to, pp. 120, 10 tab., Paris (1839).

666—Plantes cellulaires de l'histoire naturelle des iles Canaries. 4to, pp. 208, 9 tab., Paris (1840).

(Forming Part IV. of the work by Webb and Berthollet.)

667—Hepaticæ, in Seconde Centurie de Plantes cellulaires exotiques ou indigènes nouvelles. Ann. des Sc. Nat., 2d ser., xiv. 332–337 (1840); xvi. 110–112, 126–128 (1842).

668—Hepaticæ, in Cryptogamæ Nilgherienses seu Plantarum cellu-arium in montibus peninsulæ Indicæ Neelgherries dictis, a cl. Perrottet collectarum enumeratio. Ann. des Sc. Nat., 2d ser., xvii. 12–21 (1842).

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670—Plantes Cellulaires du Voyage au Pôl Sud et dans l'Oceanie sur les corvettes l'Astrolabe et la Zelee sous le commandement de M. Dumont d'Urville, 1837–40. 8vo. pp. xiv. 349, 20 tab., Paris (1845).

671—Hepaticæ, in *D. Ramon de la Sagra:* Historia fisica, politica y natural de la Isla de Cuba. Vol. IX (Bot. Criptog.), 4to. pp. 328, 20 tab. col., Paris (1845).

672—Essai d'Organographie de la Famille des Hépatiques. Extrait du Dict. Univ. d'histoire naturelle. 8vo. pp. 15, Paris (1845).

673—Hepaticæ, in Cinquième Centurie de Plantes cellulaires exotiques ou indigenes nouvelles. Ann. des Sc. Nat., 3d ser., iv. 346–355 (1845).

674—Plantæ cellares quas in insulis Philippinensibus a cl. Cuming collectas recensuit observationibus nonnullis descriptionibusque illustravit. Lond, Jour. Bot. iv. 3–11 (1845).

(Includes 8 Hepaticæ.)

675—Hepaticæ, in Voyage autour du Monde exécuté pendent les années 1836 et 1837 sur la corvette la Bonité, commandée par M. Vaillant. 8vo. avec Atlas folio, Paris (1844–1846).

676—Hepaticæ, in Sixtieme Centurie de Plantes cellulaires exotiques ou indigénes nouvelles. Ann. des Sc. Nat., 3d ser., x. 111–117 (1848).

677—Hepaticæ, in Septieme Centurie de Plantes cellulaires exotiques ou indigénes nouvelles. Ann. des Sc. Nat., 3d ser., xi. 34–35 (1849).

678—Note sur le genre Riella et description d'une espéce nouvelle. Ann. des Sc. Nat., 3d ser., xviii. 11–13 (1852).

679—Hepaticæ, in *Gay :* Historia fisica y politica de Chile. vii. 205–327 (1852).

(Includes descriptions of 117 Hepaticæ.)

680—Hepaticæ, in Cryptogamia Guyanensis, seu Plantarum cellularum in Guyana Gallica annis 1835–1849 a cl. Leprieur collectarum enumeratio universalis. Ann. des Sc. Nat., 4th ser., iii. 311–321 (1855).

681—Note sur le Boschia, noveau genre de la famille des Hépatiques. Bull. de la Soc. Bot. de France, iii. 572–576 (1856).

682—Sylloge generum specierumque Cryptogamarum quas in variis operibus descriptas iconibusque illustratas, nunc ad diagnosim reductas, nonnullasque novas interjectas, ordine systematico disposuit. 8vo. pp. 498, Paris (1856).

(Includes descriptions of 158 Hepaticæ, pp. 52–95.)

683—Hepaticæ (Plantæ Weddellianæ), in Septième Centurie Plantes cellulaires exotiques ou indigènes nouvelles. Ann. des Sc. Nat., 4th ser., v. 348–352 (1856).

684—Hepaticæ, in Huitième Centurie Plantes cellulaires exotiques ou indigènes nouvelles. Ann. des Sc. Nat., 4th ser., vi. 186–199 (1856); vii. 149, 150 (1857).

Moore, David. Dundee, Scotland, 23 April 1808. † Dublin, Ireland, 9 June 1879.

685—Ordnance Survey Collections of Counties of Derry and Antrim. Vol. I. Mosses and Hepaticæ exsiccatæ (1834–8).

686—Addenda to the Musci and Hepaticæ of the Flora Hibernica, with some new habitats for Irish Hepaticæ. Proc. Dublin Nat. Hist. Soc. v. 89 (1866).

687—Contributions to the British and Irish Musci and Hepaticæ. Proc. Dublin Univ. Zool. and Bot. Assoc. ii. 80– (1863).

688—Anthoceros lævis in Ireland. Jour. of Bot. xi. 274 (1873).

689—Illustrations of the Reproductive Apparatus in Marchantieæ. Quar. Jour. Micros. Science, 215, 216 (1874).

690—Report on Irish Hepaticæ. Proc. Roy. Irish Acad., 2d ser., ii. 591–672, 2 Pl. (1876).

(Describes 143 Hepaticæ.)

Morgan, Andrew Price. Centreville, Ohio, 27 Oct. 1836.

691—Flora of the Miami Valley. 16mo. pp. 68, Dayton, Ohio (1878).

(Includes list of Hepaticæ.)

Moris, Giuseppe Giacinto. Arbassano, Italy, 25 April 1796. † Turin, 18 May 1869.

Moris, G. G. et **DeNotaris**, G.

692—Flora Caprariæ, sive enumeratio plantarum in Insula Capraria. Mem. della Reale Accad. di Torino, ser. ii. 59–303, 6 tab. (1839). [Sep. pp. 244.]

(Includes the Hepaticæ, pp. 175–180; Jung. fragrans, n. sp. 177, t. iv.)

Mottier, David Myers. Patriot, Indiana, 4 Sept. 1864.

693—Notes on the apical growth of Liverworts. Bot. Gazette, xvi. 141–143, pl. XIII. (1891).

Mougeot, Jean Baptisté. Bruyeres, France, 25 Sept. 1776. † Bruyeres, 5 Dec. 1858.

Mougeot, J. B., **Nestler**, C. G. et **Schimper**, W. P.

694—Stirpes Cryptogamæ Vogeso-Rhenanæ. (15 Fasciculi mit 1500 getrockneten species.) Voges (1810–1856).

(Contains numerous species of Hepaticæ.)

Müller, Ferdinand, Baron von.

695—On some plants from Norfolk Island. Jour. of Bot. xxiii. 353, 354 (1885).

(List of 6 Hepaticæ.)

Müller, W. O.

695a—Cryptogamen-Herbarium der Thuring. Staaten. 5 Theils. pp. 49 (277 getrockneten Species). Gera (1869).

(Contains several Hepaticæ among other cryptogams.)

Murray, George. See *Bennett, A. W.*

Nägeli, Carl Wilhelm von. Kilchberg bei Zurich, Switzerland, 27 March 1817. †Munich, Germany, 10 May 1891.

696—Botanische Beitrage: 2. Entwickelung der Hautdrüsenzellen und Spaltöffnungen bei Marchantia polymorpha. 3. Wurzelhaare von Marchantia polymorpha. Linnæa, xvi. 237–285 (1842).

697—Wachthumsgeschichte der Laub- und Lebermoose. (1. Wachsthum der Laubachsen bei Echinomitrium. [Metzgeria] 138–150, t. ii. fig. 1–14. 2. Wachsthum des Brutkeimblattes von Lunularia, 150–158, t. iii. fig. 1–23. 3. Brutkeimblatt an Jungermannia? 158–164, t. iii. fig. 24–35. 4. Brutkörner bei Jungermania exsecta. 164–166, t. iii. fig. 36–40.) Zeit. fur wissensch. Botanik. 138–166, t. ii., iii. (1845).

Necker, Noel Joseph de. Lille (Nord), France, 1729. † Mannheim, Germany, 10 Dec. 1793.

698—Methodus Muscorum per classes, ordines, genera et species, cum synonymis etc. 8vo. pp. xvii. 296, 1 tab. Mannheim (1771).

699—Elementa Botanica. 3 vol. 8vo. Neowedæ (1791).
(Establishes several genera of Hepaticæ, iii. 339–353.)

Nees von Esenbeck, Christian Gottfried. Auf der Reichenberge bei Erbach, Germany, 14 Feb. 1776. †Breslau, 16 March 1858. See also *Bischoff, G. W.*, *Gottsche, C. M.*, *Reinwardt, K. G. K.*, *Martius, K. F. P.*

700—Duvalia, novum genus ex ordine Hepaticarum cum Hepaticis elateratis comparatum. Mag. der nat. Freund. zu Berlin, viii. 269–272. (1818).

701—[Description of Fimbriaria.] Hor. Phys. Berol. ———, 44, (1820).

701a—Hepaticæ, in *Lindley:* Introduction to the Natural System of Botany. Edition II. 8vo. pp. xv. 580, London (1835).

702—Enumeratio plantarum cryptogamicarum Javæ et insularum adjacentium, quas a Blumio et Reinwardtio collectas describi edique curavit. Fasc. I. Hepaticas complectens. 8vo. pp. viii. 86, Vratislaviæ (1830).

703—Berichtigungen zur Enumeratio plantarum cryptogamicarum Javæ. Linnæa, vi. 602–623 (1831).

704—Naturgeschichte der europäischen Lebermoose. 4 vol. sm. 8vo. Berlin and Breslau (1833–38).

Nees von Esenbeck, C. G. et **Bischoff,** G. W.

705—Lunularia alpina und Corsinia lamellosa, zwei neue europäische Lebermoose. Flora, xiii. 393–404 (1830).

Nees von Esenbeck, C. G., et **Montagne,** C.

706—Jungermanniearum Herbarii Montagneani species. Ann. des Sc. Nat., 2d ser., v. 52–72, t. I., II. (1836).

Nestler, C. G. See *Mougeot, J. B.*

Nicotra, L.

707—Cenno intorno ad alcune Epatiche di Messina. Nuovo Giorn. Bot. Ital. xviii. 75–77 (1886).

Nordenström, H. och **Nyman,** E.

708—Växtgeografiska bidrag till Östergötlands Mossflora. Bot. Notiser, 16–20 (1889).
(Notes on stations for Hepaticæ.)

Norrlin, J. P.

709—Ofversigt af Torneå (Muonio) och angränsande delar af Kemi Lappmarkers Mossor och Lefvermossor. Notis. ur Sällsk. pro Fauna et Flora Fenn. Forhandl. xiii. (1871–4).
(List of 50 Hepaticæ.)

Oakes, William. Danvers, Mass., 1 July 1799. †Ipswich, Mass., 31 July 1848.

710—Notice of some of the Mosses of New England. Hovey's Mag. Hort. xiii. 171–174 (1847).

Oeder, George Christian. Anspach, Germany, 3 Feb. 1728. †Oldenberg, 28 Jan. 1791.

711—Icones Plantarum in regnis Daniæ et Norvegiæ in ducatibus Slesvici et Holsaticæ, et in comitatibus Oldenburgi et Delmenhorstiæ ad illustrandum opus dei isdem plantis regio jussu exarandum, Floræ Danicæ inscriptum. Folio, 2880 tab. et textus, Copenhagen (1761–1871). (Includes many plates of the Hepaticæ: the work of Oeder continued after his death by others; some of the later text to the Hepaticæ contributed by Gottsche.)

Orten.

711a—Keimung der Lebermoossporen. Sitzb. der wissensch. Akad. (Wien), (1876).

Pabst, G.

712—Cryptogamen—Flora, III Band: Die Moose. I Abtheilung: Lebermoose. Folio, pp. 36, 8 Taf., Gera (1877).

Palisot de Beauvois, Ambroise Marie Francois Joseph. Arras, France, 28 Oct. 1755. †Paris, 21 Jan. 1820.

713—Flora d'Oware et de Benin en Afrique. 2 vol. folio, Paris (1804–1807).

Pančić, Josef. Bribir, Croatia, 6 May 1814. †Belgrade, 8 March 1888.

714—Zur Moosflora des Nordostlichen Banates. Verhandl. der zool.-bot. Verein (Wien), xi. 93–96 (1861).

Payot, Venance.

715—Catalogue des Hépatiques du Mont Blanc et des Alpes Pennines. Rev. Bryol. xv. 17–24 (1888).

716—Florule du Mont Blanc. 3 me Partie. Les Muscinées des Alpes Pennines. 12mo. pp. 100.

Pearson, William Henry. Pendleton, England, 22 July 1849. See also *Carrington, B.*

717—Yorkshire Hepaticæ. Naturalist, i. (1876.)

718—Lejeunea ovata Tayl. in North Wales. Jour. of Bot. xv. 307 (1877).

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723—A new British Jungermania (Jung. socia N.). Jour. of Bot. xviii. 375 (1880).

724—Jungermania Juratzkana Limpr. in Britain. Jour. of Bot. xix. 116 (1881).

725—On Radula Carringtonii Jack. Jour. of Bot. xx. 141, 142 (1882).

726—On Radula germana Jack. Jour. of Bot. xi. 227–230 (1882).

727—Cephalozia Turneri Hook. in North Wales. Jour. of Bot. xxi. 110 (1883).

728—Marsupella sparsifolia Lindb. Jour. of Bot. xxii. 225–227, t. CCXLVIII. (1884).

729—New British Hepaticæ. Jour. of Bot. xxii. 249 (1884).

730—Hepaticæ Natalenses a clarissima domina Helena Bertelsen missæ. Christiania Vid.-Selsk. Forhandl., No. 3, 1–20, Pl. I.–XII. (1886).

731—Hepaticæ Knysnanæ sive Hepaticarum in regione Capensi "Knysna" Africæ Australis a fabro ferrario Hans Iverson lectarum. Christiania Vid.-Selsk. Forhandl., No. 9, 1–16, Pl. I.–VI. (1887).

732—Blepharostoma palmatum Lindb. Jour. of Bot. xxv. 193–195, t. CCLXXV. (1887).

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735—Scapania planifolia Hook. Jour. of Bot. xxviii. 219 (1890).

736—The Lejeunæ of Lindenberg's Herbarium. Jour. of Bot. xxviii. 377–379 (1890). (Sep. 3 pp.)

737—Review of Dr. Spruce's "Hepaticæ Bolivianæ." Jour. of Bot. xxviii. 252 (1890).

738—List of Canadian Hepaticæ. 8vo. pp. 31, Pl. I.–XII. Montreal, 1890.

739—Frullaniæ Madagascarenses precipue e collectionibus Borgeni. Christiania Vid.-Selsk. Forhandl. No. 2, 1–9, Pl. I.–IV. (1891).

740—Lejeuneæ Madagascarienses. Christiania Vid.–Selsk. Forhandl. No. 8, 1–9, 2 Pl. (1892).

(List of 33 species; Lopho-lejeunea lepidoscypha n. sp.)

741—A New British Hepatic. Jour. of Bot. xxx. 257, Pl. 327 (1892).

(Description and figure of Marsupella (Cesia) conferta.)

741a—A new British Hepatic. Jour of Bot. xxx. 353, Pl. 329 (1892).

(Description and figure of Scapania aspera.)

Peck, Charles Horton. Sandlake, New York, 30 Mar. 1833.

742—Plants of the Summit of Mt. Marcy. 7th Rep. Adirondack Survey, 401–412 [Sep. 8vo. pp. 12, Albany (1880).]

(List of 10 Hepaticæ.)

743—Reports of State Botanist, in Annual Reports of the Regents of the University of the State of New York, (1869–90).

(28th Rep. for 1868 contains list of 23 species; 15th Report for 1871 mentions one species; 27th Rep. for 1873 mentions 5 species; and the 41st Rep. for 1890 mentions 2 species of Hepaticæ.)

Personne, J.

744—Note sur l'existence de l'iode dans certaines plantes d'ean douce. Comptes Rendus, xxx. 478 (1850).

(Notes presence of Iodine in *Aneura pinguis.*)

Petiver, James. †London, England, 20 April 1715.

745—Musei Petiveriani, etc. 8vo. pp. 93, London (1692–1703).

(Contains notes on two species of Hepaticæ, identified by Lindberg as Riccia canaliculata and R. natans.)

Petounikow, Alexis.

746—Sur les organes reproducteurs du Sphærocarpus. Bull. de la Soc. Bot. de France, xiv. 137–142, Pl. 3 (1867).

Pfeffer, W.

747—Die Oelkorper des Lebermoose. Flora, lvii. 2–6, 17–27, 33–43, Taf. i. (1874).

Pfeiffer, Ludwig. Kassel, Germany, 4 July 1805.

748—Flora von Niederhessen und Munden. 2 vol. 8vo. Kassel (1847–55).

Philibert.

749—Sur quelques Hépatiques observées à Cannes. Rev. Bryol. ix. 29–54 (1882); x. 1–5 (1883).

750—Sur la fructification du Marsupella revoluta Dumortier. Rev. Bryol. xvii. 33, 34 (1890).

Pichi, P. e **Bottini,** A.

750—Prime Muscinee dell' Appen Casentinese. Nuovo Giorn. Bot. Ital. xx. 321–329 (1888).

(List of 12 Hepaticæ.)

Plukenet, Leonard. ———, 1642. †London, England, 1706.

751—Almagestum botanicum, etc. 4to, pp. 402, London (1696).

(Mentions one hepatic, identified by Lindberg as Pellia epiphylla).

752—Amaltheum botanicum, etc. 4to. pp. 214, t. 351–454, London (1705).

(Mentions one hepatic, identified by Lindberg as Aneura pinguis.)

Pokorny, Alois. Iglau, Austria, 22 May 1826.

753—Notiz über Riccia crystallina und Equisetum— Keimlinge, die nach hohem Wasser auf abgeschlagertem Schlamme hervorgekommen sind. Verhandl. des zool.-bot. Vereins (Wien), i. 55, 56 (1852).

754—Ueber die Verbreitung und Vertheilung der Lebermoose von Unter-Oesterreich. Sitzungsb. der kais. Akad. der Wissench. (Wien), L. 186–200 (1852).

(List of 71 Hepaticæ.)

755—Vorarbeiten zur Kryptogamen flora von Unter-Oesterreich. I. Revision der Literatur. Nebst einer systematischen Aufzählung sämmtlicher in der vorhandener literatur angeführten Cryptogamen aus Unter-Oesterreich. Verhandl. des zool.-bot. Vereins (Wien), iv. 35–168 (1854).

Polakowsky, H.

756—Bryophytas et Cormophytas Costaricensis anno 1875 lectas enumerat. Jour. of Bot. xxv. 225–231 (1887).

(Three new species of Hepaticæ described by Gottsche.)

Power, Thomas.

757—Contributions toward the Fauna and Flora of Cork. Part II. Botany. 8vo. pp. 130, London (1845).

(List of 50 species of Irish Hepaticæ.)

Prescher, R.

758—Die Schleimorgane der Marchantieen. Sitzungsb. der kais. Akad. der Wissensch. (Wien), lxxxvi. 132–158 (1882).

Preuschoff-Tannsee.

759—Beitrage zur Flora der Provinz Westpreussen. Jahresb. des westpreuss. bot.-zool. Vereins, v. 69–74 (1882).

Prien.

760—Verzeichniss der im oberpfalzischen Theile des bayerischen Waldes um Falkenau und Nittenau beobachteten Lebermoose. Bericht des bot. Vereins in Landshut (1874–75–76).

(List of 51 Hepaticæ.)

Prost, T. C.

761—Liste des Mousses, Hépatiques et Lichens du departement de la Lozere. 8vo. pp. 80, Mende (1828).

Quelet, L.

762—Catalogue des Mousses, Sphaignes et Hépatiques des environs de Montbélard. 8vo. pp. 332 (1869).

Rabenhorst, Ludwig. Treuenbrietzen, Germany, 22 March 1806. † Meissen, 24 April 1881. See also *Gottsche, C. M.*

763—Deutschlands Kryptogamenflora oder Handbuch zur Bestimmung der Kryptogamischen Gewächse Deutschlands, der Schweiz, des Lombardisch-Venetianischen Königreichs und Istriens. II. 3, Lebermoose, Laubmoose und Farn. 8vo. pp. xvi. 352, Leipzig (1848).

(Contains descriptions of 275 Hepaticæ.)

764—Kryptogamenflora von Sachsen, der Oberlausitz, Thuringen und Nordböhmen, mit Berücksichtigung der benachbarten Länder. I. Algen, Lebermoose, Laubmoose. 8vo. pp. xx. 653, Leipzig (1863).

Raciborski, M.

765—Przyczynek do znajowski watrobowcéw poludniówo zachodnig Polski. Ber. der physiogr. Commis. der Akad. der Wissensch. in Krakau, xxii. (1881). [Sep. pp. 6.]

(List of 59 Hepaticæ of S. E. Poland.)

766—O obecnym stanie mych badán flory kopalnej ogniotrwatych glinek krakowskich. Ber. der physiogr. Commis. der Akad. der Wissensch. in Krakau, xxiii. 129–140 (1880).

(Account of fossil Hepaticæ of the clays of Kracow.)

Raddi, Giuseppe. Florence, Italy, 9 Feb. 1770. † Rhodos, 6 Sept. 1829.

767—Novarum vel rariorum ex cryptogamia stirpium in agro Florentino collectarum decades duæ. 4to. pp. 13, 2 tab. Bononiæ (1818).

768—Di alcune specie nuove di rettili e piante brasiliane. Mem. Soc. Ital. Sci. di Modena, xviii. 313–349 (1819).

769—Jungermanniographia Etrusca. Mem. di Matem. e di Fisica della Soc. Ital. delle Sci. (Modena), xviii. 14–56, 7 tab. (1820).

(Contains several genera formed from the genus Jungermania; the work was reprinted at Bonn 1841.)

770—Crittogame Brasiliane. Mem. Soc. Ital. Sci. di Modena, xix. 27–57 (1823).

(Contains 27 Hepaticæ.)

771—Supplemento alla Memoria di G. Raddi: Crittogame Brasiliane, inserta nel precedente (XIX.) volume, e tavole per servire di corredo alla medesima. Mem. Soc. Ital. di Modena, xx. 43–54, 6 tav. (1829).

Rattray, John.

772—Observations on the oil bodies of the Jungermanieæ. Trans. Bot. Soc. (Edinburgh), 123–128 (1884).

Rau, Eugene Abraham. Bethlehem, Pa., 22 July 1848.

773—List of Colorado Musci and Hepaticæ, collected by T. S. Brandegee in 1873–75. Bull. Torrey Bot. Club, vi. 89, 90 (1876).

(List of 5 Hepaticæ.)

Ravenel, Henry William. St. John's, S. C. 19 May 1814. † Aiken, S. C., 17 July 1887.

774—Contributions to the Cryptogamic Botany of South Carolina. Mosses and Hepaticæ. Charleston Med. Jour. iv. 428–433 (1849).

Ray, John. Black Notley (Essex), England, 29 Nov. 1628. † 17 Jan. 1705.

775—Synopsis methodica stirpium britannicarum, etc. 8vo. pp. 317, London (1690).

(Includes two Hepaticæ, identified by Lindberg as Pleurozia purpurea and Porella platyphylla.)

Reader, H. P.

776—Monmouthshire Cryptogams. Jour. of Bot. xx. 120 (1882).

(Includes 4 Hepaticæ.)

776a—The Hepaticæ of Gloucestershire. Jour. of Bot. xxiii. 331, 332 (1885).

(List of 32 Hepaticæ).

Reichardt, Heinrich Wilhelm. Iglau, Austria, 16 April 1835. † Vienna, 2 Aug. 1885.

777—Verzeichniss aller von J. Ch. Neumann in Böhmen gesammelten Pflanzen. Verhandl. des zool.-bot. Vereins (Wien), iv. 253–284 (1854).

778—Beitrag zur Moosflora des Wechsels in Niederösterreich. Verhandl. des zool.-bot. Vereins (Wien), xi. 161, 162 (1861).

779—Beitrag zur Moosflora Steiermarks. Verhandl. des zool.-bot. Vereins (Wien), xiv. 137–146 (1864).

780—Beitrag zur Kryptogamen Flora des Maltathales in Kärnthen. Verhandl. des zool.-bot. Vereins (Wien), xiv. 721–732 (1864).

781—Diagnosen der neuen Arten von Lebermoosen welche die Novara Expedition mitbrachte. Verhandl. des zool.-bot. Vereins (Wien), xviii. 957–960 (1868).

(Describes 8 Hepaticæ from Australia, New Zealand and Tahiti.)

781a—Pilze, Leber- und Laubmoose, gesammelte auf der Reise der Novara um der Erde. 4to. Vienna (1870).

782—Beiträge zur Flora der hawaischen Inseln. Sitzber. der. k. k. Akad. der Wissensch. (Wien), lxxv. 553–582 (1877).

Reinwardt, Kaspar George Karl. Lütteringhausen, Germany, 3 June 1773. † Leyden, Holland, 6 March 1854.

Reinwardt, K. G. K., **Blume**, K. L. et **Nees** ab **Esenbeck**, C. G.

783—Hepaticæ Javanicæ. Nova Acta Acad. Caes. Leop. xii. 181–238, 409–417 (1825).

Renauld, F. et **Cardot**, J.

784—Contributions a la flore des Muscinées des îles austro-africaines de l'Ocean Indien. Rev. Bryol. xviii. 55–58 (1891).

(List of the Hepaticæ of Madigascar, etc.)

785—Musci novi vel minus cogniti descripti. II. Bull. de la Soc. Bot. de Belgique, xxx. 181–207 (1891). III. *Ibid*, xxxi. 100–123 (1892).

(40 Hepaticæ described by F. Stephani; a part previously published.)

Richard, O. J.

786—Liste de Muscinees recueillies dans le Poitou et la Saintonge. Bull. de la Soc. de Deux-Sevres, (1886).

(List of 40 Hepaticæ.)

Rimelin, P.

787—Enumération des Mousses et des Hépatiques recueillies au Chateau de Grignon (Côte-d'Or). Prologium, i. 149–150 (1891).

(List of 7 Hepaticæ.)

Robison, John. Salem, Mass., 13 July 1846.

788—Flora of Essex County [Mass.]. 8vo. pp. 200, Salem (1880).

(Includes list of Hepaticæ.)

Röll, Julius.

789—Vorlaüfige Mittheilung über die von mir in Jahre 1888 in Nord Amerika gesammelten neuen Arten der Lebermoose. Bot. Centralblatt, xlv. 203, 204 (1891).

(Descriptions of Porella Röllii and Marchantia Oregonensis by F. Stephani.)

Röse, A.

790—Verzeichniss der von A. Röse bis jetzt in Thüringen resp. in thüringer Walde aufgefundenen Lebermoose. Bot. Zeitung. x. 96–99 (1852).

(List of 84 Hepaticæ.)

Rossetti, Corrado. Seravezza (Lucca), Italy, 7 Feb. 1866.

791—Appunti di Epaticologia toscana. Nuovo Giorn. Bot. Ital. xx. 412, 413 (1888).

(List of 21 Hepaticæ.)

792—Epatiche della Toscana nord-ouest. Nuovo Giorn. Bot. Ital. xx. 461, 462 (1888).

(Announcement of following paper.)

793—Epaticologia della Toscana nord-ouest. Nuovo Giorn. Bot. Ital. xxii. 305–346 (1890).

(List of 101 Hepaticæ with notes on distribution.)

Rossetti, Corrado, e **Baroni**, Eugenio.

793a—Frammenti Epatico-Lichenografeci. Nuovo Giorn. Bot. Ital. xxiv. 372–378 (1892).

(List of 22 Hepaticæ from Tuscany.)

Roth, Albrecht Wilhelm. Dötlingen (Oldenburg), Germany, 6 Jan. 1757. †Bremen, 16 Oct. 1834.

794—Tentamen Floræ Germanice. 3 vol. 8vo. Leipzig (1788–1800).

Rothrock, Joseph Trimble. McVeytown, Pa., 9 Apr. 1839.

795—Sketch of the Flora of Alaska. Rept. Smithsonian Inst. 433–463 (1867).

(Includes list of 6 Hepaticæ.)

Roze, Ernest. See *Bescherelle, E.*

Ruppius, Heinrich Bernhard. Giessen, Germany, 1688. †Jena, 7 March 1719.

796—Flora Jenensis, sive enumeratio plantarum tam sponte circa Jenam et in locis vicinis nascentium etc. 8vo, pp. 376 (1718); 2d Ed. 8vo. pp. 311, Frankfurt and Leipzig (1726).

(Includes 13 Hepaticæ; establishes the genus Jungermania.)

Russ, G. Ph.

797—Uebersicht der Gefässcryptogamen, Laub- und Lebermoose der Wetterau. 8vo. pp. 68, Hanau (1858).

Russell, John Lewis. Salem, Mass. 2 Dec. 1808. †Salem, 7 June 1873.

798—Attempt to ascertain some of the Hepatic Mosses of Massachusetts with Remarks. Boston Jour. Nat. Hist. iii. 465–469 (1845).

Sadebeck, Richard. Breslau, 20 May 1839.

799—Ueber Marchantiaceen. Verhandl. des bot. Vereins der Provinz Brandenburg (1873). [Sep. pp. 8.]

Salwey, T.

800—A List of certain plants to be met with in the neighborhood of Barmouth, Dolgelley and Harlech. 12mo. pp. 40 (1863).

(List of 25 Hepaticæ, pp. 27, 28.)

Sande-Lacoste, Cornelius Marinus van der. Dordrecht, Holland, 5 March 1815. †Amsterdam, 15 Jan. 1887. See also *Dozy, F.*

801—Bijdrage tot de Bryologie van Nederland. Van der Hoeven en de Vriese Tijdschrift, xi. 165–177 (1844).

802—(Review of known Hepaticæ of Holland.) Nederl. Kruidk. Archief, i. 447——— (1848).

(List of 59 Hepaticæ.)

803—Novæ species Hepaticarum ex insula Java a Dr. F. Junghuhn detectæ. Nederl. Kruidk. Arch. iii. 415–424, 521–530 (1854). (Continued in) Batavia Nat. Tijdsch. x. 393–398 (1856).

804—Over eene studie der Javaansche Hepaticæ. Verslag Kon. Akad. v. Wetensch. (Amsterdam), iv. 202–207 (1856).

805—Synopsis Hepaticarum Javanicarum adjectis quibusdam speciebus Hepaticarum novis extra-Javanicis. Verh. der Koninkl. Akad. v. t. I.–XXII. (1856). (Sep. 112 pp.)

806—Hepaticæ Jungermaniaceæ Archipelagi Indici, adjectis quibusdam speciebus Japonicis. Ann. Musei Bot. Lugduno-Batavi, i. , (1864).

807—Nieuwe indigene Musci en Hepaticæ (1869). Nederl. Kruidk. Archief, 2d ser., i. 106–108 (1874).

808—Aanwinsten voor de Flora Bryologica van Nederland. Nederl. Kruidk. Archief, 2d ser., i. 308–311 (1874).

809—Overzicht der Lebermossoorten welke in dez Provincieen van Nederland zym waargenommen, gerangschikt van het woorden des lands naar het zuiden. (1880.)

(Includes 73 Hepaticæ.)

Sanio, C.

810—Zahlenverhaltnisse der Flora Preussens. Verhandl. der bot. Vereins der Provinz Brandenburg, 55–93 (1882).

(List of 71 Hepaticæ,)

Saporta, Gaston, Comte de.

811—Dernieres adjunctions a la Flore fossile d'Aix-en-Provence. Ann. des Sc. Nat. ser. 7, vii. 1–104 (1888).

Sassi, Agostino.

812—[Note on Antrocephalus Italicus.] Attti di Sc. Ital., 138–139 (1839).

Satter, Hans.

813—Beiträge zur Entwickelungsgeschichte des Lebermoosantheridiums. Sitzungsb. der kais. Akad. der Wissensch. (Wien), lxxxvi. 170–183 (1882).

Sauter, Anton Eleutherius.

814—Die Lebermoose der Nordseite der Alpen von Salzburg und Oesterreich. Rabenh. Bot. Centralblatt, i., no. 24 (1846).

815—Die Moosschätze des Unterbergs bei Salzburg. Flora, xli. 382–386 (1858).

816—Berichtigung die Moosschätze des Unterbergs bei Salzburg. Flora, xliii. 351 (1860).

817—Die Lebermoose des Herzzogthums Salzburg. Flora, liv. 375–377 (1871).

Savi, Gætano. Florence, Italy, 13 June 1769. †Pisa, 28 April 1844.

818—Sinossi delle Epatiche di J. B. Lindenberg. 8vo. Pisa (1831).

Schacht, Hermann. Ochsenwärder, Germany, 15 July 1814. †Bonn, 20 Aug. 1864.

819—Beitrag zur Entwickelungsgeschichte der Frucht und Spore von Anthoceros lævis. Bot. Zeitung. viii. 457–464, 473–480, 489–496, taf. VI. (1850).

820—Ueber Antheridien der Lebermoose. Bot. Zeitung. x. 153–157 (1852).

Schiffner, Victor. Böhmisch Leipa, 10 Aug. 1862.

821—Observationes de quibusdam Hepaticis. Bot. Centralbl. xxvii. 207–211, 239–243, 1 Taf. (1886).

822—Beiträge zur Kenntniss der Moosflora Böhmens. I. Theil. Lotos: Jahrb. für Naturwissensch. vii. (1886). [Sep. 35 pp.]; II. Theil. Lotos: Jahrb. für Naturwissensch. x. (1890). [Sep. 36 pp.]

823—Note sur le Riella Battandieri Trabut. Rev. Bryol. xiv. 13, 14 (1887).

824—De Jungermannia Hornschuchiana Nees. Bot. Centralbl. xxx. 22–25, 1 Taf. (1887).

825—Lebermoose (Hepaticæ) gesammelt auf der Reise S. M. S. Gazelle, vorzüglich in der Magellan-Strasse, auf den Malayischen Inseln und Kerguelen-Land. 4to. pp. 48, 8 tab., Berlin, 1890.

Schiffner, V., und **Schmidt**, Anton.

826—Moosflora des nordlicher Böhmen. Lotos: Jahrb. für Naturwissensch. vii. (1886). (Sep. 74 pp.)

Schiller, K.

827—Erstes Verzeichniss der in der dresdener Haide bis Ende 1883 gefundenen Laub–, Leber– und Torfmoose. Sitz. der naturw. Gesellsch. Isis (Dresden), 1883, 112–114 (1884).

(List of 25 Hepaticæ.)

828—Seltene Moosspecies aus Sachsen und Ergänzung des Moosverzeichnisses der dresdener Haide. Sitz. der naturw. Gesellsch. Isis (Dresden), 1887, 7.

(List of 37 Hepaticæ.)

Schmidel, Casimir Cristoph. Bayreuth, Bavaria, 21 Nov. 1718. †Anspach, 18 Dec. 1792.

829—Icones Plantarum, etc. Folio, pp. 197, 50 tab. col., Nuremberg, (1747). 2nd Ed. (Bischoff), Folio, pp. 280, 75 tab. col., Erlangen (1793–7).

830—De Blasia. Diss. bot. argum. 63–88. [Sep. 4to. pp. 32. 1 tab. Erlangen (1759).]

831—De Jungermanniæ charactere. Diss. bot. argum. 89–114. [Sep. 4to. pp. 29, 1 tab. Erlangen (1760).]

Schmidt, Anton. Böhmisch Leipa, 3 June 1842. See *Schiffner, V.*

Schrader, Heinrich Adolph. Alfeld bei Hildesheim, Germany, 1 Jan. 1767. † Göttingen, 21 Oct. 1836.

832—Plantæ Cryptogamicæ novæ, rariores aut minus cognitæ. Jour. für die Botanik, i, 66–80 (1801).

Schrank, Franz von Paula. Farnbach, Germany, 21 Aug. 1747. † Munich, 23 Dec. 1835.

833—Baiersche Flora. 2 vol. 8vo. Munich (1789).

834—Primitiæ Floræ Salisburgensis. cum dissertatione prævia de discrimine plantarum ab animalibus. 8vo. pp. xvi. 240, 2 tab. Frankfort (1792).

Schreber, Johann Christian Daniel. Weissensee, Germany, 16 Jan. 1739. † Erlangen, 10 Dec. 1810.

835—Spicilegium Florae Lipsicae. 8vo. pp. 148, Leipzig (1771).

Schwægrichen, Christian Friedrich. Leipzig, Germany, 16 Sept. 1775. † Leipzig, 2 May 1853.

836—Historia Muscorum hepaticorum Prodromus. 8vo. pp. 39, 1 tab., Leipzig (1814).

(The first general synopsis of the Hepaticæ since Linnæus ; includes 128 species.)

837—Ueber Porella pinnata L. oder Jungermannia porella Dicks., Madotheca porella Nees. Linnaea, xiii. 113–117, t. xiii. (1839).

Schweinitz, Lewis David von. Bethlehem, Pa., 13 Feb. 1780. † Bethlehem, 8 Feb. 1834.

838—Specimen Florae Americanae Septentrionalis Cryptogamicae sistens Muscos Hepaticos huc usque in America septentrionali observatos. 8vo. pp. 27, Raleigh (1821).

(The first systematic attempt to enumerate the Hepaticæ of the United States ; describes 77 species.)

839—On two remarkable Hepatic Mosses found in North Carolina. Jour. Acad. Nat. Sci. (Phila.) ii. 361–370, 1 plate (1822).

(Notes *Sphærocarpus terrestris* and *Carpobolus orbicularis.*)

Scopoli, Johann Anton. Cavalese im Fleimsthale, Tryol, 3 June 1723. † Pavia, Italy, 8 May 1788.

840—Flora Carnolica, etc. 2d Ed., 2 vol., 8vo., Vienna (1772).

(Contains the Hepaticæ, pp. 343–355, tab. 63.)

Scully, R. W.

841—Hepaticae found in Kerry, 1889. Jour. of Bot. xxviii. 200–203 (1890).

Sendtner, Otto. Munich, Bavaria, 1814. † Erlangen, 21 April 1859.

Sendtner, O. und **Kummer**, F.

842—Enumeratio plantarum in itinere Sendtneriano in Bosnia lectaum. Flora (1849).

(List of 15 Hepaticæ.)

Simkovits, L.

843—Budapest környékénsk Mohfloràja, Magyar Növénijtani-Lapok. (Klausenburg), iii. 1–9 (1879).

(List of 15 Hepaticæ.)

Sibbald, Robertus. ——— Scotland, 1643. † 1720.

844—Scotia illustrata, sive Prodromus historiæ naturalis. Folio, Edinburgh (1684).

(Describes and figures one Hepatic, identified by Lindberg as Plagiochila asplenoides.)

Smith, James Edward. Norwich, England, 2 Dec. 1759. † Norwich, 17 March 1828. See *Sowerby, J.*

Sommerfeldt, Sören Christian. Sukkestad, Norway, 9 April 1794. † Ringeboe, 28 Dec. 1838.

845—Supplementum Floræ Lapponicæ, quam edidit Dr. Georgius Wahlenberg. 8vo. pp. xii. 331, Christiana (1826).

Sorokin, N.

846—Beitrag zur Kenntniss der Cryptogamenflora der Uralgegend. Hedwigia, xvi. 40–44, 49–53 (1877).

(List of 4 Hepaticæ.)

Sowerby, James. London, England, 21 March 1757. † Lambeth, 25 Oct. 1822.

847—English Botany, or colored figures of English plants, with their essential characters, synonyms and places of growth. To which will be added occasional remarks by James Edward Smith and James Sowerby. The figures by James Sowerby. 36 vol. 8vo. 2592 tab. col. with text. London (1790–1814).

(Includes figures of English Hepaticæ.)

Sprengel, Kurt. Boldekow, 3 Aug. 1766. † Halle, 15 March 1833.

848—Anleitung zur Kenntniss der Gewächse. III. Einleitung in das Studium der kryptogamischen Gewächse. 8vo. pp. 374, 10 tab. (1804).

849—Caroli Linnæi Systema Vegetabilium. (Editio XVI.). 4 vol., 8vo. Göttingen (1825–28).

Spruce, Richard. Ganthorpe, North Yorkshire, England. 10 Sept. 1817. See also *Bescherelle, E., Underwood, L. M.*

850—A list of Mosses and Hepaticæ collected in Eskdale, Yorkshire. Phytologist, i. 540–544 (1844).

851—On the branch-bearing leaves of Jungermania juniperina Sw. Phytologist, ii. 85, 86 (1845).

852—A list of the Musci and Hepaticæ of Yorkshire. Phytologist, ii. 147–157 (1845).

853—The Musci and Hepaticæ of Teesdale. Trans. Bot. Soc. Edinb. ii. 65–89 (1846).

854—The Musci and Hepaticæ of the Pyrenees. Ann. and Mag. Nat. Hist., 2d ser., iii. 81–106, 269–293, 358–380, 478–503; iv. 104–120, t. I.–III. (1849); Trans. Bot. Soc. Edinb. 103–216, t. I., II., XIV. (1850).

855—On Anomoclada, a new genus of Hepaticæ, and on its allied genera, Odontoschisma and Adelanthus. Jour. of Bot. xiv. 129–136, 161–170, 193–203, 230–235, t. CLXXVIII., CLXXIX. (1876). [Sep. pp. 33.]

856—Musci Præteriti sive de Muscis nonnullis adhuc neglectis, prætervisis vel confusis, nunc recognitis. Jour. of Bot. xix. 33–40 (1881).

857—On Marsupella Stableri, n. sp., and some allied species of European Hepaticæ. Rev. Byrol. viii. 89–104 (1881).

858—On Cephalozia, its sub-genera and some allied genera. 8vo. pp. 99, Malton (1882).

859—Hepaticae of the Amazon and of the Andes of Peru and Ecuador. Trans Bot. Soc. Edinb. xv. 1–590, t. i.–xxii. (1885).

860—Lejeunea Holtii, a new hepatic from Killarney. Jour. of Bot. xxv. 33–39, 72–82, t. cclxxii. (1887).

861—On a new Irish Hepatic (Radula Holtii). Jour. of Bot. xxv. 209–211 (1887).

862—Hepaticæ in provincia Rio Janeiro a Glaziou lectæ. Rev. Bryol. xv. 33–34 (1888).

(List only.)

863—Hepaticæ Paraguayensis, Balansa lectæ. Rev. Bryol. xv. 34, 35 (1888).

(List only.)

864—Lejeunea Rossettiana Massal. Jour. of Bot. xxvii. 337–338 (1889).

865—Hepaticæ Bolivianæ, in Andibus Boliviæ orientalis, annis 1885–6, a cl. H. H. Rusby lectæ. Mem. Torrey. Bot. Club, i. 113–140 (1890).

866—Hepaticæ novæ Americanæ, tropicæ et aliæ. Bull. Soc. Bot. de France, xxxvi., cxxxix.–ccvi. (1889).

867—Hepaticæ Spruceanæ: Amazonicæ et Andinæ, annis 1849–1860 lectæ. Malton (1892).

(478 specimens from Dr. Spruce's extensive labors in South America.)

Stabler, G.

868—Jungermannia Helleriana Nees in Britain. Jour. of Bot. xx. 248 (1882).

Steinhaus, J.

869—Materialien zur Kryptogamenflora der Umgegend von Warschau und Oizow. Warschauer Universitätsnachrichten, No. 7, 8 (1887). [Sep. pp. 42.]

(List of 49 Hepaticæ.)

Stephani, Franz. Berlin, Germany, 15 Apr. 1842. See also *Jack, J. B.*, *Roll, J.*, *Renauld, F. et Cardot, J.*

870—Verzeichniss der in der Umgegend von Zschopan im Erzgebirge beobachteten Leber- und Laubmoose. Jahresb. des Annaberg-Buchholzer Ver. für Naturkunde, iv. (1876).

871—Deutschlands Jungermannien in Abbildungen nach der Natur, nebst Text. Bot. Verein in Landshut, vii. 93–164, 31 taf. (1879).

872—Riccia ciliifera Link und Riccia Breidleri Jur. Hedwigia, xxi. 76 (1882).

873—Einige neue Lebermoose. Hedwigia, xxii. 49–52 (1883).

874—Zwei neue Lebermoose. Hedwigia, xxii. 145–148 (1883).

875—Die Gattung Radula. Hedwigia, xxiii. 113–116, 129–137, 145–159, 161–163 (1884).

876—Neue und kritische Arten der Gattung Riccia. Hedwigia, xxiv. 2–7, t. i. (1885).

877—Gymnomitrium confertum. Rev. Bryol, xii. 19–22 (1885).

878—Hepaticarum species novæ vel minus cognitæ. Hedwigia, xxiv. 89–91, t. i., ii; 166–168, t. iii., iv.; 214–218, t. i., ii.; 246–250, t. i.–iii. (1885): xxv. 5–9, t. ii.–iv.; 133, 134, t. iii.–vi.; 202–208, t. i.–iii.; 233–249, t. i. ii. (1886).

(Includes species from many regions; especially species of *Bazzania*.)

879—Hepatiques insectivores. Rev. Bryol. xiii. 97–99 (1886).

880—Di una nuovo specie di Plagiochila. Ann. dell'. Ist. di Roma. ii. 86, t. VI. (1886).

881—Hepaticæ Insula St. Thome. Bolet. da Soc. Broteriana, iv. 149–156, 170–176, t. I.–III. (1887).

882—Ueber einige Lebermoose Portugals. Hedwigia, xxvi. t. I. (1887).

883—Hepaticæ Africanæ. Botanischer Jahrbücher (Engler). viii. 79–95 (1887).

(Hepaticæ from St. Thomas and the Niger region.)

884—Hepaticæ von der Halbinsel Alaska. Botanischer Jahrbücher. viii. 96–99, Pl. III. (1887).

885—Hepaticæ Africanæ. Hedwigia, xxvii. 59–63, 106–113 (1888).

(Hepaticæ from Kilimanjaro, Mascarene Is., Mozambique, Insula Principe and portions of W. Africa.)

886—Anthoceros Husnoti Stephani, n. sp. Rev. Bryol. xv. 49, 50 (1888).

887—Marchantia Bescherellei St., n. sp. Rev. Bryol. xv. 86, 87 (1888).

888—Calyculari crispula Mitten. Hedwigia, xxvii. 250–252 (1888).

889—Westindische Hepaticæ. Hedwigia, xxvii. 276–302, t. XI.–XIV. (1888).

(Hepaticæ from Porto Rico and Santo Domingo.)

890—Hepaticæ in Contribuçoes para o estudo da Flora da costa occidental d'Africa. Bolet. da Soc. Broteriana, v. 224–225 (1888).

(Species described in Hedwigia, xxvii. 108–110.)

891—Hepaticæ Australiæ. Hedwigia, xxviii. 128–135, t. iii.; 155–175, t. iv.; 257–278 (1889).

892—Dichiton perpusillum Mont. Rev. Bryol, xvi. 49–51 (1889).

893—Die Gattung Lejeunea im Herbarium Lindenberg. Hedwigia, xxix. 1–23, 68–99, 133–142 (1890).

894—Hepaticæ Africanæ novæ in insulis Bourbon, Maurice et Madagascar lectæ. Bot. Gazette, xv. 281–292 (1890).

895—Treubia insignis Göb. Hedwigia, xxx. 190–193 (1891).

896—Hepaticæ Africanæ. Hedwigia, xxx. 201–217, 265–272, t. xxi.–xxiv. (1891); xxxi. 120–130, t. v.–vii; 165–174, t. x.–xv.; 198–214 t. xix.–xxi. (1892).

(Hepaticæ from the Cameroons, Leikipia, Cape Colony, Natal, Transvaal, Madagascar and the Mascarene Is.)

897—Cryptomitrium tenerum Austin. Bot. Gazette, xvii. 58–60 (1892).

898—The North American Lejeuneæ. Bot. Gazette, xvii. 170–173 (1892).

(List of 20 species; describes as new L. Cardoti, and L. Underwoodii.)

899—Hepaticæ novæ Caucasicæ. Bot. Centralblatt (1892).

900—Colenso's New Zealand Hepaticæ. Jour. Linn. Soc. xxix. 263–280, pl. 26–28 (1892).

(Reduces many of Colenso's species to synonymy; describes 18 new species.)

Stewart, S. A.

901—Report on the Botany of South Clare and the Shannon. Proc. Roy. Irish Acad., 3d ser., i. 343–359 (1890).

Strasburger, Eduard. Warsaw, Poland, 1 Feb. 1844.

902—Die Geschlechtsorgane und die Befruchtung bei Marchantia polymorpha. Pringsh. Jahrb. vii. 409–422, t. XXV., XXVI. (1870).

903—Ueber Befruchtung und Zelltheilung. 8vo. Jena (1878).

(Die Befruchtungsvorgange bei Marchantia polymorpha, pp. 12–14, t. I., f. 9–21.)

904—Das botanische Practicum. (Zweite Auflage.) 8vo. Jena (1887).

Morphology of Marchantia polymorpha, Plagiochila asplenoides and Metzgeria furcata., pp. 293–299, 442–447.)

905—Entwickelungsgeschichte und Bau der Spermatozoiden bei Pellia calycina. Histologische Beiträge, iv. 124–132 (1892).

Sullivant, William Starling. Franklinton, Ohio, 15 Jan. 1803. Columbus, Ohio, 30 April 1873.

906—Musci Alleghanienses, sive Spicelegia Muscorum atque Hepaticarum quas in Itinere a Marylandia usque and Georgiam per tractus montium, A. D. 1843, decerpserunt Asa Gray et W. S. Sullivant. 292 spec. exsicc. et 12 mo., pp. 72, Columbus (1845).

(Nos. 216–292 are Hepaticæ, and include several new and rare species.)

907—Review of Musci Alleghanienses, with descriptions of the new species. Amer. Jour. Sci. and Arts, 2d ser., i. 70–81 (1846).

908—Contributions to the Bryology and Hepaticology of North America. Part I. Mem. Amer. Acad., new ser., iii. 57–66 (1846); Part II. *Ibid.* iv. 169–176 (1849).

(Includes descriptions of 5 new species and notes on others.)

909—Notices of several new species of Mosses and Hepaticæ from Tierra del Fuego. Lond. Jour. of Bot. ii. 315–318 (1850).

(Describes 7 new Hepaticæ.)

910—The Musci and Hepaticæ of the United States east of the Missisippl River. 8vo. pp. iv. 113, New York (1856).

(Includes descriptions of Hepaticæ, with three plates illustrating the genera.)

911—Hepaticæ, in *Gray*: Manual of Botany, 2d Ed., (1856).

912—Descriptions of Musci and Hepaticæ collected on the Pacific R. R. Survey. Pacific R. R. Survey, iv. 185–193 (1858).

(List of 7 Hepaticæ, mostly from California.)

Swartz, Olaf. Norrkoping, Sweden, 21 Sept. 1760. †Stockholm, 19 Sept. 1818.

913—Flora Indiæ occidentalis aucta atque illustrata, sive descriptiones plantarum in prodromo recensitarum. 3 vol. 8vo. Erlangen (1797–1806).

(Includes Musci hepatici, iii. pp. 1842–1885.)

Sydow, P.

914—Die Lebermoose Deutschland, Oesterreich und der Schweiz. 8vo. Berlin (1882).

Szymanski, F.

915—Ueber einige parasitische Algen. Inauguraldiss. der Phil. Facultät der Univ. Breslau (1878).

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974—Beiträge zur Moosflora der Oberharzer. Hedwigia, xxii. 148–153, 163–170 (1883).

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Watson, Hewitt C.

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(Describes 223 Hepaticæ distributed among 7 genera.)

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990—Botanisches Taschenbuch auf das Jahr 1807. Deutschland kryptogamische Gewachse. I Abtheilung : Filices, Musci frondosi et hepatici. 12 mo. pp. xlvi. 509, 12 tab. Kiel (1807).

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991—Spicilegium Floræ Gottingensis, plantas imprimis cryptogamicas Hercyniæ illustrans. 8vo. pp. 288, 5 tab. col., Gotha (1778).

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(List of 26 Hepaticæ.)

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(Contains Hepaticæ exsiccatæ among other Cryptogams.)

Wigand, Albert.

997—Intercellularsubstanz und Cuticula. 8vo. pp. vi. 130, Braunschweig (1850).

(Account of leaf-structure of Lophocolea bidentata, Plagiochila asplenoides, Radula complanata, Frullania tamarisci.)

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Winkelmann, J.

1000—Jungermannia acuta Lindenb. in Pommern. Verhandl. des Bot. Vereins der Prov. Brandenburg, vii. (1888).

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1001—A Botanical Arrangement of all the Vegetables naturally growing in Great Britain, with descriptions of the genera and species. 2 vol., 8vo. pp. xcvi. 838, 12 tab. (1776).

(Includes the Hepaticæ.)

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1003—Hepaticæ Cubenses Wrightianæ.

(A collection of Cuban Hepaticæ named by Gottsche; they were issued in unnumbered series from Cambridge, Mass., by Dr. Gray after Wright's death.)

Wright, C. H.

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(List of 44 Hepaticæ from Lat. 60° 37′ Norway.)

Wünche, O.

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1010—Om växtligheten på Vestergötlands siluriska berg med Särskeld hänsyn till Mossvegetationen. Ofversigt af Kongl. Vetensk.-Akad. Forhandl. 1876, No. 1, 43–71.

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6. COLOMBIA (NEW GRANADA):—302*, 330*, 627.
7. ECUADOR: - 626, 859*, 867*, 929.
8. GUIANA:—79*, 562*, 658, 680*.
9. PARAGUAY:—863.
10. PATAGONIA:—3*, 4, 76*, 77*, 251*, 261, 362*, 363, 364, 591*, 664*, 825*, 909*;
11. PERU:—331*, 859*, 867*;
12. ISLANDS:—(Falklands)- 364; (Galapagos)- 3*; (Juan Fernandez)- 652.

VI. AUSTRALIA:

1. GENERAL:—3*, 4*, 151*, 294*, 308*, 432, 448 629*, 781*, 891*.
2. TASMANIA:—46*, 47*, 48*, 149*, 150*, 631*.

VII. OCEANIC ISLANDS:

(See also Scandinavia, Russia, Africa, West Indies, and South America for islands in the vicinity of continents.)—(Admiralty Group)- 652; (Bermudas)-342; (Borneo)- 227*, 228*; (Fiji Islands)- 632*, 640*; (Java)- 236*, 287*, 293*, 611, 702*, 703*, 783*, 803*, 804, 805*, 806*; (Kerguelen Land)- 364, 643, 645, 647, 825; (Moluccas)- 652; (New Caledonia)- 79; (New Guinea)- 270; (New Zealand)- 128, 161*, 162*, 163*, 164*, 165*, 166*, 167*, 168*, 169*, 170*, 171*, 172*, 360*, 412, 564, 628*, 781*, 900*; (Norfolk Island)- 695; (Philippines)- 387*, 674*; (Samoa)- 640*; (Sandwich Islands)- 3*, 4, 27*, 250*, 640*, 782*; (South Georgia)- 314*; (Tahiti)- 3*, 781*.

Special Morphology, Physiology and Classification.

[Including descriptions of single species, monographs of genera, etc. Morphological and physiological papers are indicated by *Italics.*]

I. RICCIACEÆ:—83, 84, 85*, *422*, *465**, 560*, 582.

BOSCHIA:—681.

GREENCASTLE, INDIANA,
6 February, 1893.

MEMOIRS

OF THE

TORREY BOTANICAL CLUB.

VOL. IV. No. 2.

REPORT

ON THE

BOTANICAL EXPLORATION

OF

SOUTHWESTERN VIRGINIA

During the Season of 1892.

BY

JOHN K. SMALL and ANNA MURRAY VAIL.

THE MUSCI DETERMINED BY ELIZABETH G. BRITTON;
THE HEPATICÆ BY ALEXANDER W. EVANS;
THE LICHENES BY J. W. ECKFELDT.

PRICE, - - - - 50 CENTS.

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Report of the Botanical Exploration of Southwestern Virginia During the Season of 1892.

BY JOHN K. SMALL AND ANNA MURRAY VAIL.

The term Southwestern Virginia is a rather vague expression and to the majority of botanists it does not by any means convey its real significance. Occasionally it is met with in botanical text-books or on the labels of some collector who has made a limited excursion into that region. On an ordinary geographical map this tract of country appears quite small, and it is not until one enters it that it is realized how vast and important, as well as interesting, the district really is.

Early in the spring of 1892 several members of the Torrey Botanical Club planned an extended excursion to the border-land of Southwestern Virginia and North Carolina. Entering the field through the Valley of Virginia, on the sixteenth day of May, they selected Marion, the court house of Smyth County, as a centre from which exploring trips could be made.

Marion lies in and near the lower end of the great Valley of Virginia, which forms a more or less natural boundary between the Blue Ridge on the east and the Alleghany Mountains on the west. The territory visited lay close to the North Carolina State line, and the ground that was most thoroughly explored was that within a radius of about twenty miles from Marion, though a number of excursions to more distant localities and points of special prominence were made at intervals. Marion is situated near the Virginia and North Carolina boundary line, which, besides being a political limit, has always been made a conventional line between the northern and southern floras of the States east of the Mississippi river, or the temperate region of eastern North America.

Although contiguous, the mountains of North Carolina and Virginia are of two very different types, and any one accustomed to collecting in the wilderness of the western portions of the former State is immediately struck with the great topographical difference between the two regions. In the tract of country under consideration the mountain ridges and valleys are usually long, although much varying in length, and run in nearly parallel lines, whereas in North Carolina, in place of the parallel system, there is a mass of short ridges and peaks thrown together in all conceivable positions and at every possible angle and relation to one another. As can naturally be inferred, there is considerable dissimilarity in the floras of the two tracts. The conventional line between the two states is by no means absolute, and there is much overlapping and intergrading of their respective floras. This was especially observed, and it furnished many facts concerning the geographical distribution of species.

The two factors that have exerted the greatest influence in producing such an extensive flora as there exists are the varied character of the contour of the region and the variety of the geological formations of its valleys and its mountain ranges, which latter are the Blue Ridge, the Alleghanies and the Cumberland Mountains. As to the former, there are all conditions of erosion and varying altitudes ranging from the valleys, some of which are 2,000 feet above the level of the sea, to ridges 5,000 feet and peaks nearly 6,000 feet in height. The latter factor's influence can readily be understood when we consider both the restricted and extensive limestone valleys followed by thick strata of the different sedimentary rocks on the mountain slopes and ending with the granite or gneiss of the higher peaks, each formation supporting a greater or less number of peculiar species and varieties. In addition to these there are two other factors, the climatic and meteorological conditions as they prevail there. They may not exert as much power in enlarging the flora as in rendering it as luxuriant as it is. The temperature seems to be just about the requisite degree, seldom so hot as to produce excessive transpiration, seldom so cool as to do harm. The rainfall is large, seemingly excessive in some of the mountains, but favorable to the growth of the majority of plants, while those preferring drier situations are found on the more open and plain-like plateaus or on the southern slopes of many of the mountains. These latter remain peculiarly dry notwithstanding the large rainfall.

In consequence of these agents, there exists, especially on the mountains, an extraordinarily prolific growth of plants. Not only are the smaller phanerogams, the ferns, the mosses and the lower cryptogams remarkably well developed, but the mountains and valleys are clothed with magnificent, in some instances almost primeval, forests.

Local Geography.

Towards the east and southeast, in fact just on the limits of the town of Marion, lie the foot-hills of the Blue Ridge. These consist of a chain of peculiar and striking "knobs" reaching an altitude of about 2,600 feet. Immediately behind them is the first ridge of the range, called Pond Mountain. The highest point attained there is 3,400 feet. East of the northern end of Pond Mountain, and more or less connected with it, is Brushy Mountain, whose altitude exceeds that of the former ridge by 200 feet. Beyond this the country is more open for a short distance, forming thus the Valley of the South Fork of the Holston River.*

Rising abruptly from the valley is the massive ridge of the Iron Mountains, with its many lofty spurs and out-lying peaks, which ascend as high as 4,900 feet. The culmination of altitude is reached in the next short but stately elevation, for on either end of this ridge are situated two most conspicuous peaks, Mt. Rogers and White Top Mountain, the highest points in Virginia, the former 5,719 feet and the latter only 41 feet lower. After these summits are passed, the country gradually decreases in altitude until the narrow and cañon-like valley of the New River is reached. This stream has cut down its valley until now it flows in that region at an elevation of about 2,000 feet. Beyond the river still eastward the land again rises rapidly, and an extensive

* In this brief description the smaller valleys and ridges are not considered.

mountainous tract separates the New River from the plain on the east. This region when more thoroughly explored in the future will doubtless yield fine results.

About four miles northwest of Marion, on the opposite side of the valley of the middle fork of the Holston River, the Alleghanies take their rise. Beyond a more or less interrupted outlying ridge, at some places rising to 3,000 feet, Walker Mountain is situated, its highest altitude being 3,800 feet. Gradually shading out into the irregular valley of the north fork of the Holston, the land rises into more lofty and rugged mountains, prominent among which are the peak-like summits of White Rock, Red Rock, etc. The Alleghanies extend westward for many miles, finally ending with the Powell River valley, whence the most westerly mountain range rises—the Cumberland. This, although much lower than the two eastern ranges, spreads over a large area, and consists of almost innumerable small ridges, which fade out little by little into the plains of Kentucky and the neighboring States.

In consequence of such diversified conditions, it is natural that the flora of the whole district is more or less affected and locally distributed. The botany of our excursion is recorded in the following annotated list of the plants collected:

Clematis Addisonii, Britton. Roanoke, alt. 1,000 ft.

The locality discovered in 1890* was again visited and found to have been nearly obliterated by the quarrying down of the hill in the process of building new streets, so that where hundreds of plants were seen before not more than a couple of dozen were noticed.†

‡ *Clematis ovata*, Pursh. Fl. Am. Sept. ii. 737 (1814). Kate's Mt. Greenbriar Co., W. Va., alt. 3,300 ft.

For the first time, as far as is known, this rare Clematis has been collected in flower at the same place where Dr. Britton found it in fruit in 1890, and it proves to be a good species.

* Mem. Torr. Club, ii. 28.

† In the Gattinger Herbarium of the University of Tennessee, at Knoxville, there is a specimen of this species preserved, collected by Mrs. Bennett, in 1888, in the Cumberland Mountains, Tenn.—N. L. B.

‡ Mem. Torr. Club, ii. 28.

It grows on a dry, slaty hillside, in low, crowded clumps, often as many as twenty stems growing from a lignous base and matted mass of lignous roots. The stems, leaves and petioles are pubescent with weak, matted, silky hairs, becoming more glabrous with age, the peduncle and petioles retaining more pubescence than the remaining portion of the plant; the leaves ovate, sparingly pubescent with few, weak, silvery hairs, becoming glabrous and strongly reticulate with age, sessile or very short petioled, entire or rarely with a few teeth. The flower is 1½–2½ cm. long, densely tomentose on the exterior, violet purple inside, the ripe plumose tails of the achenes greyish or creamy white.

Clematis ovata differs mainly from *C. ochroleuca* in its smaller more slender habit, nearly glabrous leaves, shorter petioles, smaller flowers and the much lighter color of its fruit, though whether the latter character is a constant one remains to be seen when more material of *C. ovata* has been collected and studied.

Clematis ochroleuca, Ait. Roanoke, alt. 1,000 ft.

A particularly vigorous form of this interesting plant. It grew in great profusion on a dry hillside and for a distance of half a mile or more very close to the town, and the locality will doubtless soon share the fate of that of *C. Addisonii.*

The majority of the many plants noted were remarkable for the lobing of their leaves, which in some cases were 3–5-cleft or parted nearly to the base. The flowers were about 3 cm. long, often with 5–6 sepals, very densely tomentose and cream or yellowish white on the outer surface; the interior of the sepals cream white or streaked with bluish purple, or entirely bluish-purple with a whitish margin. A few plants were slender and less vigorous, with more narrowly ovate leaves and distinctly purple flowers, and in leaf characters approaching *C. ovata.*

Clematis Viorna, L. Banks of the Middle Fork of the Holston, Marion, alt. 2,100 ft. Slopes White Rock Mt., alt. 4,200 ft.

Clematis Virginiana, L. Hog-trough Creek, base of Iron Mts., alt. 2,600 ft.

Thalictrum clavatum, D. C. Staley Creek, alt. 2,200 ft. Slopes and summit of White Top Mt., alt. 2,600–5,675 ft. Damp ledges of cliffs on Farmer Mt., alt. 2,300 ft.

THALICTRUM CORIACEUM (Britton) Small. *T. dioicum*, L., var. *coriaceum*, Britton, Bull. Torr. Club, xviii. 363.

The plant here raised to specific rank was first published by Dr. Britton as a variety of *Thalictrum dioicum*. After a thorough study of it in the field, it has been found to possess excellent specific characters, which are briefly brought out in the following description, the most prominent being italicized:

Perennial, root-stock and fibres large, *bright yellow;* strictly diœcious, rather strict, glabrous and more or less glaucous. Stem erect, 9–16 dm. tall, branching above into a compound panicle, striate; leaves ternately-decompound, short petioled, the petiole at the base expanded into two large *stipular appendages*, divisions of the leaflets varying from obovate to reniform-orbicular, almost white beneath, mostly *deeply and sharply incised*, quite *coriaceous*, veins prominent on the under surface; staminate flowers white, rather few, anthers linear, subulate-tipped, longer than the filiform filaments; pistillate flowers purple, numerous, ovary shorter than the style; achene oblong-ovoid, rather acute, *about the same length as the persistent style*, *sharply ribbed*, generally *long-stalked*.

Discovered at two localities in Southwestern Virginia, in the Blue Ridge along Nick's Creek, alt. 2,400 feet, and in the Alleghanies on White Rock Mountain, alt. 4,000 feet.

Thalictrum dioicum, L. Staley Creek, alt. 2,200 ft. Slopes of White Top Mt., alt. 2,600–5,000 ft.

Thalictrum polygamum, Muhl. Banks of the James River, Lynchburg, alt. 500 ft. Falls of the Holston, below Marion, alt. 2,050 ft.

Thalictrum purpurascens, L. Walker Mt., alt, 2,800 ft.

The only locality observed and not far from the southern observed limit of the range of this species, which is about the summit of the Blue Ridge in Watauga Co., N. C.*

Syndesmon thalictroides (L.) Hoffmsg. Vicinity of Marion, alt. 2,100–2,500 ft.

On some of the plants gathered the leaflets were 3 cm. long and 4 cm. broad. A few plants were also noticed with pink flowers.

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*Mem. Torr. Club, iii. 6 and 22.

Anemone quinquefolia, L. Marion, alt. 2,100 ft. Skull Gap, Iron Mts., alt. 3,000 ft.

On two occasions at the above localities a very small form of this plant was found in dense shade growing only a few inches high, with small ovate, almost rhomboid leaflets and very delicate flowers, the petals of which were pink tinged, and in character approaching *A. nemorosa* of Europe. A larger form grew in more open woods at Marion.

Anemone trifolia, L. Pond Mt., alt. 3,000. Walker Mt., below Chatham Hill Gap. alt. 2,700–3,400 ft. Slopes and summit of White Top Mt. alt. 2,600–5,678 feet.

Not seen below 2,500 feet, but on the higher slopes very abundant. The woods at the foot of and all along White Top Mt. summit were filled with it, in places to the exclusion of other plants. There was a diversity of leaf form noted, though in general the leaves did not vary as greatly as did those of plants noted two years previous on Salt Pond Mt. and on the Peaks of Otter.*

Anemone Virginiana, L. Beaver Creek, alt. 2,400 feet. Farmer Mt. New River, Carroll Co., 2,200 ft. Along Dickey Creek, alt. 2,600 ft.

Hepatica acuta (Pursh) Britton. Banks of the Holston, near Marion, alt. 2,100 ft. Hungry's Mother Creek, alt. 2,200 ft.

Only collected in fruit, some of the plants 30 cm. tall, the leaves often 12–13 cm. broad.

From the last named locality specimens were collected with leaves having the middle lobe of the leaf in its turn 3-lobed towards the apex, the lateral lobe often 1–2 lobed.

Trautvetteria Carolinensis (Walt.) Vail. Slopes of White Top Mt., alt. 3,500 ft. Banks of the South Fork of the Holston River, alt. 2,200 ft. Peak Creek, Peak Mt. alt. 2,200 ft. Shady cliffs of Farmer Mt., alt. 2,300 ft. In bloom on June 20th.

Ranunculus abortivus, L. Slopes and Summit White Top Mt., alt. 2,600–5,678 ft. Buchanan, alt. 1,100 ft. Hills about Marion, alt. 2,400.

The plants collected on White Top Mt. were very variable in size and aspect, those from near the base of the mountain were

* Mem. Torr. Club, ii. 32.

robust and large, whereas those from the exposed summit were so greatly reduced in size that their branches were almost filiform.

Ranunculus hispidus, Michx. Woods and hillsides, Marion, alt. 2,100–2,500 ft. Walker Mt., alt. 2,600–3,000 ft. Pond Mt., alt. 3,300 ft. Buchanan, alt. 1,100 ft.

R. septentrionalis was sought for but without success.

Ranunculus recurvatus, Poir. Walker Mt., woods, alt. 2,700–3,300 ft. Near Marion, alt. 2,100 ft. Slopes of White Top Mt., alt. 2,600–5,000 ft.

Ranunculus sceleratus, L. Roanoke, alt. 1,000 ft.

Caltha palustris, L. Staley Creek, Marion, alt. 2,200 ft.

Hydrastis Canadensis, L. Along a meadow on Hungry's Mother Creek, alt. 2,300 ft.

Aquilegia Canadensis, L. Rocky banks of the Middle Fork of the Holston River, alt. 2,100 ft. Dickey Creek, alt. 2,800 ft. Slopes of White Top Mt., alt. 2,600–5,000 ft.

Growing in great clumps through the White Top woods, some of the flowers measuring over 4 cm. in length.

Delphinium Consolida, L. Beaver Creek, alt. 2,000 ft. A pink and white-flowered form along the railroad track near Liberty, Bedford Co., alt. 1,000 ft.

A low, hardly more than 30 cm. high, deep blue-flowered form noted at intervals along the Norfolk and Western R. R., in many cases for several miles at a stretch. June 30th.

Delphinium tricorne, Michx. Woods on the Chatham Hill Gap road, on Hungry's Mother Creek, alt. 2,300 ft.
In fruit May 24th.

Aconitum reclinatum, A. Gray. East slope of White Top Mt., alt. 4,000 ft.

The second known locality for this species north of the North Carolina Mts. It is not plentiful and only one station was noticed. The other locality in Virginia is Cheat Mt. *

Aconitum uncinatum, L. Ravine of the Middle Fork of the Holston, alt. 2,100 ft.

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*A. Gray, Man. Bot. N. U. S. (Revised ed.) p. 47.

Actæa alba (L.) Mill. Summit and slopes of White Top Mt., alt. 2,600 to 5,500 ft. Along Nick's Creek, alt. 2,600 ft.

Cimicifuga Americana, Michx. The Island, Marion, alt. 2,100 ft. Falls of the Holston, below Marion, alt. 2,050 ft.

Cimicifuga cordifolia, Pursh. Hills east of Marion, alt. 2,300 ft. Falls of the Middle Fork of the Holston, alt. 2,050 ft.

Cimicifuga racemosa (L.) Nutt. Lynchburg, alt. 500 ft.

Xanthorhiza apiifolia, L'Her. Farmer Mt., New River, alt. 2,200 ft.

Evidently a rare plant in the region, as it was not seen in the Valley of Virginia.

Magnolia acuminata, L. Staley Creek, alt. 2,100–2,300 ft., and common elsewhere throughout the county.

Magnolia Fraseri, Walt. Staley Creek, alt. 2,200 ft. Walker Creek, alt. 2,200 ft. Dickey Creek, alt. 2,800 ft. White Top Creek, below Skull Gap, alt. 3,000–3,500 ft., and elsewhere along swamps and streams, where during the last week in May the slender trees, 30–50 feet high, were in full bloom, the greenish-white petals measuring 10 cm. or more long when fully expanded.

Liriodendron Tulipifera, L. Hungry's Mother Creek, alt. 2,300 ft. Marion, alt. 2,100 ft., and elsewhere common throughout the county. In full bloom June 13th.

Asimina triloba (L.) Dunal. Near Broadford, alt. 2,200 ft. Lynchburg, alt. 500 ft.

Menispermum Canadense, L. Sugar Creek, near Marion, alt. 2,100 ft. Reed Creek, base of lower rocks, alt. 2,000 ft.

Berberis Canadensis (Ait.) Pursh. Banks of the Middle Fork of the Hoston at Marion, alt. 2,100 ft.

Common along streams and in rocky places. Messrs. Small and Heller did not meet with it in their journey through Northwestern North Carolina in 1891.

Caulophyllum thalictroides (L.) Michx. Slopes of White Top Mt. and Chestnut Ridge, alt. 3,000–5,000 ft. Lynchburg, alt. 500 ft.

Diphylleia cymosa, Michx. Slopes of White Top Mt., alt. 3,000–5,000 ft. In full bloom May 28th, along the swampy borders of streams and around springs, where it was very abundant.

Jeffersonia diphylla (L.) Pers. Hungry's Mother Creek, alt. 2,300 ft. Along Middle Fork of the Holston River, alt. 2,100–1,050 ft. In fruit June 10th. Plants 20–35 cm. high.

Podophyllum peltatum, L. Staley Creek, alt. 2,100 ft. Also common in fields and along woods elsewhere in the county.

Sanguinaria Canadensis, L. Banks of the Middle Fork of the Holston, alt, 2,100 ft. Woods in Hungry Hollow, alt. 2,300 ft. Mountains east of Buchanan, alt. 1,300 ft.

Bicuculla Canadensis, (Goldie) Millsp. Slopes of White Top Mt., alt. 4,500 ft.

Bicuculla Cucullaria (L.) Millsp. Slopes of White Top Mt., alt. 4,500 ft.

Bicuculla eximia (Ker) Millsp. Laurel Creek, in the North Fork of the Holston River Valley, alt. 2,200 ft.

Capnoides sempervirens (L.) Borckh. Dickey Creek, alt. 2,700 ft. Farmer Mt., New River, alt. 2,200 ft.

Roripa Nasturtium (L.) Rusby.* (*Sisymbrium Nasturtium*, L.; *Nasturtium officinale*, R. Br.) Staley Creek, 2,100 ft., and common elsewhere in the region in brooks and swamps.

Arabis Canadensis, L. Shannon Gap, Walker Mt., alt. 3,000 ft. Dickey Creek, Iron Mts., alt. 2,900 ft. Spur of Pine Mt., alt. 3,000 ft.

Arabis lævigata (Muhl.) Poir. River bluffs, Marion, alt. 2,100 ft. Slopes of Mt. Rogers, alt. 4,000–5,719 ft. Slopes of White Top Mt., alt. 4,000 ft. Buchanan, alt. 1,100 ft.

Arabis lyrata, L. Laurel Creek in the North Fork of the Holston River Valley, alt. 2,200 ft.

Cardamine bulbosa (Schreb.) B.S.P. Staley Creek, alt. 2,100 ft.

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* Mem. Torr. Club, iii., Part 3, 5 (1893). The generic name *Roripa*, Scop. Fl. Carn. 520 (1760), Adamson, Fam. Pl. ii. 417 (1763), must clearly displace *Nasturtium*, R. Br.

Cardamine Clematitis, Shuttl. Upper slopes and summit of White Top Mt., alt. 5,000–5,678 ft. Upper slopes of Mt. Rogers, alt. 5,600 ft.

The third known locality for this interesting Crucifer. The species was first collected on the summit of Roan Mt., Tenn. and N. C., many years ago, then in 1891 near the summit of Grandfather Mt., N. C., by Small and Heller.* This last collection brings the plant into the range of the flora of the Northern United States.

Cardamine flexuosa, With.† Summit and slopes of White Top Mt., alt. 4,500–5,678 ft. In rivulets on the slopes of Mt. Rogers, alt. 4,500 ft.

Cardamine parviflora, L. Chatham Hill road, Walker Mt., alt. 2,800–3,000 ft.

Cardamine Pennsylvanica, Muhl. Staley Creek, near Marion, alt. 2,100 ft.

Cardamine rotundifolia, Michx. Hungry's Mother Creek, alt. 2,600 ft. Slopes of Pine Mt., alt. 3,000–4,600 ft. Staley Creek, Marion, alt. 2,400 ft.

Dentaria diphylla, L. Ravine of the Middle Fork of the Holston, alt. 2,100 ft. Bluffs along Staley Creek, alt. 2,200 ft.

Dentaria laciniata, Muhl. Walker Mt. road, alt. 2,700 ft. Hill near Staley's Knob, Marion, alt. 2,300 ft. Slopes of White Top Mt., alt. 4,500 ft. Mt. Rogers, alt. 3,000–5,000 ft.

Many of the specimens densely puberulent.

Draba verna, L. Bluffs of the Holston, Marion, alt. 2,100 ft. Kate's Mt., Greenbriar Co., W. Va., alt. 3,300 ft.

Sisymbrium officinale (L.) Scop. Streets of Marion, alt. 2,100 ft.

Brassica campestris, L. Marion, alt. 2,100 ft.

Brassica nigra (L.) Koch. Old fields about Marion, alt. 2,100 ft.

Brassica oleracea, L. Marion, alt. 2,100 ft.

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*Mem. Torr. Bot. Club, iii. 5 and 22.

† This is certainly identical with the European plant. I have elsewhere expressed doubt of its occurrence in America, but I am now convinced that we have it. The plant is very distinct from *C. Pennsylvanica*, Muhl., which is abundant at lower altitudes. N. L. B.

Bursa Pastoris (L.) Weber. Bluffs of the Holston, Marion, alt. 2,100 ft.

Lepidium Virginicum, L. Sugar Creek, Marion, alt. 2,100 ft.

Lechea racemulosa, Michx. Pond Mt., alt. 3,000 ft. Banks of the Middle Fork of the Holston, Marion, alt. 2,100 ft. Dickey Creek, Iron Mts., alt. 2,900 ft. Mouth of Brush Creek, New River, alt. 2,200 ft. Pinnacle, alt. 3,500 ft. Peak Creek, alt. 3,200 ft.

Viola blanda, Willd. Summit White Top Mt., alt. 5,678 ft.

Viola blanda, var. *amœna* (Le Conte) B. S. P. (*Viola blanda*, var. *palustriformis*, A. Gray). Skull Gap, Iron Mts., alt. 3,500 ft. Pine Mt., alt. 4,000–4,900 ft. East Fork Walker Creek, alt· 2,250 ft.

Viola Canadensis, L. Staley Creek, alt. 2,400 ft. East slope of White Top Mt., alt. 4,600 ft.

Viola hastata, Michx. Staley Creek, alt. 2,400. Slopes of White Top Mt., alt. 4,000–5,000 ft. Along Nick's Creek, alt. 2,600 ft.

Viola Muhlenbergii, Torr. Staley Creek, alt. 2,400 ft.

Viola obliqua, Hill (*V. cucullata*, Ait.). Nick's Creek, Marion, alt 2,600 ft. Walker Mt., alt. 16 ft. Summit and slopes of White Mt., alt. 4,000–5,678 ft.

Viola obliqua, Hill, forma *albiflora*, Britton. Staley Creek, Marion, alt. 2,200 ft.

Viola palmata, L. Pond Mt. and Walker Mt., alt. 2,500–3,000 ft. Skull Gap, Iron Mts., alt. 3,000 ft. Nick's Creek, alt. 2,100 ft.

Viola pedata, L. Bear Creek, alt. 2,200 ft. Chatham Hill road, Walker Mt., alt. 2,500–3,000 ft. Kate's Mt., W. Va., alt. 3,300 ft.

Viola pedata forma *bicolor* (Pursh) Britton. Walker Mt., alt. 2,500–3,000 ft. Kate's Mt., W. Va., alt. 3,300 ft.

Viola pubescens, Ait. Staley Creek, alt. 2,400 ft. Hungry Hollow, alt. 2,200 ft. Mouth of Hungry's Mother Creek, alt. 2,075 ft.

Viola rostrata, Muhl. Pond Mt., alt. 2,800–3,500 ft. Falls of the Middle Fork of the Holston, alt. 2,050 ft. And elsewhere in the county.

Viola rotundifolia, Michx. Nick's Creek, alt. 2,300 ft. Pine Mt. alt. 4,800 ft. White Top Mt., alt. 5,000 ft.

Growing to great size in the deeper hemlock woods. Some of the leaves measuring 10-13 cm. long.

Viola sagittata, Ait. Lynchburg, alt. 500 ft. Skull Gap, Iron Mts., alt. 3,500 ft. Summit White Top Mt., alt. 5,000–5,678 ft.

Viola sagittata, var. *ovata* (Nutt.) T. and G. Summit of White Top Mt., alt. 5,678 ft.

Leaves villous, ovate, cordate, crenate, mostly with margined petioles, the earlier leaves round, cordate; flowers on peduncles much exceeding the leaves, very dark purple, large, with a thick, short spur. In bloom May 28th, among grass in an open field and appearing to be a marked variety.

Viola scabriuscula, Schwein. Walker Mt. road, alt. 2,400 ft. Green Cove, alt. 2,500 ft. Spruce Swamp, White Top Mt., alt. 4,500–5,000 ft.

Viola striata, Ait. Bluffs of the Holston, alt. 2,100 ft. Hungry's Mother Creek, near Marion, alt. 2,200 ft.

The common violet of the lower levels, often found in wet meadows and along streams, growing from 10–45 cm. tall.

Viola tenella, Muhl. Roanoke, alt. 1,000 ft. Buchanan, alt. 1,100 ft.

Viola villosa, Walt.* Pond Mt. and Staley's Creek, alt. 2,100–3,000 ft. Lynchburg, alt. 500 ft.

Solea concolor (Forst.) Ging. River bank, Marion, alt. 2,100 ft. Roanoke, alt. 1,000 ft.

Polygala ambigua, Nuttall. Lynchburg, alt. 500 ft.

Polygala paucifolia, Willd. Ravine of the Holston, below Marion, 2,050 ft. Knobs east of Marion, alt. 2,300 ft. Kate's Mt., West Virginia, alt. 3,300 ft.

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* After seeing this plant growing in great quantities in the region explored, I cannot doubt that it is distinct from *V. palmata*. Its characters are much more pronounced in the field than in the herbarium. The leaves are orbicular or ovate, obtuse and lie flat on the ground, are purple beneath or sometimes on both sides, and are seldom over 2 inches broad; their upper surfaces are usually silvery-pubescent. The whole plant, as in the related forms, varies from densely hirsute to nearly glabrous. N. L. B.

At all localities where the "fringed polygala" was found, the plants were producing cleistogamous flowers near the roots. These flowers fertilized themselves much more readily than the showy ones at the summit of the stem and produced by far the greater amount of fruit.

Polygala Senega, L., var. *latifolia,* Torrey & Gray. Buchanan, Botetourt Co., alt. 1,100 ft. Nick's Creek, east of Marion, alt. 2,700 ft. Pond Mt., east of Marion, alt. 3,000 ft.

Not one of our numerous specimens of the above species can be referred to the typical form, but all of them must be placed under the variety *latifolia.* The study of the specimens collected leads us to believe that the variety may be more prevalent than it is supposed to be, for this reason; the best and constant character of the variety is the *erose-denticulate* margins of the leaves under a lens, which are easily overlooked, as they are not very conspicuous. The varietal name is a poor guide, and is in fact often misleading.

Polygala verticillata, L. Lynchburg, alt. 500 ft. Slopes and summit of the Iron Mts., at Skull Gap, alt. 2,500–3,500 ft.

Dianthus Armeria, L. Lynchburg, alt. 500 ft. River banks, Marion, alt. 2,100 ft. Valley of the North Fork of the Holston River, alt. 2,100 ft. Banks of the New River, near Farmer Mt., alt. 2,200 ft.

Saponaria officinalis, L. Lynchburg, alt. 500 ft. Hogtrough Creek, base of Iron Mts., alt. 2,600 ft. Marion, alt. 2,100 ft. Pinnacle, Cumberland Gap, alt. 2,500 ft.

Silene antirrhina, L. Lynchburg, alt. 500 ft. Pinnacle, Cumberland Gap, alt. 3,500 ft. Middle Fork of the Holston, six miles west of Marion, alt. 2,050 ft.

Silene Caroliniana, Walter (*S. Pennsylvanica,* Michx.). Roanoke, alt. 1,000 ft. Kate's Mt., W. Va., alt. 3,300 ft.

Silene stellata (L.) Ait. Slopes and summit of Iron Mt., alt. 2,500–3,500 ft. Nick's Creek, base of Pine Glade Mt., alt. 2,500 ft.

Silene Virginica, L. Marion, Alt. 2,100 ft. Slopes of White Rock Mt., alt. 4,000 ft. Buchanan, alt. 1,200 ft.

Agrostemma Githago, L. (*Lychnis Githago,* Lam.) Marion, alt. 2,100 ft.

Cerastium vulgatum, L. Summit White Top Mt., alt. 5,678 ft. Pine Mt., alt. 4,000–4,900 ft. East Fork Walker Creek, near Marion, alt. 2,250 ft.

Alsine media, L. Marion, alt. 2,100 ft.

ALSINE PUBERA (Michx.) Britton. (*Stellaria pubera*, Michx. Fl. Bor. Amer. i. 273 (1803).) Buchanan, alt. 1,100 ft. Staley Creek, near Marion, alt. 2,400 ft. Pond Mt., alt. 3,000 ft. Slopes of White Top, alt. 2,600–5,000 ft. Pine Mt. and Fox Creek Valley, alt. 3,000–4,600 ft.

Arenaria serpyllifolia, L. Roanoke, alt. 1,000 ft. Mouth of Hungry's Mother Creek, alt. 2,075 ft.

Sagina decumbens (L.) Torr. and Gray. Add Wolf, South Fork Holston River, alt. 2,300 ft.

Claytonia Caroliniana, Michx. Summit and slopes of White Top Mt., Washington Co., alt. 4,500–5,678 ft.

Claytonia Virginica, L. Wood about Marion, alt. 2,200 ft.

Ascyrum hypericoides, L. (*A. Crux Andreæ*, L.). Chatham Hill Gap, Walker Mt., alt. 3,000 feet. Skull Gap, Iron Mts., alt. 3,000 ft. Along Middle Fork of the Holston, near Marion, alt. 2,100 ft.

Hypericum Drummondii, Torr. and Gray. South Fork of the Holston River, near Add Wolf, alt. 2,300 ft.

Growing on the sandy banks of the river. Reported hitherto in Gray's Manual from Western Illinois, Iowa, Kansas and southward.

Hypericum graveolens, Buckl. Chestnut Creek, Gossan, alt. 2,300 ft. Summit of White Top Mt., alt. 5,678 ft.

As the exploration of the northern Alleghanies goes on, the range of this rare and interesting plant is being gradually brought out. Up to a few years ago it was known only from the summit of Roan Mt., N. C., and vicinity, at elevations of 6,000 feet or more. In 1891 it was found on the southern slopes of Grandfather Mt., N. C., at 4,200 feet, and a short time after this it was also discovered on Blowing Rock Mt., in the same State, at 4,000 feet.* Although collected at these new localities, it was still con-

* Mem. Torr. Club, iii. 17 and 23.

fined to the mountains of Western North Carolina. On the present expedition special search was made for the plant, and we were rewarded by finding it at the two stations given, thereby bringing it into the range of the Northern flora. The Chestnut Creek locality is especially interesting, as it is nearly 4,000 feet lower than the original and ordinary habitat of this mountain plant.

Hypericum maculatum, Walt. Peak Creek, Peak Mt., alt. 2,200 ft. Reed Creek, at base of lower rocks, alt. 2,000 ft. Round Top Mt., Seven Mile Ford, alt. 3,000 ft. Middle Fork of the Holston, Marion, alt. 2,100 ft. Along Hungry's Mother Creek, alt. 2,200 ft.

Hypericum mutilum, L. Peak Creek, Peak Mt., alt. 2,200 ft. Hogtrough Creek, base of Iron Mts., alt. 2,000 ft.

Hypericum perforatum, L. Broakford, North Fork of the Holston River Valley, alt. 2,200 ft. Peak Creek, Peak Mt., alt. 2,200 ft.

Hypericum prolificum, L. Banks of the Middle Fork of the Holston River, Marion, alt. 2,100 ft. Chilhowie, alt. 2,000 ft. Near Seven Mile Ford, alt. 2,025 ft.

Hypericum virgatum, Lam. Mouth of Brush Creek, New River, alt. 2,200 ft.

Malva moschata, L. Streets of and roadsides near Marion, alt. 2,100 ft.

Malva rotundifolia, L. Streets of Marion, alt. 2,100 ft. Near Bristol, alt. 1,800 ft.

Malva sylvestris, L. Middle Fork of the Holston, six miles west of Marion, alt. 2,050 ft.

Sida spinosa, L. Chilhowie, alt. 2,000 ft. Cumberland Gap, alt. 1,500 ft.

Hibiscus Syriacus, L. Along South Fork of the Holston, at St. Clair's, alt. 2,200 ft.

Tilia heterophylla, Vent. Lynchburg, alt. 500 ft. Marion, alt. 2,100 ft. Reed Creek, base of lower rocks, alt. 2,000 ft. Farmer Mt., New River, alt. 2,200 ft.

Linum striatum, Walter. South Fork of the Holston River, at Add Wolf, alt. 2,300 ft.

Linum Virginianum, L. Lynchburg, alt. 500 ft.

Linum usitatissimum, L. Lynchburg, alt. 500 ft.

Geranium Carolinianum, L. Roanoke, alt. 1,000 ft. Summit of Walker Mt., near Chatham Hill Gap, alt. 3,000 ft. Along Hutton's Branch, alt. 2,300 ft.

Geranium maculatum, L. Marion, alt. 2,100 ft. Pond Mt., alt. 3,000 ft.

Geranium pusillum, L. Laurel Creek, at junction with the North Fork of the Holston River, alt. 2,200 ft. Slopes of White Rock Mt., alt. 3,500 ft.

Abundant on the slopes of the White Rock Mt., and formerly collected only as far south as Pennsylvania.

Oxalis Acetosella, L. Summit of White Top Mt., alt. 5,000–5,678 ft. Slopes and summits of Mt. Rogers and Pine Mt., alt. 4,000–5,719 ft.

Quite abundant on the upper slopes, where in dense shade some plants with deep red-purple flowers were collected.

Oxalis recurva, Ell. Banks of the Holston River, Marion, alt. 2,100 ft. Beaver Creek, near the North Fork of the Holston Valley, alt. 2,800 ft.

Oxalis stricta, L. Lynchburg, alt. 500 ft. Roanoke, alt. 1,000 ft. Sugar Creek, near Marion, alt. 2,200 ft.

About the Falls of the Middle Fork of the Holston, near Marion, alt. 2,050 feet, a very slender, small-leaved plant was collected. The flowers were small and delicate, yellow; the pods short and broad, with prominently recurved, long and slender pedicels. The same form was found before at Roanoke, and in central North Carolina.*

Oxalis violacea, L. Vicinty of Marion, alt. 2,100 ft.

Impatiens aurea, Muhl. Island in the Holston, at Marion, alt. 2,100 ft.

Ilex montana, Torrey and Gray. Eastern slopes of White Top Mt., alt. 4,000 ft. Summit White Rock Mt., alt. 4,400 ft.

Ilex opaca, Ait. Slemp's Creek, alt. 2,600 ft. McGrady's Creek, alt. 2,200 ft.

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* Mem. Torr. Club, iii. 1.

Ilex verticillata (L.) A. Gray. Peak Creek, Peak Mt., alt. 2,200 ft.

Euonymus Americanus, L. Ravine of the Holston, below Marion, alt. 2,000 ft.

Pachystima Canbyi, A. Gray. Reed Creek, base of Lower Rocks, alt. 2,000 ft.

Still growing in seemingly inexhaustible quantities on the shaded mountain side above Reed Creek, northeast of Wytheville, where it was discovered by Mr. Howard Shriver, many years ago. It forms dense mats over the dry soil and rocks on the steep and in some places almost perpendicular slopes.

Euonymus atropurpureus, Jacq. Island in the Holston, near Marion, alt. 2,100 ft.

Celastrus scandens, L. Nick's Creek, on Brushy Mt., alt. 2,800 ft.

Ceanothus Americanus, L. Along Peak Creek on Peak Mt., alt. 2,200 ft. On Round Top, west of Seven Mile Ford, alt. 3,000 ft. On Walker Mt., near Shannon Gap, alt. 2,800 ft.

Vitis æstivalis, Michx. Chatham Hill Gap, Walker Mt., alt. 3,000 ft. Farmer Mt., on New River, alt. 2,200 ft. Common everywhere.

Vitis cordifolia, Michx. Bluffs of the Holston at Marion, alt. 2,100 ft. Near Bristol, alt. 1,000 ft. Spurs of Walker Mt., alt. 2,400 ft.

Vitis Labrusca, L. Rocky bluffs along the Holston River, at Marion, alt. 2,100 ft.

The only station noticed.

Vitis vulpina, L. (*Vitis riparia*, Michx.). Lynchburg, alt. 500 ft.

Æsculus octandra, Marsh. Staley Creek, near Marion, alt. 2,300 ft.

Common in the valleys and on the lower slopes of the mountains.

Acer nigrum, Michx. f. Hungry's Mother Creek, near Marion, alt. 2,500 ft. Limestone bluff of the Holston River, below Marion, alt. 2,050 ft.

The most conspicuous and stately tree of the region, attaining great height and development in the valleys.

Acer Pennsylvanicum, L. Skull Gap, in the Iron Mts., alt. 3,000 ft. Brushy Mt., east of Marion, alt. 3,000 ft. Slopes of White Top Mt., alt. 4,800 ft. Kate's Mt., White Sulphur Springs, W. Va., alt. 3,300 ft.

Acer rubrum, L. Falls of the Middle Fork of the Holston, alt. 2,050 ft.

This species, usually described as a "small tree" reaches a considerable development in the southern Alleghanies. On the mountain sides the trunk commonly measures two to three feet in diameter.

Acer Saccharum, Marsh. Near the summit of White Top Mt., alt. 5,300 ft.

Acer spicatum, Lam. Ravine of the Middle Fork of the Holston, alt. 2,050 ft. Hungry's Mother Creek, near Marion, alt. 2,300 ft.

Negundo Negundo (L.) Karst. Along North Fork of the Holston, near McGrady's Creek, alt. 2,200 ft.

Staphylea trifolia, L. River banks at Marion, alt. 2,100 ft.

Rhus copallina, L. Hogtrough Creek, base of the Iron Mts., alt. 2,600 ft.

Rhus glabra. L. South Fork of the Holston River at St. Clair's Bottom, alt. 2,200 ft.

Rhus radicans, L. Banks of the Holston, Marion, alt. 2,100 ft.

Quite abundant in the immediate vicinity of the town and on some of the surrounding hills, and remarkable for the more or less deeply lobed or broadly crenate leaves.

Baptisia tinctoria (L.) R. Br. Round Top Mt., west of Seven Mile Ford, alt. 3,000 ft. Shannon Gap, Walker Mt., alt. 2,800 ft.

Lupinus perennis, L. Buchanan, Botetourt Co., alt. 1,100 ft. Kate's Mt., W. Va., alt. 3,300 ft.

Not encountered in the mountains or valleys south of Buchanan.

Melilotus alba, L. Lynchburg, alt. 500 ft. In a meadow along the railroad on Peak Mt., alt. 2,200 ft.

Trifolium agrarium, L. Peak Creek on Peak Mt., alt. 2,200 ft.

Trifolium arvense, L. Farmer Mt., New River, alt. 2,200 ft.

Trifolium dubium, Sibth. (*Trifolium procumbens*, L., var. *minus*, Koch.). River banks, Marion, alt. 2,100 ft.

Trifolium hybridum, L. Hungry's Mother Creek, near Marion, alt. 2,500 ft.

Trifolium pratense, L. Hungry's Mother Creek, near Marion, alt. 2,500 ft.

Forma *alba*, Britton. Flowers white. Hungry's Mother Creek, near Marion, alt. 2,300 ft. Hill east of Marion, alt. 2,300 ft.

Trifolium procumbens, L. Hills east of Marion, alt. 2,300 ft. Lyon Gap, Walker Mt., alt. 2,800 ft.

Trifolium repens, L. Reed Creek, at base of Lower Rocks, alt. 2,000 ft. Marion, alt. 2,100 ft.

TRIFOLIUM VIRGINICUM, Small n. sp. Perennial from a large and long root, diffusely branched from the summit of the root; branches 2–4 cm. long, strictly prostrate, pubescent; leaves 3-foliolate, petiole 4–8 cm. long; leaflets linear, linear-lanceolate or oblanceolate, 1–4 cm. long, acute or cuspidate, serrate-dentate, glabrous above, more or less silky beneath, conspicuously veined; sepals ovate, conspicuous; infloresence in terminal, globose heads, about 2.5 cm. in diameter; flowers whitish, more or less crowded on slender pedicels, .2–.4 cm. long, standard emarginate-mucronate, striate; calyx clothed with long silky hairs, the teeth subulate, nearly half the length of the corolla. Pod and seeds not seen. (Plate 75.)

Growing on the rocky slopes of Kate's Mt., Greenbrier Co., West Virginia, in company with *Clematis ovata*.

The most marked new plant collected on the expedition. By its flower most closely related to *T. stoloniferum*, but in all other respects differing from that and the other eastern American species.

Robinia Pseudacacia, L. Vicinity of Marion, alt. 2,100 ft. Summit of Brushy Mt., and along Nick's Creek, alt. 2,500–3,000 ft.

Cracca Virginiana, L. Lynchburg, Co., alt. 500 ft. Shannon Gap, Walker Mt., alt. 2,800 ft. Round Top Mt., west of Seven Mile Ford, alt. 3,000 ft. Pinnacle, alt. 3,500 ft.

Astragalus Carolinianus, L. (*Astragalus Canadensis*, L.). Along Middle Fork of the Holston at Marion, alt. 2,100 ft. Nick's Creek, at base of Pine Glade Mt., alt. 2,500 ft. Brushy Mt., alt. 3,000 ft. Slope and summit of the Iron Mts., at Skull Gap, alt. 2,500–3,500 ft.

Stylosanthes biflora (L.) B.S.P. Near Seven Mile Ford, alt. 2,050 ft. Lyon's Gap, Walker Mt., alt. 2,800 ft. Round Top Mt., west of Seven Mile Ford, alt. 3,000 ft.

Meibomia Dillenii (Darl.) Kuntze. Brushy Mt., alt. 3,000 ft. Immature specimens only.

Meibomia grandiflora (Walter) Kuntze. Nick's Creek, at base of Pine Glade Mt., alt. 2,500 ft.

Meibomia lævigata (Nutt.) Kuntze. Shannon Gap, Walker Mt., alt. 2,800 ft.

Immature specimens only.

Meibomia nudiflora (L.) Kuntze. Nick's Creek, at base of Pine Glade Mt., alt. 2,500 ft.

Meibomia rotundifolia (Michx.) Kuntze. Brushy Mt., alt. 3,000 ft. Growing on the gravelly banks of the road, from long, branching ligneous roots.

Lespedeza hirta (L.) Elliott. Skull Gap, Iron Mts., alt. 2,500–3,500 ft.

Lespedeza intermedia (S. Wats.) Britton. Skull Gap, Iron Mts., alt. 2,500–3,500 ft.

Lespedeza repens (L.) Barton. Lynchburg, alt. 500 ft. Rich Valley and Bradford, alt. 2,200 ft. Shannon Gap, Walker Mt., alt. 2,800 ft.

Lespedeza striata (Thunb.) H. and A. Cumberland Gap, alt. 1,500 ft.

Vicia Americana, Muhl. Summit and slopes of White Rock Mt., alt. 4,000–4,400 ft.

Not collected south of Pennsylvania before.

Vicia Caroliniana, Walt. Staley Creek, near Marion, alt. 2,300 ft. Kate's Mt., White Sulphur Springs, W. Va., alt. 3,000 ft.

Apios Apios (L.) MacM. Along Middle Fork of the Holston River, Marion, alt. 2,100 ft.

Lathyrus venosus, Muhl. Kate's Mt., W. Va., alt. 3,300 ft.

Cassia Marylandica, L. Reed Creek, at base of Lower Rocks, alt. 3,000 ft. St. Clair's Bottom on South Fork of the Holston, alt. 2,000 ft.

Cassia nictitans, L. Pinnacle, alt. 3,500 feet.

Cercis Canadensis, L. Banks of the Holston River at Marion, alt. 2,100 ft.

Prunus Americana, Marsh. Roadsides, west of Marion, alt. 2,000 ft. Saltville, alt. 2,200 ft.

Prunus Pennsylvanica, L. f. Summit of White Top Mt., alt. 5,678 ft. Slopes of White Top Mt., alt. 2,600–5,000 ft. Slopes of the Iron Mts., alt., 2,600–3,500 ft.

Cerasus serotina (Ehrh.) Loisel. River banks, Marion, alt. 2,100 ft. Hungry Hollow, above Marion, 2,400 ft.

Cerasus serotina, var. MONTANA, Small, n. var. A small tree, twenty-five feet tall, and with a trunk diameter of 2–5 dm., well rounded, rather stiff and not lax; bark early developing numerous lenticels; leaves elliptical, oblong-lanceolate or lanceolate, 5–17 cm. long, 2–4.5 cm. broad, very coriaceous, coarsely serrate, the teeth incurved, dark green above, light beneath, rather coarsely veined, glands on the petiole separated from the blade from .2–.5 cm.; inflorescence of short, thick, divergent racemes, not drooping, rather few-flowered, also bearing two to three leaves; flowers quite large; calyx and *filaments* persistent; drupe large (ripe fruit not seen, half-ripe drupes .7 cm. in diameter.)

A very distinct variety of *C. serotina* found only on the "balds," near the summit of White Top Mt. at an altitude of about 5,500 ft. Readily distinguished from the species by the larger, more lanceolate and coriaeous leaves, the shorter, thicker and more divergent racemes and the larger fruit.

Aruncus Aruncus (L.) Karst. (*Spiræa Aruncus*, L.). Peak Creek, Peak Mt., alt. 2,200 ft. Shannon Gap, Walker Mt., alt. 2,800 ft. Hutton's Branch near Marion, alt. 2,300 ft. Hills east of Marion, alt. 2,400 ft.

Spiræa corymbosa, Raf. Near Buchanan, alt. 1,100 ft.

Spiræa tomentosa, L. Peak Creek, on Peak Mt., alt. 2,200 ft.

Opulaster opulifolius (L.) Kuntze. (*Spiræa opulifolia* L.). Banks of the Holston River, Marion, alt. 2,100 ft.

PORTERANTHUS TRIFOLIATUS (L.) Britton.* (*Gillenia trifoliata*, Moench). Chatham Hill Gap, Walker Mt., alt. 3,000 ft. Kate's Mt., W. Va., alt. 3,300 ft. (Plate 76.)

Rubus invisus (Bailey) Britton. (*Rubus villosus*, Ait. var. *humifusus*, Torr. and Gray.) Banks of the Middle Fork of the Holston at and below Marion, alt. 2,100 ft. Chatham Hill Gap, Walker Mt., alt. 3,000 ft. Hillsides around Marion, alt. 2,100–2,500 ft. Staley Creek, near Marion, alt. 2,200 ft. Dickey Creek, along the Iron Mts., Grayson Co., alt. 2,800–3,000 ft.

Rubus Millspaughii, Britton. Above Fox Creek, on Pine Mt., in deep woods, alt. 3,000 ft. Summit and slopes of Mt. Roger's, alt. 4,000–5,719 ft. Summit of White Top Mt., alt. 5,678 ft. Slopes and summit of White Rock Mt., alt. 3,000–4,400 ft.

Rubus occidentalis, L. Walker Mt. road near Hungry's Mother Creek, alt. 2,400 ft. River banks at Marion, alt. 2,100 ft.

Rubus odoratus, L. Chatham Hill Gap, Walker Mt., alt. 3,100 ft. Skull Gap, Iron Mts., alt. 3,000 ft. Pine Mt., alt. 4,600 ft. Reed Creek, base of Lower Rock, alt. 2,000 ft.

Rubus villosus, Ait. Walker Mt. road near Hungry's Mother Creek, alt. 2,400 ft. Open fields near Troutdale at the base of Pine Mt., alt. 2,800 ft.

Rubus villosus, Ait., var. *frondosus*, Torr. Nick's Creek, alt. 2,100 ft. Petals pink.

Rubus villosus, Ait., var. *montanus*, Porter. Chatham Hill Gap, Walker Mt., alt. 2,800 ft.

Growing on the edge of a swamp below the Gap.

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*The generic name *Gillenia*, applied to this plant by Mœnch, in 1802, is a homonym of *Gillena*, Adans., published in 1763, for plants now referred to the genus *Clethra*, L., the two being but different spellings of the same word, and hence is to be rejected. It is with great pleasure that I here associate with these herbs the name of Professor Thomas Conrad Porter, whose important contributions to our knowledge of North American plants have extended over a period of more than fifty years.

The other species of the genus is:

PORTERANTHUS STIPULATUS (Muhl.).

Spiræa stipulata, Muhl.; Willd. Enum. i. 542 (1809). N. L. B. (Plate 77.)

Geum Canadense, Jacq. Slopes of White Rock Mt., alt. 4,000 ft. Mouth of Hungry's Mother Creek and along the Middle Fork of the Holston, alt. 2,100 ft.

Geum Canadense, var. *flavum* (Porter) Britton. Banks of the Holston above Marion, alt. 2,100 ft.

Waldsteinia fragarioides (Michx.) Tratt. Ravine of the Middle Fork of the Holston, below Marion, alt. 2,050 ft.

Fragaria Americana (Porter) Britton. Beaver Creek, alt. 2,500 ft. Growing in a damp, shady ravine with *F. Virginiana*, and both fruiting. The fruit 8–10 mm. long, acute, very sweet and fragrant.

Fragaria Virginiana, Mill. Roanoke, alt. 1,000 ft. Beaver Creek, alt. 2,500 ft. Near Marion, Smyth Co., alt. 2,100 ft. Summit of White Top Mt., alt. 5,678 ft.

The specimens collected in the last locality grew among grasses on the great "balds" along the top of the mountain, and were very small and stunted, only from 4–8 cm. high; in bloom on May 28th.

Potentilla Canadensis, L. Near Staley Knob, Marion, alt. 2,300 ft. Walker Mt. road, woods near Marion, alt. 2.300 ft. Summit of White Top Mt., alt. 5,678 ft. Chatham Hill Gap, Walker Mt., alt. 3,000 ft. Summit of White Rock Mt., alt. 4,400 ft.

Potentilla Norvegica, L. Peak Creek, on Peak Mt., alt. 2,200 ft.

Potentilla tridentata, Sol. Summit of White Top Mt., alt. 5,678 ft. Slopes of the Iron Mts., alt. 3,000 ft.

Agrimonia mollis (Torr. & Gray) Britton. East slopes of White Top Mt., alt. 4,000 ft.

Agrimonia parviflora, Ait. Ravine of the Middle Fork of the Holston River, six miles below Marion, alt. 1,050 ft. On the South Fork of the Holston River, near Add Wolf, alt. 2,300 ft.

Agrimonia striata, Michx. Hills near Marion, alt. 2,100 ft. Along the South Fork of the Holston River, and about Chilhowie, alt. 2,000–2,200. Woods on Fox Creek, base of Pine Mt., alt. 3,000 ft.

Rosa canina, L.? Slopes of Pond Mt., alt. 2,600 ft.

Rosa Carolina, L. Vicinity of Marion, alt. 2,100 ft. New River at mouth of Brush Creek, alt. 2,200 ft.

Rosa humilis, Marsh. Skull Gap, Iron Mts., alt. 2,500 ft. Round Top Mt., Seven Mile Ford, alt. 3,000 ft. New River, at mouth of Brush Creek, alt. 2,200 ft. Rye Valley, alt. 2,400 ft.

Rosa rubiginosa, L. Skull Gap, Iron Mts., alt. 3,000 ft. Reed Creek, at base of Lower Rocks, alt. 2,000 ft.

Sorbus Americana, Marsh. Summit White Top Mt., Washington Co., alt. 5,678 ft. One tree noted was over 30 cm. in diameter.

Pyrus angustifolia, Ait. Headwaters of Comer Creek, Iron Mts., alt. 3,000 ft.

Pyrus arbutifolia (L.) L. f. Peak Creek, Pulaski Co., alt. 2,200 ft.

Pyrus coronaria, L. Along the South Fork of the Holston River, alt. 2,200 ft. Peak Creek, on Peak Mt., alt. 2,200 ft.

Pyrus Ioensis, Bailey ? Peak Creek, on Peak Mt., alt. 2,200 ft.

Pyrus nigra (Marsh.) Sargent. Summit White Rock Mt., alt. 4,410 ft. Staley Creek, near Marion, alt. 2,200 ft.

Cratægus coccinea, L. Staley Creek above Marion. alt. 2,100 ft. Rye Valley, alt. 2,400 ft. Tree 1° in diameter. Saltville, alt. 2,200 ft. Chatham Hill Gap, Walker Mt., alt. 3,000 ft.

Cratægus Crus-galli, L. Along the South Fork of the Holston, alt. 2,200 ft. Along the North Fork of the Holston near Saltville, alt. 2,200 ft. Near Bristol, alt. 1,800 ft. Hungry Hollow near Marion, alt. 2,200 ft.

Cratægus Crus-galli, L. var. *ovalifolia*, Lindley. Along the South Fork of the Holston River, alt. 2,200 ft.

Cratægus glandulosa, Münch. Chatham Hill Gap, Walker Mt., alt. 3,000 ft. Along South Fork of the Holston River, alt. 2,200 ft. Staley Creek above Marion, alt. 2,200 ft. Hills near Buchanan, alt. 1,100 ft. Kate's Mt., W. Va., alt. 3,300 ft.

Cratægus mollis, Schrad. Shannon Gap, Walker Mt., alt. 2,800 ft.

Cratægus punctata, Jacq. Hunger Hollow, near Marion, alt. 2,300 ft. Summit of White Top Mt., alt. 5,678 ft. White Rock Mt., alt. 4,400 ft. Saltville, alt. 2,200 ft. In Rye Valley, alt. 2,300 ft.

Cratægus uniflora, Münch. Near Buchanan, alt. 1,100 ft. Roanoke, alt. 1,000 ft. Along Walker Creek, foot of Walker Mt., alt. 2,500 ft. Bristol, alt. 1,800 ft.

Amelanchier Canadensis (L.) Medic. Kern Valley, alt. 2500 ft. Pond Mt., alt. 3,000 ft. Summit of White Top Mt., alt. 5,678 ft.

Saxifraga Caroliniana, A. Gray. Chloris Boreali Americani, in Mem. Am. Acad. Arts Sci. iii. 39 (1846). Chatham Hill Gap, Walker Mt., alt. 3,000 ft.

This interesting plant was first collected by Dr. Asa Gray on Grandfather Mt., North Carolina, growing with *S. Careyana*, both plants being published under that name in Am. Journ. Sci., xlii. in 1842. Dr. Gray wrote that the difference between the two plants was not detected till they bloomed in Cambridge the following spring, when they displayed characters that remained constant in cultivation.

On Walker Mt. *S. Caroliniana* was growing in great abundance on wet rocks on the north side of the Gap for a space of possibly quarter of a mile along the road. It was 20–40 cm. or more high, the stems glandular pubescent, the leaves all in a rosette at the base, ovate-oblong or round-reniform, 2½–11 cm. or more long, 1½–8 cm. wide, crenately dentate with broad, acute, mucronulate or obtuse teeth, glandular pubescent on the margins, acute, cuneate or deltoid at the base, gradually or abruptly contracted into a margined petiole, mostly about the length of the blade. Panicle diffuse, with a few very narrow, inconspicuous bracts, the white, two-spotted petals longer than the reflexed sepals. Filaments slender, clavate. Follicles ovate, acute, spreading, when mature probably over 6 mm. long.

Engler, in his Monographie der Gattung Saxifraga, p. 137 (1872), accords this species only varietal rank. *S. Careyana* is glabrous, with only faintly spotted petals, spreading sepals and filiform filaments.

Saxifraga Michauxii, Britton.* Summit of White Top Mt., alt. 5,678 ft. White Rock Mt., alt. 4,400 ft.

Growing on the wet cliffs at the summit of the mountain and showing great diversity in the size and shape of the leaves. Some

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* *Saxifraga leucanthemifolia*, Michx., Flor. Bor. Am. i. 268 (1803) not La Peyr.

Hexaphoma petiolaris, Raf. Flor. Tell. 267 (1836) not *S. petiolaris*, R. Br.

plants collected were leafy all the way to the top of the panicles, the leaves being from 5–10 cm. in length.

Saxifraga micranthifolia (Haw.) B.S.P. Staley Creek and Hutton's Branch, near Marion, alt. 2,200–2,300 ft. Along White Top Creek, alt. 2,600 ft. Slopes of Mt. Roger's, alt. 4,000–5,719 ft. Lynchburg, alt. 500 ft.

The plants gathered in the last named locality were growing on dripping rocks on the banks of the James River and were noteworthy on account of the broad, oblong, thick, rather sharply denticulate leaves.

Therofon aconitifolium (Nutt.) Kuntze (*Boykinia aconitifolia*, Nutt.). Comer Creek, Iron Mts., alt. 2,600 ft. Dickey Creek, alt. 2,800 ft. In the last named locality it was quite abundant, growing on rocks in and along the creek.

Tiarella cordifolia, L. Staley Creek near Marion, alt. 2,300 ft. Nick's Creek at the base of Pine Glade Mt., alt. 2,300 ft. Summit of White Top Mt., alt. 5,678 ft.

Mitella diphylla, L. Staley Creek near Marion, alt. 2,400 ft.

Heuchera pubescens, Pursh. Shannon Gap and Lyon Gap, Walker Mt., alt. 2,800 ft. Round Top Mt., west of Seven Mile Ford, alt. 3,000 ft. Roanoke, alt. 1,000 ft.

Heuchera villosa, Michx. Hungry Hollow near Marion, alt. 2,200–2,300 ft. Along Middle Fork of the Holston, near Marion, alt. 2,100 ft. Peak Creek, Peak Mt., alt. 2,200 ft.

Chrysosplenium Americanum, L. Nick's Creek, at base of Pine Glade Mt., alt. 2,500 ft. White Top Mt., alt. 5,678 ft.

Hydrangea arborescens, L. Bristol, alt. 1,800 ft. Along Beaver Creek, alt. 2,600 ft. Slopes of Pond Mt., alt. 2,500 ft. Along Middle Fork of the Holston, below Marion, alt. 2,000 ft. Nick's Creek at the base of Pine Glade Mt., alt. 2,500 ft. Round Top Mt., near Seven Mile Ford, alt. 3,000 ft. Farmer Mt., alt. 2,200 ft. Lynchburg, alt. 500 ft.

Ribes Cynosbati, L. Bluffs of the Middle Ford of the Holston near Marion, alt. 2,100. Slopes of White Top Mt., alt. 2,600–5,000 ft.

Ribes prostratum, L'Her. Pine Mt., alt. 3,000 ft. Mt. Rogers, alt. 5,000 ft. Summit of White Top Mt., alt. 5,678 ft.

Ribes rotundifolium, Michx. Slopes of White Top Mt., alt. 5,000 ft.

Ribes rubrum, L. Fields near Marion, alt. 2,100 feet. Introduced.

Sedum Nevii, A. Gray, Roanoke, alt. 1,000 ft.

Sedum ternatum (Haw.) Michx. Banks of the Holston and Staley Creek, Marion, alt. 2,100–2,300 ft. Buchanan, alt. 1,100 ft. Slopes of Farmer Mt., alt. 2,200 feet.

Hamamelis Virginiana, L. Hills near Marion, alt. 2,200 ft.

Cuphea petiolata (L.) Kœhne. Mouth of Hungry's Mother Creek, alt. 2,075 ft.

Decodon verticillatum (L.) Ell. Wallace Switch, alt. 1,900 ft.

Ludwigia palustris (L.) Ell. Wallace Switch, alt. 1,900 ft.

Œnothera fruticosa, L. Head waters of Comers Creek, Iron Mts., alt. 3,000 ft. Slopes of White Top Mt., alt. 3,000 ft. Trautdale fields, alt. 2,800 ft.

Œnothera glauca, Michx. Lynchburg, alt. 500 ft.

Œnothera linearis, Michx. Fields near Marion, alt. 2,100 ft.

Œnothera pumila, L. Hills east of Marion, alt. 2,300 ft. Lynchburg, alt. 500 ft.

Gaura biennis, L. Wallace Switch, alt. 1,900 ft. Marion, alt. 2,100 ft.

Circæa alpina, L. Nick's Creek, base of Pine Glade Mt., alt. 2,500 ft. Iron Mts., near White Top Creek, alt. 3,000 ft. Pine Mt., alt. 4,600 ft.

Circæa Lutetiana, L. Beaver Creek, at the base of Walker Mt., alt. 2,600 ft. Mouth of Hungry's Mother Creek, alt. 2,075 ft.

Passiflora lutea, L. Banks of the Holston at Marion, alt. 2,100 ft.

Mollugo verticillata, L. Farmer Mt., on New River, alt. 2,200 ft.

Hydrocotyle Americana, L. Base of the Iron Mts., below Skull Gap, alt. 2,200 ft.

Sanicula Canadensis, L. Slopes of White Top Mt., alt. 2,600–5,000 ft. Pinnacle, alt. 2,000 ft. Chilhowie, alt. 2,000 ft. Lynchburg, alt. 500 ft.

Sanicula Marylandica, L. Vicinity of Marion, alt. 2,100 ft.

Cicuta maculata, L. Hutton's Branch, near Marion, alt. 2,200 ft. At St. Clair's Bottom and along the Middle Fork of the Holston River, near Marion, alt. 2,100 ft.

Zizia aurea, Koch. Vicinity of Marion, alt. 2,100 ft. Bear Creek, east of Hungry Hollow, alt. 2,400 ft. Peak Creek, on Peak Mt., alt. 2,200 ft.

Zizia Bebbii (Coult. and Rose) Britton. Chatham Hill Gap, Walker Mt., alt 2,400–3,000 ft. Kate's Mt., W. Va., alt. 3,300 ft.

Zizia cordata (Walt.) Koch. Pond Mt., alt. 3,000 ft.

Sium cicutæfolium, Gmelin. River banks, Marion, alt. 2,100 ft.

Pimpinella integerrima (L.) Benth. and Hook. Chatham Hill Gap, Walker Mt., alt. 3,000 ft.

Deeringia Canadensis (L.) Kuntze (*Cryptotænia Canadensis*, D. C.). River banks, Marion, alt. 2,100 ft. Summit of Walker Mt., alt. 3,400 ft.

Osmorhiza Claytoni (Michx.) B. S. P. White Rock Mt. alt. 4,400 ft. Chatham Hill Gap, Walker Mt., alt. 3,000 ft.

Osmorhiza longistylis (Torr.) D. C. Roanoke, alt. 1,000 ft. Vicinity of Marion, alt. 2,100 ft.

Fœniculnm Fœniculum (L.) Karst. (*Fœniculum vulgare*, Gaertn.) Along Middle Fork of the Holston River west of Marion, alt. 2,050 ft.

Ligusticum Canadensis (L.) Vail. (*Ligusticum actæifolium*, Michx.) Shannon Gap, Walker Mt., alt. 3,000 ft. Nick's Creek, at base of Pine Glade Mt., alt. 2,500 ft. Peak Creek, on Peak Mt., alt. 2,200 ft.

Thaspium barbinode (Michx.) Nutt. Vicinity of Marion, alt. 2,100 ft. Slopes of White Top Mt., alt. 2,600–5,000 ft. Near Bristol, alt. 1,000 ft. Farmer Mt., on New River, alt. 2,200 ft. Lynchburg, alt. 500 ft.

Angelica villosa (Walt.) B.S.P. Chatham Hill Gap, Walker Mt., alt. 3,000 ft. Slemp Creek, alt. 2,800 ft. Peak Creek, Peak Mt., alt. 2,200 ft. Pinnacle, alt. 3,500 ft.

Daucus Carota, L. Marion, alt. 2,100 ft.

Aralia nudicaulis, L. Summit of Pond Mt., east of Marion, alt. 3,300 ft.

Aralia racemosa, L. Along the upper part of Nick's Creek, on the slopes of Pine Glade Mt., alt. 2,600 ft.

Panax quinquefolia, L. (*Aralia quinquefolia*, Decne. and Planch.) Only one specimen of this species was collected and it was found under a damp, overhanging cliff near the falls of the Holston River, alt. 2,050 ft.

Cornus alternifolia, L. f. Bluffs of the Holston River at Marion, alt. 2,100 ft. Along Bear Creek, alt. 2,400 ft.

Cornus florida, L. Along Staley Creek, east of Marion, alt. 2,200 ft. Northeast slope of White Top Mt,, alt. 4,000 ft. Chestnut Ridge, alt. 3,500 ft. Walker Mt., at Lyon's Gap, alt. 2,800 ft. Along Peak Creek on Peak Mt., alt. 2,200 ft. Kate's Mt., W. Va., alt. 3,300 ft.

On the hills along Staley Creek, near Marion, a decidedly pinkish-flowered form was noticed.

Cornus sericea, L. Along the South Fork of the Holston River near Add Wolf, alt. 2,200 ft. Rocky banks of the Middle Fork of the Holston River, near Marion, alt. 2,100 ft. Sandy shore of New River at foot of Farmer Mt., alt. 2,200 ft.

Nyssa aquatica, L. Lynchburg, alt. 500 ft. River banks and hills near Marion, alt. 2,100–2,500 ft. Chatham Hill Gap, Walker Mt., alt. 3,000 ft.

In the higher altitudes the larger and older trees were very remarkable for the heavy, thick, almost corky bark, splitting into more or less regular, hexagonal sections. Near Marion some specimens were collected that had decidedly lobed leaves.

Sambucus Canadensis, L. Cliffs of Farmer Mt. along the New River, alt. 2,200 ft. About Lynchburg, alt. 500 ft. Fall of the Holston River, alt. 2,050 ft.

The specimens from the last cited locality are noteworthy on account of pubescence on the under surface of the leaves. A minute and inconspicuous pubescence often occurs in this species, but on the specimens here noted it has developed into conspicuous and rather stiff silky hairs.

Sambucus pubens, Michx. Western slope of Mt. Rogers, alt. 4,600 ft. On the Iron Mts., at Skull Gap, alt. 3,500 ft.

Viburnum acerifolium, L. On slope of Pine Glade Mt. near Nick's Creek, alt. 2,600 ft. On a spur of Pine Mt. alt. 4,000 ft. Falls of the Holston River, alt. 2,050 ft. On the Iron Mts., along Comer Creek, alt. 3,000 ft.

Viburnum cassinoides, L. Banks of Peak Creek, on Peak Mt., alt. 2,200 ft. Summit of White Rock Mt. alt. 4,400 ft. Rye Valley, alt. 2,300 ft.

Credited as growing only as far south as New Jersey. After two years exploration in the mountains of North Carolina and Virginia, it can be safely asserted that there it is the prevailing viburnum and grows with equal vigor on exposed mountain tops and in sheltered valleys. The species reaches greater development in the Southern Alleghenies than it does in the North.*

Viburnum dentatum, L. Along Peak Creek on Peak Mt. alt. 2,200 ft.

The specimens from this locality are a little more pubescent than usual, but are clearly the species to which they have been referred.

VIBURNUM FERRUGINEUM (T. & G.) Small.

V. prunifolium, L. var. *ferrugineum*, T. & G. A small tree twenty feet high. Leaves elliptical-ovate to elliptical-obovate, two to three and one-half inches long, often coriaceous when young, finely and sharply serrate petioled; petiole winged; wings of the petiole above and beneath, ribs and veins beneath and the mid-rib above ferruginous-tomentose; cymes compound, large, sessile or sometimes peduncled; rays four, rarely three or five; flowers large, three to three and one-half lines across; drupe large, five to seven lines long, broadly ovoid, covered with a bloom, seed nearly orbicular. (Plate 78.)

Along a stream on the southern cliffs of the Pinnacle near Cumberland Gap, Lee Co., alt. 2,500 ft. We also have specimens from Milledgeville, Georgia (Boykin, No. 2), in oak-wood, near Tallahassee, Florida (Rugel), Alabama (Buckley), Bayou Fasilier, Opelousas, Louisiana (Carpenter, No. 21), and Fredericksburg, Texas (Thurber, No. 83).

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* Mem. Torr. Club, iii. 6, 27.

Viburnum alnifolium, Marsh. (*Viburnum lantanoides*, Michx.). Pine Mt., alt. 4,600 ft. Slopes and summit of White Top Mt., alt. from 4,800 to 5,678 ft. Along White Top Creek, between White Top and the Iron Mts., alt. 2,600 ft.

The specimens collected at the last locality are remarkable for the size of the cymes, some of which measured more than eight inches across, and although growing in the damp shade of an original forest where the sun seldom penetrates, the drupes were fully ripe, while the fruit of bushes two thousand feet higher on the mountain side had not yet begun to change color or ripen, notwithstanding that they grew in more open places. This observation serves to show how great an effect altitude has on a plant, even when strong influences are present to counteract it. In the valley the shrub reached a height of 5 m.

Viburnum prunifolium, L. On the South Fork of the Holston River, near St. Clair's Bottom, alt. 2,200 ft. Ledges of the Holston River, opposite Marion, alt. 2,100 ft.

Triosteum perfoliatum, L. Southern slope of White Rock Mt., alt. 3,800 ft. Rocky banks of the Middle Fork of the Holston River, alt. 2,100 ft.

Symphoricarpos racemosus, Michx. Rocky banks of the Middle Fork of the Holston River, at the mouth of Hungry's Mother Creek, alt. 2,075 ft.

Hitherto Pennsylvania has been given as the southern limit of the range of this species. It will now have to be extended to Southwestern Virginia, as it occurs plentifully at the above cited locality. There is, also, a specimen in the Columbia College Herbarium, collected by Short in Kentucky.

Symphoricarpos Symphoricarpus (L). MacM. (*Symphoricarpos vulgaris*, Michx.). Banks of the Holston River at Marion, alt. 2,100 ft.

The note on the preceding species applies as well to this one. It is not rare in the mountains of North Carolina.*

Lonicera dioica, L. (*Lonicera glauca*, Hill.) Cliffs north of Bristol, alt. 1,800 ft.

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* Mem. Torr. Club, iii. 18, 27.

Evidently not collected in this region before, but found previously in the mountains of North Carolina.*

Lonicera Japonica, Thunb. Roadsides north of Abingdon, alt. 1,950 ft. On limestone ledges of Middle Fork of the Holston River, one mile south of Marion, alt. 2,100 ft.

The range of this much neglected species now extends from New York to North Carolina and across the mountains into West Virginia. It has probably escaped from cultivation and become naturalized in many parts of New England and the territory west of the mountains, but at present we have no record as to its occurrence there.

Diervilla Diervilla (L.) MacM. (*Diervilla trifida*, Mœnch.) Summit of White Rock Mt., alt. 4,400 ft.

It may be of interest to note that the only locality at which this species, usually common in the mountains, was observed during the journey was on the very summit of the white sandstone cliffs that crown the top of the White Rock Mt.

Cephalanthus occidentalis, L. Rocky banks of the New River at the base of Farmer Mt., alt. 2,100 ft. Near Lynchburg, alt. 500 ft.

Houstonia cærulea, L. Lynchburg, alt. 500 ft.

Not noticed in the mountains. The closely related species *H. serpyllifolia* seems to replace it throughout the upper slopes.

Houstonia serpyllifolia, Michx. Banks of Staley Creek near Marion, alt. 2,100 ft. Slopes and summit of White Top Mt., alt. 2,600–5,078 ft.

Houstonia purpurea, L. Southern slope of White Rock Mt., alt. 3,800 ft. On Pine Mt., alt. 3,500 ft. Near Marion, alt. 2,100 ft. Although observed at a number of localities this species is not by any means as plentiful, nor as widely distributed as it is in similar situations in the mountains of North Carolina.

Houstonia purpurea, L., var. PUBESCENS, Britton, n. var.

Erect, slender, densely pubescent, 6′–10′ high. Leaves ovate or lanceolate. On dry wooded hills west of Lynchburg, Campbell Co., alt. 600 ft. This may be *H. pubescens*, Raf. Med. Rep., 1808?

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* Mem. Torr. Bot. Club, iii. 6.

Houstonia tenuifolia, Nutt. Cliffs of Farmer Mt. along the New River, alt. 2,200 ft. Along Peak Creek, on Peak Mt., alt. 2,200 ft. In sandy soil on the western slope of the Pinnacle near Cumberland Gap, alt. 3,000 ft.

Mitchella repens, L. Pine Mt., alt. 4,500 ft. Summit of the Iron Mts., alt. 3,400 ft. Banks of White Top Creek, alt. 2,600 ft. Slemp Creek, alt. 3,800 ft.

Showing great variation in the flowers, which were 3–6 merous, those with included stamens having apparently a longer tube than those with exerted stamens, and all variations were found on the same plant. At Green Cove P. O., Grayson Co., dry plants of *Mitchella* were sold under the name of "Squaw Root" for medicinal purposes.

Diodia teres, Walt. On the South Fork of the Holston River, near Add Wolf, alt. 2,300 ft. Sandy barrens below Abingdon, alt. 1,900 ft. Near Cumberland Gap, alt. 1,500 ft.

Galium Aparine, L. Banks of the Holston River near Marion, alt. 2,100 ft.

Galium Anglicum, L. Along road in the valley of the North Fork of the Holston River near Broad Ford, alt. 2,200 ft. About Lynchburg, alt. 500 ft., where it was thoroughly established.

Galium circæzans, Michx. On the Island, near Marion, alt. 2,100 ft. On Walker Mt., near Chatham Hill Gap, alt. 3,000 ft. Slopes of Round Top Mt. west of Seven-mile Ford, alt. 2,800 ft. Woods about Lynchburg, alt. 500 ft.

Galium latifolium, Michx. Slopes of Pine Glade Mt., along Nick's Creek, alt. 2,600 ft. Southern slope of White Rock Mt., alt. 4,000 ft. Cliffs of Farmer Mt., along the New River, alt. 2,200 ft. Iron Mts., about Skull Gap, alt. 3,000 ft.

Galium latifolium, Michx., var. HISPIDUM, Small, n. var.

Plants forming dense tufts, strongly branching from the roots, a little more than 30 cm. tall. Stems densely hispid. Leaves lanceolate, rather broadly lanceolate pubescent on both sides with hispid hairs.

On spurs of the Iron Mts., along Hog-trough Creek, alt. 2,600 ft.

Galium lanceolatum, Torr. Western slope of Mt. Rogers, alt. 4,600 ft. White Top Mt., alt. 4,000 ft. Walker Mt., about Chatham Hill Gap, alt. 3,000 ft. Banks of Nick's Creek, alt. 2,500 ft.

According to Gray's Manual this species is said to occur in "dry woods, New England to North Michigan and Minnesota." The plant is not rare in New York, New Jersey, Eastern and Western Pennsylvania, and southward in the mountains of Virginia.

Galium tinctorium, L. In damp places in the valley between White Top and the Iron Mts., alt. 2,800 ft.

Galium pilosum, Ait. On Peak Mt., along Peak Creek, alt. 2,200 ft. About mouth of Brush Creek on the banks of the New River, alt. 2,200 ft.

Galium pilosum, Ait. var. *puncticulosum* (Michx.) Torr. and Gray. Near Lynchburg, alt. 500 ft.

Galium triflorum, Michx. Rocky banks of the Middle Fork of the Holston River near Marion, alt. 2,100 ft. Iron Mts., alt. 3,000 ft.

Dipsacus sylvestris, Mill. Plentiful along the main roads in the valleys of the Three Forks of the Holston River.

Vernonia Noveboracensis (L.) Willd. Along the South Fork of the Holston River, above Add Wolf, alt. 2,300 ft.

Eupatorium sessilifolium, L. Banks of Middle Fork of the Holston River near Marion, alt. 2,100 ft.

Eupatorium album, L. Western slope of the Pinnacle, near Cumberland Gap, alt. 3,000 ft.

It was interesting and noteworthy to find this species of *Eupatorium*, which is almost wholly restricted to the sea coast, growing high up on a dry mountain side. However, this is only one instance of a number of other cases of coast species occurring through the Southern mountains, especially at high altitudes. Prof. Scribner has detected this species in the mountains about White Cliff Springs, in Southeastern Tennessee, which locality is several hundred miles south of the Cumberland Gap, and the plant doubtless occurs at intermediate stations.

Eupatorium perfoliatum, L. Wet places on the island near Marion, alt. 2,100 ft.

Eupatorium purpureum, L. Along Nick's Creek, alt. 2,500 ft.

Eupatorium rotundifolium, L., var. *pubescens* (Muhl.), B. S. P. Western slope of the Pinnacle near Cumberland Gap, alt. 3,000 ft.

Quite an extension of the range of this plant to the west, as it has formerly been recorded as growing near the coast.

Laciniaria graminifolia (Pursh.) Kuntze. (*Liatris graminifolia*, Pursh.) On the slopes and summit of the Iron Mts., about Skull Gap, alt. from 2,500–3,400 ft. Banks of Dickey Creek, alt. 2,800 ft. Along Comer Creek in the Iron Mts., alt. 2,600 ft.

Laciniaria scariosa (L.) Hill, var. *squarrulosa* (Michx.), (*Liatris squarrulosa*, Michx. Fl. Bor. Am. ii. 92 (1803).). Slope of the Iron Mts., near Dickey Creek, alt. 2,800 ft. Western slope of the Pinnacle, near Cumberland Gap, alt. 3,000 ft. White Sulphur Springs, West Virginia, alt. 3,300 ft. (A. Brown). Probably a good species.

Chrysopsis graminifolia, Nutt. Sandy places on the western slope of the Pinnacle, near Cumberland Gap, alt. 3,000 ft.

Chrysopsis Mariana (L). Nutt. Banks of the South Fork of the Holston River above Add Wolf, alt. 2,300 ft.

The discovery of these species of *Chrysopsis* gives us two more additions to the mountain flora. The first species occurs in the western slope of the Blue Ridge and the latter on the western slope of the Cumberland Mountains.

C. graminifolia also occurs on the dry eastern slopes of the Blue Ridge in North Carolina.

Solidago Boottii, Hook. Slopes and summit of the Iron Mts. at Skull Gap, alt. 2,500–3,500 ft. Banks of Dickey Creek, east of the Iron Mts., alt. 2,800 ft.

Solidago bicolor, L. Eastern slope of the Iron Mts., alt. 2,800 ft.

Solidago cæsia, L. On Pinnacle, near Cumberland Gap, alt. 3,000 ft.

Solidago Canadensis, L. About Marion, alt. 2,100 ft.

Solidago monticola, T. and G. Slopes and summit of the Iron Mts., alt. 2,900–3,500 ft. Eastern slope of White Top Mt., alt. 4,600 ft.

Solidago serotina, Ait. Along Hog-trough Creek, alt. 2,600 ft.

Solidago ulmifolia, Muhl. Limestone ledges of Middle Fork Holston River, near Marion, alt. 2,100 ft.

Sericocarpus asteroides (L.) B. S. P. Slopes and summit of the Iron Mts., at Skull Gap, alt. 2,600–3,500 ft. Cliffs of Farmer Mt. along the New River, alt. 2,200 ft. Western slope of the Pinnacle, near Cumberland Gap, alt. 3,000 ft. Vicinity of Lynchburg, alt. 500 ft. Mts. about White Sulphur Springs, Greenbrier Co., W. Va., alt. 3,000 ft. (A. Brown).

Sericocarpus linifolius (L.) B. S. P. Appomattox, alt. 800 ft.

Aster infirmis, Michx. Slope of Pine Glade Mt., near Nick's Creek, alt. 2,600 ft. Slopes and summit of the Iron Mts., alt. 2,600–3,500 ft.

Aster undulatus, L. On the Pinnacle, near Cumberland Gap, alt. 3,000 ft. Along Dickey Creek, alt. 2,000 ft.

Aster macrophyllus, L. Marion, alt. 2,100 ft. Along Nick's Creek, alt. 2,500 ft.

Erigeron annuus (L.) Pers. Banks of Nick's Creek, alt. 2,500 ft. Vicinity of Marion, alt. 2,100 ft.

Erigeron pulchellus, Michx. (*E. bellidifolius*, Muhl.) Mountains east of Buchanan, Botetourt Co., alt. 1,100 ft. On the Iron Mts., alt. 3,000 ft. Vicinity of Marion, alt. 2,100 ft.

Erigeron Philadelphicus, L. Along the South Fork Holston River, near Add Wolf, alt. 2,200 ft.

Erigeron ramosus (Walt.) B. S. P. Vicinity of Marion, alt. 2,100 ft. On Brushy Mt., alt. 2,800 ft. Along Nick's Creek, alt. 2,600 ft.

Antennaria plantaginifolia (L.) Hook. Summit of White Top Mt., alt. 5,678 ft. Summit of Pond Mt., east of Marion, alt. 3,400 ft.

Gnaphalium obtusifolium, L. Eastern slope of the Iron Mt., about Skull Gap, alt. 3.000 ft.

Gnaphalium purpureum, L. Eastern slope of White Rock, Mt., alt. 4,000 ft. Along Sugar Creek, alt. 2,400 ft. About Lynchburg, alt. 500 ft.

Polymnia Canadensis, L. Slope of Farmer, Mt., along the New River, alt. 2,200 ft.

Polymnia Canadensis, L., var. *radiata*, A. Gray. In a rocky rivulet on the Southern cliffs of the Pinnacle, near Cumberland Gap, alt. 2,550 ft.

Polymnia Uvedalia, L. Woods near the South Fork Holston River, alt. 2,200 ft. Banks of the Middle Fork Holston River at Marion, alt. 2,100 ft.

Silphium trifoliatum, L. Valley of the Middle Fork Holston River below Marion, alt. 2,100 ft. White Sulphur Springs, W. Va., alt., 3,000 ft. (A. Brown).

Ambrosia artemisiæfolia, L. Shore of Middle Fork Holston River, Marion alt. 2,100 ft.

Parthenium integrifolium, L. About Lynchburg, alt. 500 ft.

Xanthium spinosum, L. Along McGrady's Creek, foot of White Rock Mt., alt. 2.200 ft. Vicinity of Wytheville, alt. 2000 ft. Along the South Fork Holston River near Add Wolf, alt. 2,200 ft.

Heleopsis helianthoides (L.) B. S. P. Banks of the Middle Fork Holston River at Marion, alt. 2,100 ft. Along Nick's Creek, alt. 2,600 ft. On the Iron Mts., by Hog-trough Creek, alt. 2,600 ft. On Chestnut Creek, near Gossan, alt. 2,300 ft.

Rudbeckia laciniata, L. Along Hog-trough Creek, alt. 2,600 ft.

Rudbeckia triloba, L. Slope of White Rock Mt., alt. 3,800 ft. Vicinity of Cumberland Gap, alt. 1,500 ft.

√ RUDBECKIA BRITTONII, Small, n. sp. Perennial, stout, hispid. Stem erect 5–7 dm. tall, simple, channeled, very hispid, leafy throughout or naked above; radical leaves ovate or ovate-lanceolate, about 1 dm. long, obtuse, on petioles 4–8 cm. long, petioles somewhat clasping, upper leaves obovate, on broadly winged petioles, inclined to be one-lobed, uppermost leaves ovate or ovate-lanceolate, sessile, cordate, all of much the same size, distantly serrate-crenulate, strigose on both surfaces; involucre foliaceous, bracts oblong, 2–3 cm. long; head 1.3 cm. high; rays yellow, twelve, 2.5–3.5 cm. long, two-cleft at the apex; outer chaff oblanceolate, inner almost linear, acute, purple tipped and fringed with jointed hairs, style-tips slender, acute. (Plate 79.)

A very distinct species related to *Rudbeckia hirta* by its acute style-tips, but in appearance somewhat resembling large forms of *R. spathulata*, which however has obtuse style-tips.

Collected in thickets on the rather dry, southern slopes of White Rock Mountain, at altitude ranging from 3,800–4,000 ft.

Helianthus divaricatus, L. Summit of Brushy Mt., alt. 3,000 ft. Western slope of the Pinnacle near Cumberland Gap, alt. 3,200 ft.

Helianthus parviflorus, Bernh. Slope of Pine Glade Mt., along Nick's Creek, alt. 2,500 ft. On the Pinnacle near Cumberland Gap, alt. 3,000 ft. Slopes of the Iron Mts., along Comer Creek, alt. 3,000 ft. Along the Middle Fork Holston River at Marion, alt. 2,100 ft.

Extremely variable as to the size of the flowers and leaves, as well as in its manner of branching, and is the prevailing species of the southern Alleghanies.

Actinomeris alternifolia (L.) D. C. Sandy shore of the Middle Fork Holston River at Marion, alt. 2,150 ft. Above Wallace Switch, alt. 1,900 ft.

Coreopsis major, Walt., var. *Oemleri* (Ell.) Britton (*C. Oemleri*, Ell.) Round Top Mt., near Seven-mile Ford, alt. 3,000 ft. On Farmer Mt., along the New River, alt. 2,200 ft. Along Nick's Creek, alt. 2,300 ft. Vicinity of Marion, alt. 2,100 ft.

Coreopsis verticillata, L. Near Lynchburg, alt. 500 ft.

Bidens bipinnata, L. Rocky shore of Middle Fork Holston River near Marion, alt. 2,100 ft.

Galinsoga parviflora, Cav. Streets and waste places about Marion, alt. 2,100 ft.

Helenium autumnale, L. Along Hog-trough Creek, in slopes of the Iron Mts., alt. 2,600 ft.

Achillea Millefolium, L. At different points along Hungry's Mother Creek, alt. 2,200 ft. On Walker Mt., at Lyon's Gap, alt. 2,800 ft.

Anthemis Cotula, L. Vicinity of Marion, alt. 2,100 ft. Near Lynchburg, alt. 500 ft.

Chrysanthemum Leucanthemum, L. Along Hungry's Mother Creek, alt., 2,100 ft.

Cacalia atriplicifolia, L. Along Peak Creek, on Peak Mt., alt. 2,200 ft.

Cacalia reniformis, Muhl. On the eastern slope of White Top Mt., ranging from 3,000–5,000 ft.

Erechthites hieracifolia (L.) Raf. Along Nick's Creek, alt. 2,500 ft.

Senecio aureus, L. Swamps on Walker Mt., near Chatham Hill Gap, alt. 3,000 ft. Wet places along Bear Creek, alt. 2,400 ft. Swamp north of Bristol, alt. 1,800 ft.

Senecio obovatus, Muhl. Along East Fork Walker Creek, alt. 2,250 ft. Dry banks in Hungry Hollow, alt. 2,200 ft. On Staley's Knob, near Marion, alt. 2,400 ft. Roanoke, alt. 1,000 ft. Limestone ledges of the Holston River, near Marion, alt. 2,100 ft. Including *S. Elliottii*, T. & G., a southern form with thicker and almost orbicular root leaves, found at the last quoted station.

√ SENECIO SMALLII, Britton (*S. aureus* var. *angustifolius*, Britton, Mem. Torr. Club, ii. 39). Near Hutton's Branch, alt. 2,300 ft. Northeast slope of White Top Mt., alt. 4,600 ft. Along Staley Creek, near Marion, alt. 2,200 ft. On a spur of Pine Mt., alt. 4,000 ft. Vicinity of Lynchburg, alt. 500 ft.

Arctium minus, L. Banks of Peak Creek, on Peak Mt., alt. 2,200 ft. Vicinity of Cumberland Gap, alt. 1,500 ft. The flowers of the specimens from Cumberland Gap were almost white.

Carduus altissimus, L. Along Hog-trough Creek, near the base of the Iron Mts., alt. 2,600 ft.

Carduus lanceolatus, L. Grassy meadow near summit of White Top Mt., alt. 5,500 ft. Along Hog-trough Creek, alt. 2,600 ft. Banks of the Middle Fork Holston River, near Marion, alt. 2,100 ft. Skull Gap in the Iron Mts., alt. 3,400 ft.

Plants from the last two cited localities seem to vary from the type. The plant is more slender, the leaves less divided and the flowers smaller. This form was collected in 1889 about Long Pond in the mountains of Luzerne county, Pennsylvania, by Small & Heller.

Adopogon Virginicum (L.) Kuntze (*Krigia amplexicaulis* Nutt). Southern slope of White Rock Mt., alt. 3,800 ft.

Adopogon Carolinianum (Walt.) Britton (*Krigia Virginica*, Willd.). Vicinity of Lynchburg, alt. 500 ft.

Hieracium Marianum, Willd. Ledges of Farmer Mt., along the New River, alt. 2,300 ft.

Hieracium paniculatum, L. Eastern slope of White Top Mt., alt. 4,000 ft.

Hieracium venosum, L. Brushy Mt., alt. 2,800 ft. About Lynchburg, alt. 500 ft.

Prenanthes Serpentaria, Pursh. Slopes and summit of the Iron Mts., about Skull Gap, alt. 2,500–3,400 ft. Slopes of White Top Mt., 3,000 ft.

Taraxacum Taraxacum (L.) Karst. Eastern slope of White Top Mt., alt. 5,000 ft. Pond Mt., east of Marion, alt. 3,000 ft.

Lactuca Canadensis, L. Along Peak Creek, on Peak Mt., alt. 2,200 feet. Nick's Creek, alt. 2,500 feet. Banks of the New River, above Ivanhoe, alt. 2,200 ft.

Sonchus asper (L.) Willd. Near Saltville, the the North Fork Holston River, alt. 2,200 ft. Marion, on the Middle Fork Holston River, alt., 2,100 ft.

Tragopogon porrifolius, L. Old fields about Marion, alt. 2,100 ft.

Lobelia inflata, L. Along Middle Fork Holston River, near Marion, alt. 2,100 ft. Below Chilhowie, alt. 2,000 ft. Banks of Hog-trough Creek, alt. 2,600 ft.

Lobelia cardinalis, L. Swamp near Nick's Creek, alt. 2,500 ft.

Lobelia syphilitica, L. Along Hog-trough Creek, on the Iron Mts., alt. 2,600 ft.

Lobelia spicata, Lam. Barrens below Abingdon, alt. 1,900 ft. Near Lynchburg, alt. 500 ft.

Specularia perfoliata, (L.) A. D. C. Banks of the Middle Fork Holston River at Marion, alt. 2,100 ft. Southern slope of White Rock, Mt., alt. 3,500 ft.

Campanula Americana, L. Bluffs of the Middle Fork Holston River near Marion, alt. 2,150 ft. Woods below Chilhowie, alt. 2,000 ft. On the Pinnacle near Cumberland Gap, alt. 2,500 ft. Ravine along Reed Creek, near Wytheville, alt. 2.000 ft.

Campanula divaricata, Michx. Cliffs along Dicky Creek, alt. 2,600 ft. Summits of the Iron Mts., from 2,500 to 3,500 ft. On Brushy Mt., northeast of Marion, alt. 2,800 ft. Rocky banks along Hog-trough Creek, alt. 2,600 ft.

Gaylussacia resinosa (Ait.) T. & G. Summit of Pond Mt., east of Marion, alt. 3,400 ft. Chatham Hill Gap, Walker Mt., alt. 3,000 ft. Lynchburg, alt. 500 ft.

Vaccinium Canadense, Kalm. Mountain sides along Peak Creek, alt. 2,200 ft.

The discovery of *Vaccinium Canadense* at this station extends its range a considerable distance southward. Heretofore its southern limit was thought to be Northern Pennsylvania. Pulaski County is so near the North Carolina boundary that we suspect this *Vaccinium* may occur there and will possibly be found in the higher mountains of the northwestern corner of the State.

The specimens collected in Virginia are not exactly like the ordinary plant, but are glandular, instead of being simply pubescent.

Vaccinium erythrocarpon, Michx. Brushy Mt., alt. 3,100 ft. Summit of White Top Mt., alt. 5,678 ft.

Vaccinium pallidum, Ait. Summit of White Top Mt., alt. 5,678 ft. Northeastern slope of White Top Mt., 3,500 ft. On a spur of Pine Mt., alt. 4,000 ft.

An excellent species of blueberry from both a botanical and epicurean point of view. The prevailing *Vaccinium* in the southern Alleghanies at elevations above 4,000 ft.

Often many square miles of the southern slopes of the higher mountain peaks in North Carolina, and the surrounding territory are covered with this species which grows to a height of four to six feet and bears great quantities of fruit of an extraordinary size and a particularly fine flavor.

Vaccinium stamineum, L. Brushy Mt., alt. 2,800 ft. Walker Mt., Chatham Hill Gap, alt. 2,500–3,500 ft. Buchanan, alt. 1,100 ft.

Vaccinium vacillans, Soland. Along Peak Creek, on Peak Mt., alt. 2,200 ft. Brushy Mt., East of Marion, alt. 3,100 ft. Nick's Creek, east of Marion, alt. 2,600 ft.

Gaultheria procumbens, L. Nick's Creek, east of Marion, alt. 2,600 ft. Peak Creek, on Peak Mt., alt. 2,200 ft.

XOLISMA LIGUSTRINA (L.) Britton.*

(*Andromeda ligustrina* Muhl.; *Vaccium ligustrinum* (L.) *Lyonia ligustrina*, D. C. Peak Creek, on Peak Mt., alt. 2,200 ft. Dickey Creek at the base of the Iron Mts., alt. 2,700 ft. Summit of White Rock Mt., alt. 4,400 ft.

Pieris floribunda (Pursh) Benth. & Hook, (*Andromeda floribunda*, Pursh.) Peak Creek, on Peak Mt., alt. 2,200 ft.

Contrary to the usual habit of this *Andromeda*, it was growing abundantly on a very dry and sunny mountain side.

Leucothoë recurva (Buckl.) A. Gray. Pond Mt., alt. 3,000 ft. Along Nick's Creek, alt. 2,500 ft. Banks of Peak Creek, on Peak Mt., alt. 2,200 ft. Northern slope of White Top Mt., alt. 3,000 ft.

Oxydendrum arboreum (L.) D. C. Lynchburg, alt. 500 ft. Near Wallace Switch, alt. 1,900 ft. Walker Mt., alt. 3,000–3,500 ft. Skull Gap, Iron Mts., alt. 3,000–3.500 ft.

Epigæa repens, L. Summit of White Top Mt., alt. 5,678 ft. Pond Mt., east of Marion, alt. 3,000 ft. Walker Mt., Chatham Hill Gap, alt. 3,000 ft. Staley Creek, alt. 2,100 ft.

The "trailing arbutus," one of our early spring flowers in the North, was still in bloom as late as May 29th, on the bleak summit of White Top.

Kalmia latifolia, L. Lynchburg, alt. 500 ft. Bear Creek, near foot of Walker Mt., alt. 2,400 ft. Summit of White Rock Mt., alt. 4,400 ft. Along Peak Creek, on Peak Mt., alt. 2,200 ft.

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*I am of the opinion that the treatment of the groups included by Asa Gray in *Andromeda*, is not as satisfactory as that of Bentham and Hooker, where *Andromeda* is restricted to *A. Polifolia*, L., and *Lyonia*, Nutt, *Pieris*, Don and *Zenobia* Don recognized as genera. In Amer. Month. Mag. iv. 193 (1819) Rafinesque suggests the name *Xolisma* for the *Lyonia*, Nutt., a homonym of his own *Lyonia* of 1808, but he neither defines it nor cites species. In order to maintain this name, I here cite the synonyms of this species. N. L. B.

Measurements of one *Kalmia* tree were taken near Green Cove at the base of White Top Mt., with the following results:

Circumference of trunk 6 in. from the ground,	. . . . . .	7 ft. 2 in.
" " 1 ft. " "	. . . . . .	4 " 3 "
" " 3 " " "	. . . .	3 " 6 "

Height twenty-five feet.

An apparently distinct form was collected on Peak Mt. It is smaller throughout, the leaves narrower and more acuminate at both ends. The same was found in 1891 on Blowing Rock Mt., North Carolinia, by Small and Heller, at an altitude of 4,200 ft. We have not seen this form in flower. It may be interesting to record that the stumps and roots of *Kalmia* furnish quite a livelihood to the inhabitants of the mountains. They are taken from the soil and shipped in great quantities to the North, where they are made into "genuine Briarwood pipes" for the market. Laurel, the common name of this species, is not known in the South, where the universal name for it is "Ivy."

Azalea lutea, L.* (*Azalea calendulacea*, Michx.) Staley Creek, near Marion, alt. 2,400 ft. Slopes of White Top Mt., alt. 2,600–3,500 ft. Fox Creek on Pine Mt., alt. 3,000–3,500 ft. Summit White Rock Mt., alt. 4,400 ft.

On White Top and Pine Mt. *A. calendulacea* in several instances reached the height of over 5 meters. On White Rock Mt. many acres were covered with it, not more than 1 m. in height, the flowers very large and of every possible shade of yellow and flame color.

Azalea canescens, Michx. Kate's Mt., White Sulphur Springs, W. Va., alt. 3,300 ft. Chatham Hill Gap, Walker Mt., alt. 2,700–3,500 ft.

In both localities the specimens of this species collected, seemed to hold their characters very well, the flowers rose color, fragrant, the corollas very glandular, and the under surface of the leaves more or less canescent with stiff white hairs. On Walker Mt. they were growing along the edge of a stream and in a swamp, and were 1–2 meters in height.

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*This must be the *Azala lutea* of Linnæus, Sp. Pl. Ed. 1, in part.

Azalea nudiflora, L. Chatham Hill Gap, Walker Mt., alt. 2,700 ft.

The only locality where this species was seen. It was scarce, hardly more than 30 cm. high with the characteristic, light pink hirsute corollas and glabrous leaves.

Rhododendron Catawbiense, Michx. Chatham Hill Gap road, Walker Mt., alt. 3,000 ft. Nick's Creek, east of Marion, alt. 2,800 ft. Summit White Top Mt., alt. 5,678 ft.

Rhododendron maximum, L. Slopes of White Top Mt., along White Top Creek, alt. 2,600–4,000 ft. Slopes of the Iron Mts., near Skull Gap, alt. 3,000–3,500 ft.

Menziesia globularis, Salisb. Slopes and summit of White Top Mt., alt. 3,000–5,678 ft.

Remarkable on White Top for the size of the corollas, which were 8 mm. or more long, greenish-white with reddish tips and not at all globular.

Pyrola rotundifolia, L. Farmer Mt., on the New River, alt. 2,200 ft. Iron Mts., above South Fork of the Holston, alt. 3,000 ft.

Chimaphila maculata (L.) Pursh. Vicinity of Lynchburg, alt. 500 ft.

Clethra acuminata, Michx. Skull Gap, Iron Mts., alt. 3,000 ft. Slopes of Pine Mt., above Troutdale, alt. 3,000–4,000 ft. White Top Valley, along White Top Creek, alt. 2,600 ft.

Monotropa uniflora, L. Hills east of Marion, alt. 2,500 ft.

HYPOPITHYS HYPOPITHYS (L.) Small. (*Hypopithys Monotropa*, Crantz; *Monotropa Hypopithys*, L.). Hills east of Marion, alt. 2,500 ft.

Galax aphylla, L. Woods about Marion, alt. 2,100 ft. Hills along Bear Creek, alt. 2,400 ft. Slope of Pond Mt., east of Marion, alt. 3,000 ft.

Lysimachia quadrifolia, L. Vicinity of Marion, alt. 2,100 ft. Pond Mt., alt. 3,000 ft.

Steironema ciliatum (L.) Raf. Banks of the Middle Fork Holston River, above Marion, alt. 2,100 ft. About Lynchburg, alt. 500 ft.

A very showy plant about Marion, varying in height from one foot, in dry situations, to five feet in damp places.

Steironema lanceolatum (Walt.) A. Gray. On Peak Mt., along Peak Creek, alt. 2,300 ft. Hillside north of Pulaski City, alt. 2,200 ft. Mountains about White Sulphur Springs, W. Va., alt. 3,200 ft.

Anagallis arvensis, L. About Cumberland Gap, alt. 1,500 ft. Along the railroad on Peak Mt., alt. 2,200 ft.

Samolus floribundus, H. B. K. At Bristol, alt. 1,800 ft. In Bear Creek, alt. 2,400 ft. In the Middle Fork Holston River at Marion, and at the Falls five miles below, alt. 2,050–2,100 ft.

Diospyros Virginiana, L. On the western slope of the Pinnacle near Cumberland Gap, alt. 3,000 ft.

Mohrodendron Carolinum (L.) Britton. (*Halesia tetraptra*, L'Hér). Ledges of Farmer Mt., along the New River, alt. 2,200 ft.

Fraxinus Americana, L. Eastern slope of White Top Mt., alt. 4,600 ft. Hills east of Marion, alt. 2,400 ft. Along Slemp Creek in Rye Valley, alt. 2,800 ft.

The specimens from the locality in Rye Valley should be refered to *F. Americana*, var. *microcarpa*, A. Gray, if this variety could be maintained.

It was published by Mr. Buckley as *F. albicans*, and by Dr. Vasey as *F. Curtissii*, and then finally by Dr. Gray as cited above. It is evident now that the variety is founded on abortive fruit. This is clearly shown by the fact that the tree in question produced on the same panicles in addition to some perfect and mature fruit a large number of small and seedless samaras.

Fraxinus viridis, Michx. f. Base of the Iron Mts., alt. 2,500 ft.

Apocynum cannabinum, L. Vicinity of Marion, alt. 2,100 ft.

Apocynum androsæmifolium, L. On Walker Mt., at Shannon Gap, alt. 2,800 ft. Summit of Pond Mt., east of Marion, alt. 3,000 ft.

Acerates viridiflora (Raf.) Ell. var. *lanceolata* (Ives) Torr. Vicinity of Lynchburg, alt. 500 ft.

Asclepias exaltata (L.) Muhl. Southern slope of White Rock Mt., alt. 4,000 ft. Slopes of Pine Glade Mt., near Nick's Creek, alt. 2,600 ft. Island at Marion, alt. 2,100 ft. On Walker Mt., at Shannon Gap, alt. 2,800 ft.

Asclepias incarnata, L. Swamp near Wallace Switch, alt. 1,900 ft. Island near Marion, alt. 2,100 ft. Slope of Farmer Mt., along the New River, alt. 2,200 ft.

Asclepias obtusifolia, Michx. In Shannon Gap, on Walker Mt., alt. 2,800 ft.

Asclepias Syriaca, L. Near the South Fork Holston River about St. Clair's Bottom, alt. 2,200 ft. Banks of Hog-trough Creek in the slopes of the Iron Mts., alt. 2,600 ft. Below Lyon's Gap, near Walker Mt., alt. 2,600 ft. On Peak Mt., alt. 2,200 ft. Flowers varying to light cream-color.

Asclepias quadrifolia, L. Mountains about Nick's Creek, alt. 2,800 ft. Along Hungry's Mother Creek, alt. 2,200 ft. Pond Mt. east of Marion, alt. 3,000 ft.

Asclepias tuberosa, L. Along Peak Creek on Peak Mt., alt. 2,200 ft. On the North Fork Holston River near Broad Ford, alt. 2,200 ft.

Asclepias variegata, L. On Walker Mt., at Shannon Gap, alt. 2,800 ft. Round Top Mt., west of Seven-mile Ford, alt. 3,000 ft. Banks of Peak Creek, on Peak Mt., alt. 2,200 ft.

Obolaria Virginica, L. Woods along Nick's Creek, alt. 2,500 ft.

Phlox maculata, L. Rocky banks at the Falls of the Holston River, alt. 2,050 ft.

Phlox glaberrima, L. Banks of Peak Creek, on Peak Mt., alt. 2,200 ft.

The leaves of this species are quite variable. On the specimens collected the upper leaves run to broadly ovate, whilst the lower ones are narrowly oblong. The stems are also sparing pubescent, the hairs being arranged in lines.

Phlox paniculata, L. Slopes of the Pinnacle, near Cumberland Gap, alt. 2,500 ft.

A pubescent form of the species with rather small flowers and broad leaves, seems to be a distinct form in the Southern mountains.

Phlox reptans, Michx. Banks of Staley Creek, near Marion, alt. 2,200 ft. Slopes of Pine Mt., alt. 3,000 ft. Spurs of Walker Mt., near East Fork Walker Creek, alt. 2,300 ft.

At certain places in the deep woods this very beautiful and showy species was quite abundant and presented a most beautiful sight.

Phlox subulata, L. Dry, stony ledges on Kate's Mt., W. Va., alt. 3,300 ft.

Phlox ovata, L. Hillsides along McHenry Creek, alt. 2,600 ft.

Polemonium reptans, L. Meadow near Hungry's Mother Creck, alt. 2,300 ft. Sandy banks of the Holston River at the Falls, alt. 2,050 ft.

Hydrophyllum Canadense, L. On the southern slope of White Rock Mt., alt. 4,000 ft. Hills about Marion, alt. 2,200 ft. Under cliffs along Hungry's Mother Creek, alt. 2,200 ft.

Hydrophyllum Virginicum, L. Mountains about Buchanan, alt. 1,300 ft. Along Hungry's Mother Creek, alt. 2,200 ft. Summit of Walker Mt., about Chatham Hill Gap, alt. 3,300 ft. Deep woods along Hutton's Branch, alt. 2,500 ft. Western slope of Mt. Rogers, alt. 5,000 ft.

At all the above localities only the dark purple form of this *Hydrophyllum* was found, as was the case in the mountains of North Carolina on a previous journey.*

Hydrophyllum macrophyllum, Nutt. Shaded banks of the Middle Fork Holston River at Marion, alt. 2,100 ft. Along Hungry's Mother Creek, alt. 2,200 ft. Southern slope of White Rock Mt., alt. 4,000 ft.

This species was rather plentiful at the different localities given, and seemed to be distributed generally through the territory of Southwestern Virginia, while fifty miles north in the mountains of North Carolina, in similar situations not a single plant was observed during the summer of 1891.

Phacelia bipinnatifida, Michx. Southern slope of White Rock Mt., alt. 3,500 ft.

Gray's Synoptical Flora indicates the range of this species as follows "Ohio and Illinois to Alabama" thus cutting out all of the mountains except some of the western spurs of the Cumberlands. This range is not correct as the species extends over the summits

*Mem. Torr. Bot. Club, iii. 5.

of the Alleghanies and the Blue Ridge. On the present journey it was collected on the eastern slopes of the Alleghanies at the above given locality, and the year before on Blowing Rock Mt., North Carolina, on the eastern slopes of the Blue Ridge.*

Phacelia fimbriata, Michx. Eastern slope of White Top Mt., alt. 4,500–5,000 ft. Western slope of Mt. Rogers, alt. 4,800 ft.

This rare and beautiful species of *Phacelia* exists in inexhaustible quantities on Mt. Rogers and White Top. In some places, especially along the edges of the mountain brooks, it grows in matted patches.

Phacelia Purshii, Buckley. At different points along the Middle Fork Holston River about Marion, alt. 100 ft.

Phacelia parviflora, Pursh. Vicinity of Roanoke, alt. 1,000 ft.

Phacelia parviflora was not collected nor observed at any other locality. It seems to be restricted more to the lower country and does not get far into the mountains.

Symphytum officinale, L. Along Hutton's Branch, alt. 2,300 ft. River banks at Marion, alt. 2,100 ft. Bristol, alt. 1,800 ft.

Onosmodium Carolinianum (Lam.) D. C. Roadsides near Sevenmile Ford, alt. 2,000 ft. Banks of the Holston River below the Falls, alt. 2,050 ft.

Echium vulgare, L. Roadsides below Marion, alt. 2,100 ft.

Cynoglossum officinale, L. About Marion, alt. 2,100 ft. In Rye Valley, alt. 2,500 ft. Roadsides about Buchanan, alt. 1,100 ft. Both the red and white forms were plentiful.

Cynoglossum Virginicum, L. Low places by the East Fork Walker Creek and Hungry's Mother Creek, alt. 2,300 ft. Pond Mt., east of Marion, alt. 3,000 ft. Meadows north of Bristol, alt. 1,800 ft.

Lithospermum arvense, L. Vicinity of Roanoke, alt. 1,000 ft.

Lappula Virginiana (L.) Greene. Shaded banks of Reed Creek, alt. 2,000 ft. Hill sides about Cumberland Gap, alt. 1,800 ft.

Ipomœa pandurata (L.) Meyer. Open places near Cumberland Gap, alt. 1,600 ft. About Lynchburg, alt. 500 ft.

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*Mem. Torr. Bot. Club iii. 6.

Convolvulus repens, L. In an old field along the South Fork Holston River, alt. 2,300 ft.

Convolvulus spithamæus, L. Pond Mt. east of Marion, alt. 3,000 ft.

Lycopersicum esculentum, Mill. Along the N. & W. R. R., above Wallace Switch, alt. 1,900 ft.

Solanum Carolinense, L. Common in all situations about Marion, alt. 2,100 ft.

Solanum Dulcamara, L. Along St. Clair's Creek, near the Iron Mts., alt. 2,300 ft. Waste places about Marion, alt. 2,100 ft. White Top Creek, at base of Chestnut Ridge, alt. 2,600 ft.

Solanum nigrum, L. On the South Fork Holston River, near St. Clair's Bottom, alt. 2,200 ft.

Physalis lanceolata, Michx. Barrens about Cumberland Gap, alt. 1,600 ft.

Physalis angulata, L. Woods about Cumberland Gap, alt. 1,600 ft.

Physalis Philadelphica, Lam. Dry woods about Cumberland Gap, alt. 1,700 ft.

Physalis Virginiana, Mill. Near Saltville, alt. 2,200 ft.

PHYSALODES PHYSALOIDES (L.) Britton. *Nicandra physaloides*, Gærtn. *Atropa physaloides*, L. Open places near Cumberland Gap, alt. 1,600 ft.

Lycium vulgare (Ait.) Dun. Along Hutton's Branch, alt. 2,400 ft.

Datura Stramonium, L. Along roadsides at different points in Smyth county.

Datura Tatula, L. About Marion, alt. 2,100 ft.

In the South both species of *Datura* seem to be favorite resorts for a species of *Sphinx*, whose movements and actions it was very interesting to watch just about the time of sunset, and if one would pick a branch he would be followed wherever he went by one or two of these large moths.

Verbascum Blattaria, L. Along runs near Marion, alt. 2,200 ft. Near Lynchburg, alt. 500 ft.

Verbascum Thapsus, L. River banks at Marion, alt. 2,100 ft. Near Add Wolf, on the South Fork of the Holston River, alt. 2,200 ft.

Scrophularia Marylandica, L. About Marion, alt. 2,100 ft.

Pentstemon hirsutus (L.) Willd. Southern slope of White Rock Mt., alt. 3,800 ft.

Pentstemon lævigatus, Soland. Near Lynchburg, alt. 500 ft.

Pentstemon lævigatus, Soland. var. *canescens*, Britton. Vicinity of Lynchburg, alt. 500 ft. Slopes of Kate's Mt., near White Sulphur Springs, W. Va., alt. 3,300 ft.

Mimulus alatus, Soland. Swamp near Wallace Switch, alt. 1,900 ft.

Mimulus ringens, L. Near the source of Dicky Creek, in the Iron Mts., alt. 3,000 ft. River banks about Marion, alt. 2,100 ft.

Gratiola Virginiana, L. Muddy swamps along Dicky Creek, on the Iron Mts., alt. 2,800 ft.

Reaching an astonishing size, by actual measurement some plants grow to be sixteen inches tall with lateral branches six to eight inches long.

Ilysanthes gratioloides (L.) Benth. Damp places on ledges of Farmer Mt., alt. 2,200 ft.

Veronica Americana, Schwein. Staley Creek, near Marion, alt. 2,200 ft. Banks of the South Fork Holston River, near Add Wolf, alt. 2,300 ft. Southern slope of White Rock Mt., alt. 3,800 ft.

Veronica Anagallis, L. Wet places above Bristol, alt. 1,800 ft. Slopes of Round Top Mt., alt. 2,400 ft. Near Marion, alt. 2,100 ft.

Recorded as growing only as far south as New Jersey.* It is much more plentiful in the Southern States than in the North, often appearing as an introduced plant. At some localities it attains a remarkable size.†

Veronica arvensis, L. Mountain sides east of Buchanan, alt. 1,100 ft. Damp cliffs of Hungry's Mother Creek, alt. 2,200 ft. Slope of Pine Mt., alt. 3,500 ft.

Veronica officinalis, L. Summit of White Top Mt., alt. 5,678 ft. By streams in Hungry Hollow, alt. 2,400 ft.

*Man. Bot. N. U. S. (Revised), p. 386.

†Mem. Torr. Club, iii, 15, 31.

Veronica Virginica, L. South Fork Holston River, near St. Clair's Bottom, alt. 2,200 ft.

Gerardia flava, L. Mountain sides along Peak Creek, alt. 2,200ft.

Gerardia lævigata, Raf. Different points on the Iron Mts., alt. 2,500–3,000 ft.

Pedicularis Canadensis, L. Slopes of Kate's Mt., W. Va., alt. 3,700 ft. Summit of Pond Mt., east of Marion, alt. 3,000 ft. Walker Mt., alt. 3,000 ft.

Melampyrum latifolium, Muhl. Near Marion, alt. 2,100 ft. Slopes and summit of White Top Mt., alt. 4,000–5,600 ft.

Melampyrum lineare, Lam. Slopes and summits of the Iron Mts., alt. 2,800–3,400 ft.

Anoplanthus uniflorus (L.) Endl.* (*Aphyllon uniflorum*, A. Gray.) Slopes of Pine Mt., alt. 3,500 ft. Staley's Knob east of Marion, alt. 2,600 ft. Pond Mt., alt. 3,000 ft. (Flowers white.)

Conopholis Americana (L.f.) Wallr. In deep shaded ravines about the Falls of the Holston River, alt. 2,050 ft. Slopes of Pine Mt., alt. 3,500 ft. Ravine at the mouth of Hungry's Mother Creek, alt. 2,075 ft.

Epiphegus Virginiana (L.) Bart. On the eastern slope of White Top Mt., 5,000 ft.

Dianthera Americana, L. Flat shores of the North Fork Holston River, near Broad Ford, alt. 2,200 ft.

Ruellia ciliosa, Pursh. Vicinity of Lynchburg, alt. 500 ft.

Phryma Leptostachya, L. Hillsides near Wallace Switch, alt. 1,900 ft.

Verbena angustifolia, Michx. Dry roadsides near Lyon's Gap, alt. 2,300 ft. Barrens about Cumberland Gap, alt. 1,500 ft. Along the Middle Fork Holston River, below Chilhowie, alt. 2,000 ft. Near Lynchburg, alt. 500 ft.

Verbena hastata, L. Marion, alt. 2,100 ft. Banks of the South Fork Holston River, alt. 2,200 ft. Along Hogtrough Creek, on the Iron Mts., alt. 2,800 ft.

**Anoplanthus* is apparently the first available name for this genus. *Aphyllon*, Mitch. (1748) is ahead of Linnæus Sp. Pl. Ed. 1 (1753), and is thus ruled out.

Verbena officinalis, L. Marion, alt. 2,100 ft. Near Cedarville, alt. 1,900 ft.

Verbena riparia, Raf. Banks of Staley Creek at Marion, alt. 2,200 ft. Banks of Cedar Creek, alt. 1,900 ft.

This neglected *Verbena* was re-discovered at several localities in North Carolina in 1891.* A careful search was made for it in similar localities in the valleys of Southwestern Virginia, and we were rewarded by finding it in the valley of the Middle Fork of the Holston River, on the banks of the two creeks mentioned above.

Verbena urticæfolia, L. Vicinity of Marion, alt. 2,100 ft.

Collinsonia Canadensis, L. Woods near Nick's Creek, alt. 2,500 ft.

Mentha Canadensis, L. Muddy shores of Reed Creek, alt. 2,000 ft.

Mentha piperita, L. Clay gullies about Cumberland Gap, alt. 1,600 ft.

The *Mentha piperita* found growing on the dry, hot plains about Cumberland Gap was remarkably prolific. The plants were producing stolons to the length of a meter and sometimes longer.

Mentha rotundifolia, L. Near the South Fork Holston River below Add Wolf, alt. 2,200 ft.

Thoroughly established on a hillside and spreading by means of long stolons.

Mentha viridis, L. Near the Middle Fork of the Holston River, below Marion, alt. 2,100 ft.

Lycopus Virginicus, L. Deep shade along Nick's Creek, alt. 2,600 ft. Open bank along Comer Creek on the Iron Mts., alt. 2,800 ft.

KŒLLIA MUTICA (Michx.) Britton. (*Pycnanthemum muticum* Pers.) Along Chestnut Creek, near Gossan, alt. 2,500 ft. Slopes of Farmer Mt. along the New River, alt. 2,200 ft. Along Nick's Creek, alt. 2,300 ft.

Kœllia pycnanthemoides (Leav.) Kuntze. (*Pycnanthemum Tullia*, Benth.) Western slope of the Pinnacle, near Cumberland Gap, alt. 3,000 ft. Slopes of Peak Mt., alt. 2,200 ft. Hills along Chestnut Creek near Gossan, alt. 2,300 ft.

* Mem. Torr. Bot. Club, iii. 12.

Kœllia incana (L.) Kuntze. (*Pycnanthemum incanum* Michx.) Banks of the Middle Fork Holston River at Marion, alt. 2,100 ft.

Kœllia lanceolata (Pursh) Kuntze.* (*Pycnanthemum Virginicum* B. S. P.) Swamps on Peak Mt. (along the railroad), alt. 2,200 ft.

Kœllia Virginiana (L.) Kuntze. (*Pycnanthemum flexuosum* B. S. P.) In a large swamp on Peak Mt., alt. 2,300 ft.

Kœllia verticillata (Michx.) Kuntze. Dry western slope of the Pinnacle, near Cumberland Gap, alt. 2,800 ft. Farmer Mt. on New River, alt. 2,200 ft.

A great extension of the range of this species south and west. Its former range being "S. New York to E. Pennsylvania."†

Kœllia Torreyi (Benth.) Kuntze. (*Pycnanthemum Torreyi*, Benth.) Banks of the New River, alt. 2,200 ft.

This collection extends the range of *P. Torreyi* to Southern Virginia. Heretofore the southern limit was Southern Pennsylvania.

Hedeoma pulegioides (L.) Pers. Along St. Clair's Creek, near the base of the Iron Mts., alt. 2,400 ft.

Clinopodium vulgare, L. (*Calamintha Clinopodium*, Benth.) Southern slope of White Rock Mt., alt. 3,800 ft. Along Nick's Creek, alt. 2,600 ft. About Lynchburg, alt. 500 ft.

Clinopodium Nepeta (L.) Kuntze. (*Calamintha Nepeta*, L.) Rocky fields below Marion, alt. 2,100 ft. Banks of Reed Creek, near Wytheville, alt. 2,000 ft.

Melissa officinalis, L. Near the mouth of Nick's Creek, alt. 2,400 ft. Above Marion, alt. 2,100 ft.

Salvia lyrata, L. Mountains east of Buchanan, alt. 1,100 ft. Vicinity of Marion, alt. 2,100 ft. Falls of the Holston River, alt. 2,050 ft.

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* We are provisionally using the names assigned to this and the preceding species by Dr. Kuntze, but think it most probable that *Virginiana* properly belongs to the lanceolate-leaved plant.

†Man. Bot. N. U. S. (revised.), p. 410.

Monarda Clinopodia, L. On Peak Mt., along Peak Creek, alt. 2,200 ft. At Skull Gap, on the Iron Mts., alt. 3,000 ft. Ledges of Farmer Mt., along the New River, alt. 2,500 ft. On the South Fork Holston River, near St. Clair's Bottom, alt. 2,200 ft. Vicinity of Lynchburg, alt. 500 ft.

Monarda didyma, L. Banks of Beaver Branch, alt. 2,500 ft.

Monarda fistulosa, L. Vicinity of Lynchburg, alt. 500 ft. Hills below Marion, 2,200 ft. Hills about the mouth of Brush Creek, along the New River, alt. 2,200 ft. On Farmer Mt., alt. 2,500 ft. Along Beaver Branch, alt. 2,200 ft.

Vleckia scrophulariæfolia (Willd.) Raf. (*Lophanthus scrophulariæfolius*, Benth.) Thickets along the South Fork of the Holston River, above Add Wolf, alt. 2,200 ft. Along Hog-trough Creek, alt. 2,600 ft.

Nepeta Cataria, L. Along Hog-trough Creek, alt. 2,600 ft. Marion, alt. 2,100 ft.

Glechoma hederacea, L. Along Bear Creek, alt. 2,400 ft. In Hungry Hollow, east of Marion, alt. 2,300 ft.

Meehania cordata (Nutt.) Britton. Rocky ledges along Bear Creek, alt. 2,400 ft. Foot of White Rock Mt., alt. 3,000 ft. In dark ravines at the Falls of the Holston, alt. 2,050 ft. Along Hungry's Mother Creek, alt. 2,200 ft.

Scutellaria lateriflora, L. In the large spring near Wallace Switch, alt. 1,900 ft. Rocky Banks of the Middle Fork of the Holston River, Marion, alt. 2,100 ft.

Scutellaria pilosa, Michx. Banks of Dicky Creek, alt. 2,800 ft.

Scutellaria saxatilis, Riddell. Foot of Pond Mt., alt. 2,600 ft.

Synandra grandiflora, Nutt. Thickets on the northern slope of White Rock Mt., alt. 3,000 ft.

Another species of the Ohio Valley flora which extends over to the eastern slopes of the Alleghanies.

Marrubium vulgare, L. Along Dicky Creek, alt. 2,400 ft. Near Hutton's Branch, alt. 2,400 ft. Below Chilhowie, alt. 1,900 ft.

Stachys aspera, Michx. Near the Summit (southern slope), alt. 5,400 ft. Near Lynchburg, alt. 500 ft.

Stachys cordata, Ridd. River banks about the Falls of the Holston River, alt. 2,050 ft. Woods near Wytheville, alt. 2,000 ft.

Lamium maculatum, L. By a garden at Troutdale, alt., 2,800 ft.

Teucrium Canadense, L. Below Marion on the Middle Fork Holston River, alt. 2,050 ft. Banks of Hog-trough Creek, alt. 2,600 ft.

Leonurus Cardiaca, L. Marion, alt. 2,100 ft.

Isanthus brachiatus (L.) B. S. P. Roadsides below Chilhowie, alt. 1,900 ft. Spurs of the Iron Mts., along Hog-trough Creek, alt. 2,600 ft. Near Add Wolf, alt. 2,200 ft.

Plantago cordata, Lam. Limestone rocks at the Falls of the Holston River, alt. 2,050 ft.

Plantago lanceolata, L. Along Reed Creek, alt. 2,000 ft. Near Marion, alt. 2,100 ft.

Plantago major, L. Along railroad on Peak Mt., alt. 2,200 ft.

Plantago Virginica, L. Marion, alt. 2,100 ft. Along Hutton's Branch, alt., 2,300 ft. Near Lynchburg, alt. 500 ft.

Anychia Canadensis (L.) B. S. P. Dry hillsides about Marion, alt. 2,100 ft. Banks of the New River on Farmer Mt., alt. 2,300 ft. Woods along Beaver Branch, alt. 2,500 ft. Banks along Dickey Creek, alt. 2,600 ft.

Anychia dichotoma, Michx. Dry places near Cumberland Gap, alt. 1,600 ft.

Chenopodium murale, L. Waste places about Marion, alt. 2,100 ft. Streets of Wytheville, alt. 2,200 ft.

Phytolacca decandra, L. Along Staley Creek near Marion, alt. 2,200 ft. Falls of the Holston River, alt. 2,050 ft. Near Lynchburg, alt. 500 ft.

Polygonum aviculare, L. Near St. Clair's Bottom on the South Fork Holston River, alt. 2,200 ft.

Polygonum Convolvulus, L. Rocky places on the Southern slope of White Rock Mt., alt. 3,000 ft. Waste places near Cumberland Gap, alt. 1,600 ft.

Polygonum erectum, L. Open places near Cumberland Gap, alt. 1,700 ft. About St. Clair's Bottom on the South Fork Holston River, alt. 2,200 ft.

Polygonum Hydropiper, L. Marion, alt. 2,100 ft. Along Reed Creek, alt. 2,000 ft. On the South Fork Holston River, alt. 2,200 ft.

Polygonum littorale, Link. Dry barrens about Cumberland Gap, alt. 1,600 ft.

Polygonum orientale, L. Near the South Fork Holston River, alt. 2,200 ft.

Polygonum Pennsylvanicum, L. Near St. Clair's Bottom, alt. 2,200 ft. About Marion, alt. 2,100 ft.

Polygonum Persicaria, L. Near the summit of White Top Mt., alt. 5,300 ft. About St. Clair's Bottom, alt. 2,200 ft. Near Cumberland Gap, alt. 1,600 ft.

The specimens collected on White Top Mt. are affected, evidently by the high altitude, in a peculiar way. The stem is branched only from the root, being strictly simple beyond this. The leaves are narrower and the flowers reduced in size and of a deeper pink color.

Polygonum punctatum, Ell. Near Marion, alt. 2,100 ft.

Polygonum punctatum, Ell., var. *leptostachyum* (Meisn.) Small. Dry barrens about Cumberland Gap, alt. 1,600 ft.

Polygonum sagittatum, L. Slopes of the Iron Mts., along Comer Creek, alt. 3,000 ft.

Fagopyrum Fagopyrum (L.) Karst. (*Fagopyrum esculentum*, Mœnch). Northern slope of Pine Mt., alt. 3,300 ft. Escaped by the side of an illicit still.

Rumex Acetosella, L. Hillsides about Marion, alt. 2,300 ft. Summit of White Top Mt., alt. 5,600 ft. Vicinity of Lynchburg, alt. 500 ft.

It has been noticed that the above species does not fruit freely in the Northern and Eastern States. In all the Virginian localities noted *Rumex Acetosella* was collected in fruit, and at Marion and on White Top there was no question as to its fruiting very abundantly. It has also been collected in fruit on the mountains of North Carolina, and in the Catskill Mts., New York.

Rumex crispus, L. Along Beaver Branch, alt. 2,200 ft. Above Bristol, alt. 1,800 ft.

Rumex obtusifolius, L. On Staley Knob near Marion, alt. 2,400 ft.

Asarum arifolium, Michx. Woods north of Bristol, alt. 1,800 ft. Vicinity of Lynchburg, alt. 500 ft.

Asarum Canadense, L. East Fork Walker Creek, alt. 2,300 ft. Hungry Hollow, alt. 2,300 ft.

ASARUM GRANDIFLORUM (Michx.) Small. (*Homotropa macranthum*, Shuttl. mss. in dist. Rugel, 1841. *Asarum Virginicum*, L., var. *grandiflorum*, Michx. ex Duchartre in D.C. Prodr. xv. 426 (1864)).

It seems strange that this conspicuous plant should have been overlooked for so many years and not received any recognition in our text-books. It has been practically unnoticed by botanists since Rugel's collection of 1841.* On specimens of that collection Shuttleworth based his *Homotropa macranthum*. This was not published but distributed as a manuscript name.

When Duchartre monographed the genus for DeCandolle's Prodromus he took up the name *grandiflorum*, apparently from a manuscript name left by Michaux, as he credits the variety to him. However, he has made a mistake in referring to the name as being published by Michaux in his Fl. Bor. Am. i. 279.

After meeting with the plant during the last two seasons and studying it in the field, we reach the same conclusion as Shuttleworth did, that is, that it is not a variety of *A. Virginicum*, but a good and distinct species. As there is no complete description published, the following is appended.

Perennial, stout, arising from a more or less branched rhizome, glabrous; leaves varying from broadly-ovate-cordate to orbicular-cordate, 5–9 cm. long, 4–8 cm. broad, obtuse or acutish, long-petioled, mottled or simply green, paler beneath; flowers solitary, large, 1.5–4 cm. long, tubular-campanulate, limb not contracted but divided into three large, unequal spreading lobes, which are mottled with violet on the inside; peduncle 2–2.5 cm. long; anthers equally four-ribbed, seed oblique-ovoid, acute, 3.5 mm. long, smooth.

North Carolina; Broad River (Rugel), Hot Springs (Newberry), Wilson's Creek, Caldwell county (Small and Heller). Vir-

* Mem. Torr. Club, iii. 11.

ginia; Bedford county (Curtiss), along Laurel Creek at Broadford, Smyth County (Miss Vail).

Asarum Virginicum, L. Deep ravine by the Falls of the Middle Fork of the Holston River, alt. 2,050 ft. On Staley Knob, near Marion, alt. 2,300 ft.

Aristolochia Serpentaria, L. Southern slope of Pond Mt. east of Marion, alt 2,600 ft. Near Lynchburg, alt. 500 ft.

Aristolochia Sipho, L'Her. Northeastern slope of White Top Mt., alt. 3,500 ft. Although collected at a single locality, *Aristolochia Sipho* was abundant everywhere. *A. tomentosa*, Sims, was sought for throughout the journey but without success.

Sassafras Sassafras (L.) Karst. (*Sassafras officinalis*, Nees.) Summit of Pond Mt. east of Marion, alt. 3,400 ft.

Lindera Benzoin (L.) Meisn. Rocky banks of the Middle Fork Holston River, at Marion, alt. 2,100 ft. Near Lynchburg, alt. 500 ft. Sandy shore of the South Fork Holston River, alt. 2,200 ft.

Dirca palustris, L. Deep ravine at the Falls of the Holston River, alt. 2,050 ft.

Pyrularia pubera, Michx. Staley Knob east of Marion, alt. 2,300 ft. Shaded banks of Nick's Creek, alt. 2,500 ft. Slopes of Pond Mt., east of Marion, alt. 3,000 ft. Cliffs at the mouth of Hungry's Mother Creek, alt. 2,075 ft. Northeastern slope of White Top Mt., alt. 3,500 ft.

This interesting species was remarkably plentiful through the mountains, but it did not seem to fruit freely. A number of the localities were visited late in the season for the sake of obtaining fruit, but only one shrub was found bearing the peculiar oily drupes.

Euphorbia corollata, L. Rocky banks along Peak Creek on Peak Mt., alt. 2,200 ft. Ledges of Slemp's Creek, alt. 2,800 ft. Shannon Gap, alt. 3,000 ft.

Euphorbia corollata, L., var. *paniculata* (Ell.) Boiss. Near Lynchburg, alt. 500 ft.

Euphorbia hypericifolia, L. Along the road on Peak Mt., alt 2,200 ft.

Euphorbia Lathyris, L. Banks of the South Fork Holston River below Add Wolf, alt. 2,100 ft. Banks of St. Clair's Creek near the base of the Iron Mts., alt. 2,600 ft.

Euphorbia maculata, L. Along the road across Peak Mt., alt. 2,200 ft.

Acalypha Virginica, L., var, *gracilens* (A. Gray) Muell. Dry barrens about Cumberland Gap, alt. 1,600 ft.

Ulmus racemosa, Thomas? On the South Fork Holston River, east of Add Wolf, alt. 2,300 ft.

As the flowers and fruit of this elm could not be secured, certain determination is impossible; however, if the character of pubescent buds, which is ascribed to *U. racemosa* holds good, the specimens are correctly referred to that species.

Celtis occidentalis, L. Banks of the Middle Fork Holston River below Marion, alt. 2,100 ft.

Ioxylon pomiferum, Raf. (*Maclura aurantiaca*, Nutt.) Escaped near Marion, alt. 2,200 ft.

Morus rubra, L. Valley of the North Fork Holston River, alt. 2,000 ft. On the island near Marion, alt. 2,100 ft.

Urtica gracilis, Ait. Below Chilhowie, alt. 2,000 ft.

Laportea Canadensis (L.) Gaudich. Deep woods along Nick's Creek, alt. 2,500 ft. Slopes of White Top Mt., alt. 4,000 ft.

Bœhmeria cylindrica (L.) Willd. Vicinity of Marion, alt. 2,100 ft. Wallace Switch, alt. 1,900 ft. In a large limestone spring.

Platanus occidentalis, L. Limestone bluffs opposite Marion, alt. 2,100 ft. Along Hungry's Mother Creek, alt. 2,300 ft.

Hicoria glabra (Mill.) Britton. Dry western slope of the Pinnacle near Cumberland Gap, alt. 3,000 ft.

Hicoria minima (Marsh.) Britton. Limestone bluffs opposite Marion, alt. 2,100 ft.

Hicoria ovata (Mill.) Britton. Limestone bluffs of the Middle Fork Holston River opposite Marion, alt. 2,200 ft.

Hicoria alba (L.) Britton. Limestone bluffs of the Middle Fork Holston River near Marion, alt. 2,200 ft.

Juglans cinerea, L. Bluffs opposite Marion, alt. 2,100 ft. Valley of the South Fork Holston River, alt. 2,000 ft.

Juglans nigra, L. Along Hog-trough Creek, alt. 2,600 ft.

Betula lutea, Michx. f. Slopes and summit of White Top Mt., alt, 4,600–5,678 ft. Brushy Mt., alt. 2,800 ft.

There is a remarkably fine growth of this birch on the damp slopes of White Top. The younger trees all seem to have a silvery-gray bark, which on the older ones turns to the characteristic yellow. At an elevation of about 5,000 ft. on the eastern slope of the mountain a splendid tree was observed and the trunk measured. For the distance of about twelve feet from the ground the trunk is quite cylindrical and unbranched. Three feet from the base it measured twenty-two feet and ten inches in circumference.

Alnus serrulata, Willd. Rocky banks of Peak Creek, on Peak Mt., alt. 2,200 ft. Near Marion, alt. 2,100 ft. Sandy shores of the South Fork Holston River east of Add Wolf, alt. 2,30c ft.

The specimens collected at the latter locality are referred to the above species with some hesitation. The leaves are more sharply and prominently toothed, and have more pubescence on the under surface than is generally found in *A. serrulata*. There is a specimen of the same form preserved in the Columbia College herbarium, collected in Kentucky by Short.

Carpinus Virginiana (Marsh.) Sudw. Woods near Marion, alt. 2,200 ft. Along Chestnut Creek near Gossan, alt. 2,300 ft. Slopes of Walker Mt., alt. 2,800 ft.

Corylus rostrata, Ait. Rocky mountain slopes along Nick's Creek, alt. 2,600 ft. Ledges of Farmer Mt., on the New River, alt. 2,300 ft.

Quercus alba, L. Southern slope of White Rock Mt., alt. 4,000 ft. Common throughout the valleys.

Quercus coccinea, Wang. Dry sandy barrens below Chilhowie, alt. 2,000 ft. High cliffs of the Iron Mts., at Skull Gap, alt. 3,000 ft.

Quercus cuneata, Wang. North of Bristol, alt. 1,800 ft. Barrens below Chilhowie, alt. 2,000 ft.

Quercus minor (Marsh.) Sarg. Barrens below Chilhowie, alt. 2,000 ft.

Quercus Muhlenbergii, Engelm. Limestone bluffs of the Holston River, opposite Marion, alt. 2,100 ft.

Quercus Prinus, L. Dry western slope of the Pinnacle near Cumberland Gap, alt. 2,800 ft.

Quercus rubra, L. Bluffs along Reed Creek, alt. 2,000 ft. Banks of the Middle Fork Holston River at Chilhowie, alt. 2,000 ft. Near the summit of White Top Mt., alt. 5,500 ft. On the Iron Mts., along Dickey Creek, alt. 2,800 ft.

Quercus tinctoria, Bart. Round Top Mt., west of Seven Mile Ford, alt. 3,000 ft. Hills about Cumberland Gap, alt. 1,600 ft. Vicinity of Lynchburg, alt. 500 ft.

Castanea dentata (Marsh.) Sudw. Ledges of Farmer Mt., on the New River, alt. 2,200 ft.

Castanea pumila, Mill. Slopes of Walker Mt., alt. 2,000–3,000 ft. Base of White Rock Mt., alt. 2,500 ft. Near Abingdon, alt. 1,900 ft. Along Peak Creek, on Peak Mt., alt. 2,200 ft. Vicinity of Lynchburg, alt. 500 ft.

Fagus atro-punicea (Marsh.) Sudw. Upper slopes and summit of White Top Mt., alt. 5,000–5,600 ft. Rocky places near the Falls of the Holston River, alt. 2,050 ft.

Salix candida, Willd. Summit of White Rock Mt., alt. 4,400 ft. A remarkable southern extension of the range of this northern willow.

Salix humilis, Marsh. Peak Mt., along Peak Creek, alt. 2,200 ft.

Salix nigra, Marsh. River bank at Marion, alt. 2,100 ft.

Salix sericea, Marsh. Banks of White Top Creek, alt. 2,600 ft.

Populus balsamifera, L. var. *candicans* (Ait.). A. Gray. Base of Round Top Mt., west of Seven Mile Ford, alt. 2,600 ft. Along Hutton's Branch, alt. 2,300 ft.

Udora Canadensis (Michx.) Nutt. (*Elodea Canadensis*, Michx.) In a large limestone spring above Wallace Switch, alt. 1,900 ft.

Liparis liliifolia (L.) Rich. Woods along Staley Creek, alt. 2,300 ft.

Liparis Lœselii (L.) Rich. Damp woods along Beaver Branch, alt. 2,200 ft.

Aplectrum spicatum (Walt.) B. S. P. Deep woods along Nick's Creek, alt. 2,500 ft.

Corallorhiza multiflora, Nutt. Slopes of Pine Glade Mt., along Nick's Creek, alt. 2,600 ft.

Listera convallarioides (Sw.) Nutt. Damp woods along Comer Creek, alt. 2,600 ft. Slopes of Pine Glade Mt., along Nick's Creek, alt. 2,600 ft. Slopes of White Top Mt., alt. 5,000 ft.

Gyrostachys latifolia (Torr.) Kuntze. Sandy river bank at Marion, alt. 2,100 ft. Along Hutton's Branch, alt. 2,500 ft.

Peramium pubescens (Willd.) C. C. Curtiss. (*Goodyera pubescens*, R. Br.) Iron Mts. near Skull Gap, alt. 2,800 ft. Woods along Nick's Creek, alt. 2,600 ft.

Peramium repens (L.) Salisb. (*Goodyera repens*, R. Br.) Slopes of Pine Glade Mt., near Nick's Creek, alt. 2,600 ft. Brushy Mt., alt. 3,300 ft.

Pogonia verticillata (Willd.) Nutt. Northeastern slope of White Top Mt., alt. 3,000 ft. Pine Mt., alt. 4,000 ft.

Orchis spectabilis, L. Northern slope of White Top Mt., alt. 4,200 ft. Knobs east of Marion, alt. 2,200 ft.

Habenaria orbiculata (Pursh) Torr. Slopes of White Top Mt., alt. 3,500 ft. Western slope of Mt. Rogers, alt. 4,500 ft.

Habenaria bracteata (Willd.) R. Br. Deep woods at the Falls of Holston River, alt. 2,050 ft. Damp woods along Nick's Creek, alt. 2,500 ft.

Habenaria psycodes (L.) A. Gray. Northern slope of White Top Mt., alt. 3,000–4,800 ft. Western slope of Mt. Rogers, alt. 4,000–5,000 ft.

Habenaria tridentata (Willd.) Hook. Along Staley Creek, east of Marion, alt. 2,200 ft.

Cypripedium acaule, Ait. Summit of Pine Mt., alt. 4,900 ft. Slopes of White Top Mt., alt. 4,800 ft. Pond Mt., east of Marion, alt. 3,000 ft. Along Nick's Creek, alt. 2,600.

Cypripedium hirsutum, Mill. (*Cypripedium pubescens*, Willd.) Northern slopes of White Top Mt., alt. 3,000 ft. Brushy Mt., near the headwaters of Nick's Creek, alt. 2,900 ft. Slope of Kate's Mt., W. Va., alt. 3,000 ft.

Cypripedium parviflorum, Salisb. Brushy Mt., near headwaters of Staley Creek, alt. 2,900 ft. Slopes of Pond Mt., east of Marion, alt. 2,800 ft. Slopes of the Iron Mt., at Skull Gap, alt. 3,000 ft.

Aletris farinosa, L. At Shannon Gap on Walker Mt., alt. 3,000 ft. Along Slemp's Creek, alt. 2,800 ft. Southern slope of Round Top Mt., west of Seven Mile Ford, alt. 3,000 ft.

Iris cristata, Ait. Limestone bluffs of the Middle Fork Holston River, about Marion, alt. 2,100 ft. Shady banks on the "Knobs" west of the Blue Ridge, alt. 2,300 ft.

Sisyrinchium Bermudiana, L. On Walker Mt. near Chatham Hill Gap, alt. 3,000 ft. Slopes of Pond Mt., alt. 2,600 ft. Fields near Bear Creek, alt. 2,400 ft. Valley between White Top Mt. and the Iron Mts., alt. 2,700 ft. Along Nick's Creek, alt. 2,500 ft.

Hypoxys erecta, L. Walker Mt., alt. 3,000 ft. Southern slope of White Rock Mt., alt. 4,000 ft.

Dioscorea villosa, L. Slopes of Walker Mt., below Chatham Hill Gap, alt. 2,300–2,600 ft.

Smilax rotundifolia, L. River bank at Marion, alt. 2,100 ft.

Smilax rotundifolia, var. *crenulata*, Small and Heller. Banks of the Middle Fork of the Holston River, Marion, alt. 2,100 ft.

Smilax glauca, Walt. Peak Creek, on Peak Mt., alt. 2,200 ft. Bristol, alt. 1,900 ft. River banks, Marion, alt. 2,100 ft.

Smilax herbacea, L. Peak Creek, on Peak Mt., alt 2,200 ft.

Smilax ecirrhata, S. Watson. Riverside Marion, alt. 2,100 ft.

Smilax hispida, Muhl. Hills east of Marion, alt. 2,300 ft. Banks of the Holston, Marion, alt. 2,100 ft. Bristol, alt. 1,900 ft.

Smilax Pseudo-China, L. Reed Creek, at base of Lower Rocks alt. 2,000 ft. Wallace Switch, alt. 1,900 ft.

Smilax.

A slender vine abundant on the slopes of the Iron Mountains, at 3,000–4,000 feet altitude, with very thin, large ovate or ovate-lanceolate, acuminate 5–nerved leaves, ciliolate–spinulose on the margins and nerves ; petioles short, clasping ; stem exactly square, striate, the angles abundantly armed with staight triangular-lanceolate, flat prickles. Flowers and fruit not seen.

Asparagus officinalis, L. Reed Creek, alt. 2,000 ft.

Polygonatum biflorum (Walt.) Ell. Mouth of Hungry's Mother Creek and river banks at Marion, alt. 2,100 ft. Nick's Creek, alt. 2,400 ft.

Varying from the slender 30–40 cm. high, narrow acute leaved form to the stout, robust over 2 m. high forma *giganteum* with ovate, 13 cm. long and 9 cm. wide, obtuse leaves. The latter form was noted with stout and large old rootstocks, whereas the rootstock of the former were short and slender.

Streptopus roseus (Michx.) Pers. Spruce Swamp on White Top Mt., alt. 5,000 ft.

Unifolium racemosum (L.) Britton. Woods near Marion, alt. 2,100 ft.

Unifolium stellatum (L.) Greene. Falls of the Middle Fork of the Holston, alt. 2,050 ft.

The collection of this species at the above locality extends its geographical range to about the southern limit of the "manual range." Hitherto it has been said to occur from New Jersey westward and northward.

Unifolium Canadense (Desf.) Greene. Slopes of White Top Mt., alt. 2,600–5,000 ft.

Allium Canadense, L. Marion, river banks, alt. 2,100 ft.

Allium tricoccum, Ait. Slopes of White Top Mt. and Mt. Rogers, alt. 4,000 ft.

Convallaria majalis, L. Pond Mt., alt. 2,900–3,200 ft. Skull Gap, Iron Mt., alt. 3,000 ft. Slopes of White Top Mt., alt. 3,000 ft. Collected at Skull Gap in fruit on June 25th.

Camassia Fraseri, Torr. Meadow near the cliff on Hungry's Mother Creek, alt. 2,300 ft.

Lilium Canadense, L. Lynchburg, along the banks of the James River, alt. 500 ft. Peak Creek, on Peak Mt., alt. 2,200 ft. White Rock Mt., alt. 4,400 ft.

When first seen these lilies were taken for *L. Grayi*, but careful comparison with well authenticated specimens of that latter species prove them to be in all probability *L. Canadense*. The flower has the shape and appearance of that of *L. Canadense* and the dark red color of *L. Grayi*. It may possibly be a mountain variety of *L. Canadense*.*

LILIUM CAROLINIANUM, Michx. Fl. Bor. Am. i. 197. (*L. superbum*, L., var. *Carolinianum*, Chapm. Fl. S. States, 484.)

The above species has had a curious and complicated history, and until the plant can be studied more thoroughly in the field, especially in the districts south and east of the Southern Alleghanies, no attempt will be made to give it at length. However, it may be said here that the later botanists were for some unaccountable reason misled, and either erroneously made the plant a variety of *L. superbum* or ignored it wholly. It is hardly as closely related to that species as *L. Canadense* is. One reason for its general obscurity may be the very poor descriptions of it that have been published; for example, Dr. Watson's in his Revision of the North American Liliaceæ, "Low: flowers few (1 to 3)." As will be shown elsewhere, the plant is not at all rare in the Southern States, but for the convenience of persons interested in the flora of that district a description is here given, which will also serve to bring out the distinctions between it and related species.

Perennial, glabrous and more or less glaucous throughout; stem erect, simple, 3–9 dm. tall, slightly mottled; leaves oblanceolate or obovate, 3–11 cm. long, mostly obtuse, sometimes acute, rather fleshy, 3-nerved, entire, often slightly crisped, in whorls of 3 to 7 or on small plants alternate and scattered; the one to three, flowers (generally one) nodding, orange-red, the tips of the segments darker, mottled with dark purple; the divisions of the perianth lanceolate, strongly recurved in the lower half, more or less straight above, glossy; fruit obovoid, about 3 cm. long.

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* It may be well to note here that the specimens collected on the Peaks of Otter in 1890 (Mem. Torr. Bot. Club, ii. 50) are this same form of *L. Canadense*, and though *L. Grayi* is reported from that mountain, we did not find it there. A. M. V.

Grows plentifully on the dry and open slopes of the Blue Ridge, and collected at the following localities: Iron Mountains from Skull Gap to the source of Dickey Creek, altitude 2,000–3,400 feet. Along Nick's Creek on the slopes of Pine Glade Mountain, altitude 2,500 feet. Slopes of White Top Mountain, altitude 2,700–5,000 feet. One of the characters which, however, can only be noticed in the field, is its delightful odor which often leads one to detect it before one's attention is attracted by its brilliant colors.

Lilium superbum, L. Slopes of White Top Mt., alt. 3,000 ft.

Lilium Philadelphicum, L. Lyon Gap, Walker Mt., alt. 2,800 ft. Skull Gap, Iron Mt., alt. 3,000 ft.

Chamælirium luteum (L.) A. Gray. Pond Mt., and Brushy Mt., alt. 2,800–3,000 ft.

Erythronium Americanum, Ker. Summit of White Top Mt., alt. 4,500–5,678 ft. Staley Creak near Marion, alt. 2,300 ft.

Uvularia perfoliata, L. Falls of the Middle Fork of the Holston, alt. 2,050 ft. Nick's Creek, alt. 2,300 ft.

Uvularia puberula, Michx. Skull Gap, Iron Mts., alt. 3,000 ft. Pond Mt., alt. 2,600–3,000 ft. Hills near Marion, alt. 2,500 ft. Brushy Mt., alt. 3,400. Kate's Mt., W. Va., alt. 3,300 ft.

Disporum lanuginosum (Michx.) Britton. Walker Creek at the base of Walker Mt., alt. 2,300 ft. Pond Mt., alt. 3,000 ft.

Clintonia borealis (Ait.) Raf. Summit and slopes of White Top Mt., alt. 4,800–5,678 ft. Pine Mt. alt. 3,000–4,900 ft.

Clintonia umbellata, Torr. Staley Creek near Marion, alt. 2,300 ft. Walker Creek, alt. 2,200 ft. Nick's Creek at the base of Pine Glade Mt., alt. 2,500 ft.

Some of the plants collected were noteworthy on account of the purple spotted and streaked corollas.

Medeola Virginica, L. Nick's Creek, at the base of Pine Glade Mt., alt. 2,600 ft.

Trillium erectum, L. Spruce swamps on White Top Mt., alt. 5,000 ft. Staley Creek near Marion, alt. 2,300 ft.

In the last named locality the plants collected had creamy white flowers. The same form was also noticed elsewhere.

Trillium erythrocarpum, Michx. Summit White Top Mt., alt. 5,678 ft. Nick's Creek, alt. 2,300 ft.

Melanthium Virginicum, L. Peak Creek, on Peak Mt., alt. 2,000 ft.

Veratrum viride, Ait. Pine Mt., alt. 3,000 ft.

Chrosperma muscætoxicum (Walt.) Kuntze. Summit of White Rock Mt., alt. 4,400 ft.

Stenanthium angustifolium, Michx. Peak Creek, on Peak Mt., alt. 2,200 ft.

Tradescantia Virginica, L. (*T. montana*, Shuttl. ined.) Slopes of White Rock, alt. 3,800 ft.

Typha latifolia, L. Peak Creek, on Peak Mt., alt. 2,200 ft.

Sparganium eurycarpum, Engelm. The Island, Marion, alt. 2,100 ft.

Arisæma triphyllum (L.) Torr. Pine Mt., alt. 4,600 ft. Nick's Creek and Hungry's Mother Creek, near Marion, alt. 2,300 ft. Hutton's branch, near Marion, alt. 2,300 ft.

In the last-named locality the plants grew on a hillside in dense woods and were over 1½ m., growing from nearly 6 cm. in diameter, stout rootstocks, the purplish flowers nearly 18 cm. long.

Acorus Calamus, L. Sugar Creek, near Marion, alt. 2,300 ft.

Sagittaria latifolia, Willd. var. *pubescens* (Muhl.) J. G. Smith. McHenry's Creek, base of Walker Mt., alt. 2,300 ft.

Potamogeton foliosus, Raf. (*P. pauciflorus*, Pursh.) Island Swamp, Marion, alt. 2,100 ft.

Juncus acuminatus, Michx. Sandy places along the New River at the mouth of Brush Creek, alt. 2,100 ft.

Juncus Canadensis, J. Gay. Swamps on the Iron Mts., alt. 3,000 ft. Banks of Dickey Creek, alt. 2,500 ft.

Juncus effusus, L. Sandy banks of the New River at the mouth of Brush Creek, alt. 2,100 ft. Island near Marion, alt. 2,100 ft.

Juncus marginatus, Rostk. Shores of the island at Marion, alt. 2,100 ft. Sandy shores of the New River near Brush Creek, alt. 2,100 ft.

Juncus tenuis, Willd. Wet places at the mouth of Brush Creek, alt. 2,100 ft. Along Hutton's Branch, alt. 2,500 ft.

Juncus tenuis, Willd. var. *secundus* (Poir.) Engelm. Sandy hillsides along the New River, alt. 2,150 ft.

Juncoides campestre (L.) Kuntze. (*Luzula campestris* DC.) Summit of Pond Mt., east of Marion, alt. 3,400 ft. Summit of White Top Mt., alt. 5,678 ft. Banks of Comer Creek near summit of Iron Mts., alt. 3,000 ft.

Juncoides pilosum (L.) Kuntze. (*Luzula pilosa*, Willd.) Staley's Knob, near Marion, alt. 2,300 ft. Eastern slope of White Top Mt., alt. 5,000 ft. Southern slope of White Rock Mt., alt. 4,000 ft. Iron Mts., near the source of Comer Creek, alt. 3,000 ft.

Cyperus filiculmis, Vahl. Sandy shore of the New River, alt. 2,100 ft. Near Lynchburg, alt. 500 ft.

Eleocharis ovata (Roth.) R. Br. Near the mouth of Brush Creek, alt. 2,100 ft.

Eleocharis palustris (L.) R. Br., var. *glaucescens* (Willd.) A. Gray. Banks of Staley Creek, near Marion, alt. 2,100 ft.

Eleocharis tenuis (Willd.) Schult. Wet places along East Fork Walker Creek, alt. 2,300 ft.

Scirpus atrovireus, Muhl. Swamp on Peak Mt., alt. 2,200 ft. Recorded in the "Revised Manual" as growing only as far south as New England. The plant, however, is very common as far south as Maryland, and abundant in the above locality.

Scirpus cyperinus (L.) Kunth. Swamps on Peak Mt., alt. 2,200 ft.

Scirpus lacustris, L. Island near Marion, alt. 2,100 ft. About a limestone spring below Saltville, alt. 2,200 ft.

Scirpus lineatus, Michx. Above Bristol, alt. 1,800 ft. Meadow along Sugar Creek, alt. 2,300 ft.

Scirpus polyphyllus, Vahl. Near the South Fork Holston River below Add Wolf, alt. 2,200 ft. Along Peak Creek, on Peak Mt., alt. 2,200 ft.

Scirpus sylvaticus, L. Swamp near the mouth of Brush Creek, alt. 2,100 ft. Near the South Fork Holston River below Add Wolf, alt. 2,200 ft.

Rynchospora glomerata (L.) Vahl. Wet places along Dickey Creek, alt. 2,900 ft.

Scleria triglomerata, Michx. Dry sandy slope of the Pinnacle near Cumberland Gap, alt. 3,000 ft.

Carex æstivalis, M. A. Curtis. Western slope of Mt. Rogers, alt. 4,700 ft. Summit of White Rock Mt., alt. 4,400 ft.

Carex canescens var. *brunnescens* (Pers.) B. S. P. Rocks on the summit of White Top Mt., alt. 5,678 ft. Summit of Pine Mt., alt. 4,900 ft.

Carex Careyana, Torr.? Woods along Beaver Branch, alt. 2,200 ft.

Carex cephalophora, Muhl. Northern slope of Brushy Mt., alt. 3,000 ft. On Walker Mt., near Chatham Hill Gap, alt. 3,000 ft. Southern slope of White Rock Mt., alt. 4,000 ft.

Carex communis, Bailey. Along Hungry's Mother Creek, alt. 2,100 ft. Rocks near the Falls of the Holston River, alt. 2,050 ft. Mountains east of Buchanan, alt. 1,100 ft. Cliffs along Dickey Creek, alt. 2,700 ft. Slopes and summit of Pine Mt., alt. 3,000–4,900 ft. Woods along Nick's Creek, alt. 2,500 ft. Rocks near the summit of White Top Mt., alt. 5,500 ft. Slopes and summit of Mt. Rogers, alt. 4,000–5,719 ft.

Carex crinita, Lam. Southern slope of Pond Mt., alt. 3,000 ft. Along Hutton's Branch, alt. 2,300 ft.

Carex cristata, Schw. Along Bear Creek, alt. 2,300 ft. Near Marion, alt. 2,100 ft.

Carex debilis, Michx. Pond Mt., east of Marion, alt. 3,000 ft. Western slope of Mt. Rogers, alt. 5,000 ft. Summit of White Rock Mt., alt. 4,400 ft.

Carex digitalis, Willd. Staley Knob east of Marion, alt. 2,400 ft. Gorge in Little Brushy Mt., near Broad Ford, alt. 2,200 ft. Limestone bluffs of the Middle Fork Holston River at Marion, alt 2,100 ft. Walker Mt. at Chatham Hill Gap, alt. 3,000 ft.

Carex echinata, Murray. Slopes of Brushy Mt., alt. 2,600 ft.

Carex folliculata. L. Swamp on Peak Mt., alt. 2,200 ft.

Carex Fraseri, Andrews. Slopes of Pine Glade Mt., along Nick's Creek, alt. 2,600 ft. Banks of Beaver Branch, alt. 2,100 ft. Iron Mt., near the source of Comer Creek, alt. 3,000 ft.

Carex gracillima Schw. Chatham Hill Gap on Walker Mt., alt. 3,000 ft.

Carex granularis, Muhl. River banks at Marion, alt. 2,100 ft. Meadows along Hutton's Branch, alt. 2,400 ft.

Carex grisea, Wahl. Sandy banks of the Middle Fork Holston River near Marion, alt. 2,100 ft. Hillside near Mollie's Knob, alt. 2,300 ft. Below the Falls of the Holston River, alt. 2,050 ft.

Carex Hitchcockiana, Dewey. Hillside near the base of Mollie's Knob, alt. 2,300 ft.

Carex intumescens, Rudge. Swamps on Peak Mt., along Peak Creek, alt. 2,200 ft.

Carex laxiculmis, Schwein. Summit of White Top Mt., alt. 5,678 ft.

Carex laxiflora, Lam. Southern slope of White Rock Mt., alt. 4,000 ft. Along the East Fork Walker Creek, alt. 2,300 ft. Banks of Nick's Creek, alt. 2,600 ft. Summit of Mt. Rogers, alt. 5,719 ft. Near Marion, alt. 2,100 ft.

Carex laxiflora, Lam., var. *plantaginea* (Schk.) Boott. East Fork Walker Creek, alt. 2,300 ft. Near the base of Mollie's Knob, alt. 2,200 ft. Along Nick's Creek, alt. 2,500 ft.

Carex laxiflora, Lam., var. *latifolia*, Boott. Cliff of Farmer Mt., along the New River, alt. 2,300 ft. Ledges along Bear Creek, alt. 2,300 ft. Banks of the Middle Fork Holston River, below Marion, alt. 2,100 ft. Along Staley Creek, near Marion, alt. 2,200 ft.

Carex lupulina, Muhl. Swamps about the island near Marion, alt. 2,100 ft.

Carex lurida, Wahl. Along Peak Creek, on Peak Mt., alt. 2,200 ft. Swamp on Walker Mt., about Chatham Hill Gap, alt. 3,000 ft. Island near Marion, alt. 2,100 ft. Woods about the Falls of the Holston River, alt. 2,050 ft.

Carex Pennsylvanica, Lam. Limestone bluffs of the Middle Fork Holston River, near Marion, alt. 2,100 ft. Cliffs above the East Fork Walker Creek, alt. 2,300 ft. Banks of Hungry's Mother Creek, alt. 2,200 ft.

Carex plantaginea, Lam. Rocks near the Falls of the Holston River, alt. 2,050 ft.

Carex polytrichoides, Muhl. Along Staley Creek, near Marion, alt. 2,200 ft.

Carex prasina, Wahl. Bed of Nick's Creek, alt. 2,600 ft. Along a stream by the base of Mollie's Knob, alt. 2,400 ft.

Carex rosea, Schk. Woods in Hungry Hollow, alt. 2,300 ft. Hillsides along Bear Creek, alt. 2,400 ft. Along Nick's Creek, alt. 2,500 ft.

Carex rosea, Schk., var. *radiata*, Dewey. On Walker Mt., near Chatham Hill Gap, alt. 3,000 ft. Summit of Pine Mt., alt. 4,900 ft. Western slope of Mt. Rogers, alt. 5,000 ft. Along Beaver Branch, alt. 2,200 ft. Southern slope of White Rock Mt., alt. 4,000 ft. McGrady's Greek, near the base of White Rock Mt., alt. 2,500 ft.

Carex scabrata, Schw. In a stream in the valley between White Top Mt. and the Iron Mts., alt. 2,800 ft. Bed of Nick's Creek, alt. 2,600 ft.

Carex scoparia, Schk. Woods along Beaver Branch, alt. 2,100 ft. On the island near Marion, alt. 2,100 ft. Cliffs of Farmer Mt., along the New River, alt. 2,200 ft.

Carex sparganioides, Muhl. River bank opposite Marion, alt. 2,100 ft.

Carex stenolepis, Torr. Shore of the island near Marion, alt. 2,100 ft.

Carex s'ipata, Muhl. Northern slope of White Top Mt., alt. 4,600 ft,

Carex torta, Boott. Banks of Dickey Creek, alt. 2,600 ft.

Carex tribuloides, Wahl. Along Hungry's Mother Creek, alt. 2,200 ft.

Carex triceps, Michx. Banks of Bear Creek, alt. 2,500 ft. Slopes of Round Top Mt., west of Seven Mile Ford, alt. 2,600 ft. Walker Mt., near Chatham Hill Gap, alt. 3,000 ft. About Marion, alt. 2,100 ft.

Carex vulpinoidea, Michx. Slopes of Round Top Mt., west of Seven Mile Ford, alt. 2,500 ft. Island near Marion, alt. 2,100 ft.

Carex virescens, Muhl. Cliffs along Dickey Creek, alt. 2,800 ft. Ledges of Farmer Mt., along the New River, alt. 2,300 ft.

Paspalum setaceum, Michx. New River at the mouth of Brush Creek, alt., 2,200 ft.

Panicum ciliatum, Ell. Lynchburg, alt. 500 ft.

Panicum clandestinum, L. Peak Creek, on Peak Mt., alt. 2,200 ft.

Panicum commutatum, Schultes. Dickey Creek, Iron Mt., alt. 2,600 ft. Falls of the Holston below Marion, alt. 2,050 ft.

Panicum Crus-galli, L. Near Marion, alt. 2,100 ft.

Panicum depauperatum, Muhl. Base of Walker Mt., alt. 2,400 ft. Slopes and summit of Pond Mt., alt. 2,500–3,000 ft. In gorge near Broadford, alt. 3,000 ft.

Panicum dichotomum, L. Pinnacle, alt. 3,000 ft.

Panicum laxiflorum, Lam. Chatham Hill Gap, Walker Mt., alt. 3,000 ft. New River at mouth of Brush Creek, alt. 2,200 ft. Middle Fork of the Holston at Marion, alt. 2,100 ft. Hitherto not known north of North Carolina.

Panicum microcarpon, Muhl. Peak Creek, on Peak Mt., alt. 2,200 ft.

Panicum nitidum, Lam.? Chatham Hill Gap, Walker Mt., alt. 3,000 ft. Middle Fork Holston River, alt. 2,100 ft. Rye Valley, alt. 2,500 ft. Bear Creek, alt. 2,200 ft.

Panicum ovale, Ell. Chatham Hill Gap, Walker Mt., alt. 3,000 ft.

Panicum pubescens, Lam., var. *barbulatum* (Michx.) Britt. Chatham Hill Gap, Walker Mt., alt. 3,000 ft. Beaver Branch, alt. 2,500 ft.

Panicum ramulosum, Michx. Lynchburg, alt. 500 ft.

Panicum Walteri, Poir. Marion Bluff, alt. 2,100 ft. Chatham Hill Gap road, at the base of Walker Mt., alt. 2,400 ft. Shannon Gap, Walker Mt., alt. 2,800 ft. Dickey Creek, alt. 2,700 ft. Nick's Creek, base of Pine Glade Mt., alt. 2,500 ft. Rye Valley, alt. 2,500 ft. New River, at mouth of Brush Creek, alt. 2,200 ft. Beaver Creek, alt. 2,200 ft., var. *molle* (Vasey) Porter. Banks of the Middle Fork of the Holston, at Marion, alt. 2,100 ft.

Chamæraphis glauca (L.) Kuntze. (*Setaria glauca*, Beauv.) River banks, Marion, alt. 2,100 ft.

Chamæraphis viridis (L.) Porter. (*Setaria viridis*, Beauv.) Along New River, at the mouth of Brush Creek, alt. 2,200 ft.

Phalaris Canariensis, L. The Island, Marion, alt. 2,100 ft.

Brachyelytrum aristosum (Michx.) B. S. P. Nick's Creek, alt. 2,600 ft. Mouth of Hungry's Mother Creek, alt. 2,075 ft.

Phleum pratense, L. Marion fields, alt. 2,100 ft.

Agrostis alba, L. Peak Creek, Peak Mt., alt. 2,200 ft. Reed Creek, at base of Lower Rocks, alt. 2,000 ft.

Agrostis perennans, Turckerm. Skull Gap, Iron Mts., alt, 3,000 ft.

Trisetum Pennsylvanicum (L.) B. S. P. Chatham Hill Gap, Walker Mt., alt. 3,000 ft. Brushy Mt., alt. 3,400.

Arrhenatherum elatius (L.) M. & K. Near Marion, alt. 2,100 ft.

Danthonia compressa, Austin. Fields near Marion, alt. 2,100 ft. Base of Walker Mt., on Chatham Hill Gap road, alt. 2,400 ft.

Eatonia Dudleyi, Vasey. Hills and woods near Marion, alt. 2,100 ft. Brushy Mt., alt. 3,400 ft. Pond Mt., alt. 3,000 ft. Mountains about Buchanan, alt. 1,300 ft.

Poa compressa, L. Woods and river banks near Marion, alt. 2,100 ft. West slope of Mt. Roger, alt. 2,800–5,500 ft.

Poa debilis, Torr. Slopes and summit of Pond Mt., alt. 2,500–3,000 ft. Northeast slope White Top Mt., alt. 4,000–5,000 ft. Staley Creek and woods near Marion, alt. 2,100–2,300 ft.
It was somewhat of a surprise to find this grass so far south, Northern Pennsylvania being its southern limit formerly.

Poa sylvestris, A. Gray. Walker Mt., on the Chatham Hill Gap road, alt. 2,400 ft. Along road near Mollie's Knob, alt. 2,300 ft.

Panicularia elongata (Torr.) Kuntze. (*Glyceria elongata*, Trin.) Nick's Creek, at the base of Pine Glade Mt., alt. 2,500 ft. Hog-trough Creek, base of Iron Mts , alt. 2,600 ft.

Panicularia nervata (Willd.) Kuntze. (*Glyceria nervata*, Trin.) Chatham Hill Gap, Walker Mt., alt. 2,800 ft. River banks, Marion, alt. 2,100 ft.

Festuca elatior, L. Falls of the Holston (Middle Fork), alt. 2,050 ft.

Festuca nutans, Spreng. Staley Creek, near Marion, alt. 2,300 ft. Marion Bluffs, alt. 2,100 ft. Slopes of Pond Mt., alt. 3,000 ft.

Festuca octoflora, Walt. (*Festuca tenella*, Willd.) Pinnacle, alt. 3,500 ft.

Bromus ciliatus, L. Vicinity of Marion, alt. 2,100 ft. Falls of the Holston River, alt. 2,050 ft.

Bromus secalinus, L. Cumberland Gap, alt. 1,500 ft.

Elymus Canadensis, L. River banks, Marion, alt. 2,100 ft.

Hystrix Hystrix (L.) Millsp. (*Asprella Hystrix*, Willd.) River banks, Marion, alt. 2,100 ft.

Thuja occidentalis, L. At the mouth and upper waters of Hungry's Mother Creek, alt. 2,075–2,300 ft. Falls of the Holston River, alt. 2,500 ft. Along Reed Creek near Wytheville, alt. 2,000 ft.

Plentiful along the creeks in the valley of the Middle Fork of the Holston River, especially where the banks are rocky and cañon-like. Some large trees were noticed both at the Falls of the Holston and along Reed Creek. Measurements of the largest trees were taken which showed trunks at each locality of about fifteen feet in circumference.

Juniperus Virginiana, L. Banks of Reed Creek near Wytheville, alt. 2,000 ft. Near Marion, alt. 2,100 ft.

Taxus minor (Michx.) Britton. (*Taxus Canadensis*, Willd.) Along Hungry's Mother Creek, near the mouth, alt. 2,075 ft. Banks of the Middle Fork Holston River below the Falls, alt. 2,050 ft. Hitherto the yew was known to occur only as far south as Central Pennsylvania.

Pinus Virginiana, Mill. Along Peak Creek, on Peak Mt., alt. 2,200 ft. Slopes of Kate's Mt., W. Va., alt. 3,300 ft. Western slope of the Pinnacle, near Cumberland Gap, alt. 3,300 ft. Iron Mts., alt. 3,000 ft. Near Lynchburg, alt. 500 ft.

Pinus pungens, Michx. f. On Walker Mt., at Chatham Hill Gap, alt. 3,000 ft. On Round Top Mt., west of Seven Mile Ford, alt. 3,000 ft.

Apparently confined to the Alleghanies in the region explored.

Pinus rigida, Mill. On Peak Mt., alt. 2,200 ft. Slopes of Round Top Mt., west of Seven Mile Ford, alt. 2,600 ft.

Pinus Strobus, L. Mountains about Comer Creek, alt. 2,600 ft.

Picea rubra (Lamb.) Link. Slopes and summit of White Top Mt., alt. 4,800–5,678 ft. Mt. Rogers, alt. 4,900–5,719 ft. Pine M., alt. 4,900 ft.

Picea Mariana (Mill.) B. S. P. White Top Mt., alt. 5,000–5,678 ft. Pine Mt., alt. 4,900 ft. Mt. Rogers, alt. 5,719 ft.

Abies Fraseri, Lindl. The Southern fir had not as yet been collected north of the southern boundary of Virginia. To find the species within limits of the Northern States was one of our objects. After failing to secure it on any of the higher mountains explored, Mt. Rogers, the highest peak in Virginia, was resorted to. It was found to grow extensively on the upper parts of the mountain, extending from an elevation of about 5,000 feet to the summit, 5,719 feet above the level of the sea. The growth was very fine and many large trees were observed. The mountain being wooded to the top, the soil and rocks are the damp most of the time, and the forest is less exposed to violent storms and winds than the more open peaks of North Carolina

Tsuga Canadensis (L.) Carr. Iron Mts. about Comer Creek, alt. 3,000 ft. Along Peak Creek, on Peak Mt., alt. 2,200 ft.

Tsuga Caroliniana, Engelm. In a deep gorge in Little Brushy Mt., near Broad Ford, alt. 2,100 ft. Slopes of Farmer Mt., on the New River, alt. 2,200 ft.

The discovery of this very interesting hemlock at the two stations recorded brings it well into the limits of the Northern flora. Heretofore its northern limit was Blowing Rock Mountain, North Carolina.*

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* Mem. Torr. Bot. Club, iii. 14.

Selaginella apus (L.) Spring. Bristol, alt. 1,900 ft. East bank of the Holston River, alt. 2,200 ft.

Lycopodium complanatum, L. Along South Fork of the Holston near Comer's Creek, alt. 2,600 ft.

Lycopodium obscurum, L. Dickey Creek, Iron Mts., alt. 3,000 ft.

Lycopodium lucidulum, Michx. Summit White Top Mt., alt. 5,678 ft. Peak Creek, Peak Mt., alt. 2,200 ft. Nick's Creek, at base of Pine Glade Mt., alt. 2,500 ft.

One small plant had the fruiting branches erect and crowded as in *L. Selago*.

Equisetum arvense, L. Banks of the Middle Fork of the Holston, alt. 2,100 ft.

Equisetum hyemale. L. Ravine of the Middle Fork of the Holston, alt. 2,000 ft. Reed Creek, at base of Lower Rocks, alt. 2,000 ft.

Botrychium Virginianum (L.) Sw. Dickey Creek, alt. 2,500 ft. Var. *gracile* (Pursh.) Eaton. Base of Walker Mt., on Chatham Hill road, alt. 2,500 ft.

Polypodium polypodioides (L.) A. S. Hitchcock. Banks of the Middle Fork of the Holston at Marion, alt. 2,100 ft. On rocks!

Growing on ledges in much the same way as it does in the valleys of North Carolina. We have not observed *P. incanum* on trees in the mountains, and in fact, after careful inquiry, can learn of no such instances, while it is not at all a rare sight to see *P. vulgare* growing on trees, especially on the higher peaks.* However in the warmer district *P. incanum* prefers to grow on trees and often completely clothes large trunks.

Polypodium vulgare, L. Summit White Top Mt., alt. 5,678 ft. Slopes of Pine Mt., alt. 4,000 ft.

Adiantum pedatum, L. Mouth of Hungry's Mother Creek, alt. 2,000 ft.

Pteris aquilina, L. Woods near Marion, alt. 2,100 ft.

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* Mem. Torr. Club, iii., 18.

Pellæa atropurpurea (L.) Link. Banks of the Holston at Marion, alt. 2,100 ft. Shannon Gap, Walker Mt., alt. 2,800 ft. Reed Creek, alt. 2,000 ft. Buchanan, alt. 1,100 ft.

Asplenium acrostichoides, Sw. Lynchburg, alt. 500 ft. Slopes of White Top Mt., alt. 5,000 ft.

Asplenium Filix-fœmina (L.) Bernh. Slopes of White Top Mt., alt. 5,000 ft.

Asplenium montanum, Willd. Peak Creek, on Peak Mt., alt. 2,200 ft. Nick's Creek, alt. 2,600 ft. White Rock Mt., alt. 4,400 ft. Dickey Creek, Iron Mts., alt. 2,800 ft. The fronds from the last-named locality were in some cases 18 cm. long.

Asplenium parvulum, Mart. & Galeotti. River bank, Marion, alt. 2,100 ft. Laurel Creek, near Broadford, alt. 2,200 ft. Reed Creek, alt. 2,000 ft. Buchanan, alt. 1,100 ft.

Asplenium platyneuron (L.) Oakes. River Bluffs, Marion, alt. 2,100 ft. Rye Valley, alt. 2,400 ft. Chatham Hill Gap, alt. 3,000 ft.

Asplenium Ruta-muraria, L. River bank, Marion, alt. 2,100 ft. Reed Creek, alt. 2,000 ft.

Asplenium Trichomanes, L. Staley Creek, Marion, alt. 2,300 ft. Along New River, at mouth of Brush Creek, alt. 2,200 ft. Fronds 25 cm. long at the last-named locality.

Camptosorus rhizophyllus (L.) Link. Dickey Creek, alt. 2,500 ft. Banks of the Middle Fork of the Holston, alt. 2,100 ft. Mouth of Hungry's Mother Creek, alt. 2,075 ft. Round Top Mt., west of Seven Mile Ford, alt. 3,300 ft. Reed Creek, at base of Lower Rocks, alt. 2,000 ft. Fronds 25–35 cm. long.

Phegopteris hexagonoptera (Michx.) Fee. Lynchburg, alt. 500 ft. Beaver Creek, base of Walker Mt., alt. 2,400 ft.

Dryopteris acrostichoides (Michx.) Kuntze. Hills near Marion, alt. 2,100 ft. Nick's Creek, alt. 2,100 ft.

Var. *Schweinitzii* (Beck.) Falls of the Middle Fork of the Holston River, alt. 2,050 ft.

Dryopteris Goldieana (Hook.) A. Gray. White Top Mt. alt. 4,700 ft.

Dryopteris marginalis (L.) A. Gray. Nick's Creek, alt. 2,400 ft. Slopes of White Top Mt., alt. 4,500 ft. Hungry's Mother Creek, Marion, alt. 2,200 ft. Reed Creek, at base of Lower Rocks, alt. 2,000 ft.

Dryopteris Noveboracensis (L.) A. Gray. Nick's Creek, alt. 2,500 ft. White Top, alt. 4,500 ft.

Dryopteris spinulosa (Retz.) Kuntze. Slopes of White Top, alt. 4,500 ft.

Dryopteris spinulosa dilatata (Hook.) Kuntze. Nick's Creek, alt. 2,400 ft. Mt. Rogers, alt. 6,719 ft. Summit White Top Mt., alt. 5,678 ft.

The fronds from the last-named locality were over 1 m. 30 cm. high.

Dryopteris spinulosa intermedia (Muhl.) Underwood. Slopes of White Top Mt., alt. 5,000 ft. Pine Mt., alt. 4,900 ft. West slope of Mt. Rogers, alt. 4,800–5,500 ft.

Cystopteris bulbifera (L.) Bernh. Banks of the Middle Fork of the Holston, alt. 2,100 ft.

Cystopteris fragilis (L.) Bernh. Pond Mt., alt. 3,000 ft. Walker Mt., Shannon Gap, alt. 3,000 ft.

Onoclea sensibilis, L. Banks of the Middle Fork of the Holston, alt. 2,100 feet.

Woodsia obtusa (Spreng.) Torr. Lynchburg, alt. 500 ft. Near Broadford, on the North Fork of the Holston, alt. 2,200 ft.

Dicksonia punctilobula (Michx.) A. Gray. Below the summit of White Top Mt., alt. 5,500 ft., in open pastures. Along White Top Creek, alt. 2,600 ft.

Osmunda cinnamomea, L. Nick's Creek, alt. 2,400 ft. White Top Mt., alt. 5,678 ft. Iron Mt., alt. 3,000 ft.

Osmunda Claytoniana, L. Slopes of White Top Mt., alt. 5,000 ft. Pond Mt., alt. 2,400 ft. Staley Knob, near Marion, alt. 2,200 ft.

Osmunda regalis, L. Brushy Mt., alt. 3,000 ft.

BRYOPHYTA.

MUSCI.

NAMED BY ELIZABETH G. BRITTON.

Sphagnum cymbifolium, Ehrh. Brushy Mt., alt. 2,800 ft.

Sphagnum imbricatum (Hornch.) Russ. var. *affine*, R. & C. Dickey Creek, alt. 2,500 ft.

Sphagnum quinquefarium (Braithw.) Warnst. Summit of White Top, alt. 5,678 ft. On vertical face of cliffs.

Andreæa petrophila, Ehrh. Summit of White Top Mt. On rocks, alt. 5,678 ft.

Andreæa Rothii, Web. & Mohr. (*A. rupestris* Turn.). Summit of White Rock Mt. On white sandstone, alt. 4,400 ft. Dickey Creek. On perpendicular cliffs, alt. 2,800 ft.

Polytrichum commune, L. On summit of White Top Mt. In wet ground, alt. 5,678 ft. Also on the borders of fir woods.

Polytrichum juniperinum, Willd. Comer Creek and Staley's Creek, alt. 2.200–2,500 ft.

Polytrichum Ohioense, Ren. & Card. Along Nick's Creek. In sandy soil, alt. 2,600 ft. On Round Top Mt. In sand, alt. 3,000 ft. Summit of White Top Mt. On ground and rocks, alt. 5,678 ft. Upper slopes of Mt. Rogers. On ground, alt. 5,000–5,719 ft.

Polytrichum gracile, Dicks. Ledges on cliffs of Dickey Creek, alt. 3,000 ft.

Pogonatum tenue (Menz.) E. G. Britton. (*P. brevicaule*, Beauv.) Banks of Nick's Creek. On clay. alt. 2,500 ft. Roadside, Nick's Creek, alt. 2,500 ft. Green Cove Springs, alt. 3,000 ft.

Catharinea angustata, Brid. North of Bristol. On ground, alt. 1,800 ft. Pond Mt. along Staley Creek, alt. 2,200 ft.

Catharinea undulata (L.) W. & M. Banks of Holston River at Marion. On ground, alt. 2,100 ft. Bed of Nick's Creek. In mud, alt. 2,500 ft. Wet rocks, summit of White Top, alt. 5,678 ft.

Georgia pellucida (L.) Rab. Along Bear Creek. On stumps, alt. 2,200 ft. (Long capsules). Summit of White Top Mt. On rotten wood, alt. 5,678 ft.

Webera sessilis (Schmid.) Lindb. (*Diphyscium foliosum*, Mohr.) Slopes of Pond Mt., east of Marion. On sandy ground, along dry roadsides, alt. 2,800 ft. Also in wet holes, banks of rivulet, covering the clay banks, fine specimens, alt. 3,000 ft. Banks of Nick's Creek. On wet, perpendicular rock, alt. 2,500 ft. Wet banks of Comer Creek, Brushy Mt., alt. 2,600 ft. In wet hole, Dickey Creek, alt. 3,000 ft.

The plants growing in wet shaded localities were much more leafy, less fertile and fruit larger than those growing in dry locations.

Fissidens adiantoides (L.) Hedw. South Fork of Holston River, near mouth of Hog-trough Creek. On roots, alt. 2,200 ft. Fall of Holston River. On sand, alt. 2,050 ft.

Fissidens decipiens, De Not. Falls of Holston River. On limestone cliffs, alt. 2,050 ft. On old logs in Spruce Swamp, on White Top, alt. 4,800 ft. On the ground, Comer Creek, Brushy Mt., alt. 2,600 ft. Pine Mt., alt. 3,500 ft.

Fissidens subbasilaris, Hedw. Eastern slope of White Top Mt. On rotten bark, alt. 5,000 ft. On Chatham Hill road, near base of Mollie's Knob. On dead wood, alt. 2,200 ft. On logs in woods, South Fork of the Holston River. Hungry's Mother Creek, alt. 2,200 ft.

Fissidens grandifrons, Brid. At Falls of Holston River. On limestone rocks, alt. 2,050 ft.

Astrophyllum cuspidatum (L.) Lindb. (*Mnium affine*, Bland.) Bed of Nick's Creek, on mud, alt. 2,600 ft. In valley between White Top and the Iron Mts., on ground, alt. 2,600 ft. Chatham Hill Gap, Walker Mt., on wet sand, alt. 3,300 ft. Eastern slope of White Top Mt., on ground, alt. 5,000 ft. Falls of Holston River, on sand, alt. 2,050 ft. Slopes of Pine Mt., near Troutdale, alt. 3,000–4,000 ft.

Astrophyllum sylvaticum, Lindb. (*Mnium cuspidatum*, Hedw.) Along Hungry's Mother Creek, on ground, alt. 2,200 ft. Banks of the Holston at Marion, alt. 2,100 ft.

Astrophyllum punctatum (L.) Lindb. In bed of stream near summit of White Top, alt. 5,600 ft. Large and sterile. On eastern slope of White Top Mt., in mud, alt. 3,500 ft. In crevices of mountain rocks near summit, alt. 5,670 ft. Small, sterile. In bed of Nick's Creek, on mud, alt. 2,500 ft. Large and sterile. Western slope of Chestnut Ridge, in mud, alt. 3,000 ft. Bear Creek, on mountain rocks, alt. 2,300 ft.

Astrophyllum hornum (L.) Lindb. Along Dickey Creek, in wet sand, alt. 2,800 ft. Fruiting. Comer Creek, alt. 3,000 ft. Fruiting. Nick's Creek, alt. 2,600 ft. On limestone rocks. Sterile.

Astrophyllum rostratum, Schrad. Banks of Hungry's Mother Creek, in wet springy places, alt. 2,200 ft. Summit of White Top Mt., on rocks, alt. 5,678 ft. Wet banks near the Falls of the Holston, alt. 2,050 ft.

Sphærocephalus heterostichus (Brid.) E. G. Britton. Along Hungry's Mother Creek, on old log, alt. 2,200 ft. On Staley Knob, east of Marion, on wood, alt. 2,300 ft. At Falls of Holston River, on sand, alt. 2,050 ft. East Fork of Walker Creek, on damp, perpendicular cliff, alt. 2,200 ft.

Sphærocephalus palustris (L.) Lindb. On slopes of Brushy Mt. In bog, alt. 2,600 ft. Sterile.

Var. *polycephalum* (Br. & Sch.). Bear Creek, Bear Branch, alt. 2,200 ft. Sterile.

Bartramia pomiformis (L.) Hedw. Kate's Mt., W. Va. On ground, alt. 3,300 ft. Along Hungry's Mother Creek. On rocks, alt. 2,200 ft. Banks of Nick's Creek. On sandstone rocks, alt. 2,600 ft. On East Fork of Walker Creek. On perpendicular rocks, alt. 2,200 ft. In Hungry Hollow. At base of trees, alt. 2,200 ft. Summit of White Top, alt. 5,678 ft. On wet rocks, on the East side.

Philonotis fontana (L.) Brid. Eastern slopes of Walker Mt. At Chatham Hill Gap. On sandstone rocks, alt. 3,200 ft. In Staley's Creek, East of Marion. On old log, alt. 2,200 ft. Banks of Holston River, at Marion. On ground, alt. 2,100 ft. Along Bear Creek. On ground, alt. 2,300 ft.

Pohlia nutans (Schreb.) Lindb. (*Bryum nutans*, Schreb.) Summit of White Rock Mt. On white sandstone, alt, 4,400 ft.

Pohlia elongata, Hedw. Summit of White Top. On wet rocks and banks, alt. 5,678 ft.

Pohlia albicans (Wahl.) Lindb. (*Bryum albicans* Wahl.) Along a small branch of Hungry's Mother Creek, three miles north of Marion. On clay and sand, alt. 2,200 ft.

Bryum intermedium, Brid. Nick's Creek, alt. 2,200 ft.

Bryum ventricosum, Dicks. At the Falls of the Holston River. On limestone rocks, alt. 2,050 ft. Slopes of Pine Mt. On wet ground, alt. 4,000 ft. Summit of White Top Mt. On ground, alt. 5,678 ft. Bear Creek, alt. 2,200 ft. Hutton's Branch, on wet logs, alt. 2,300 ft.

Bryum atropurpureum, Wahl. Summit of White Top Mt. On ground, alt. 5,678 ft. East Fork Walker Creek. On ground, alt. 2,200 ft. Nick's Creek, alt. 2,500 ft. Burnt patches in fields, Bear Creek, alt. 2,200 ft.

Bryum bimum, Schreb. Along Hutton's Creek. On wet ground, alt. 2,250 ft. Staley's Creek, near Marion, alt. 2,200 ft. East bank of the Holston, near Marion. On wet rocks, alt. 2,100 ft.

Bryum cæspiticium, L. Banks of Nick's Creek. On rotten wood, alt. 2,600 ft. On burnt logs, Fox Creek Valley. Slopes of Iron Mt., alt. 3,000 ft.

Bryum capillare, L. On ledges, Walker Mt., Shannon Gap, alt. 4,000 ft. Sterile. Cliffs of White Rock, alt. 4,400 ft. Sterile.

Bryum argenteum, L. At Marion. On rotten roof, alt. 2,100 ft. Summit of White Top Mt. On ground, alt. 5,678 ft. Wet ledges, White Rock, alt. 4,400 ft. Nick's Creek, alt. 2,500 ft.

Bryum proliferum (L.) Sibth. Summit of White Top Mt. On stumps, alt. 5,678 ft. Eastern slope of White Top Mt. On old stump, alt. 4,800 ft. Green Cove. On old stumps, alt. 3,000 ft. Pine Mt., near Troutdale, alt. 3,500 ft. East bank of the Holston, near the falls, alt. 2,050 ft. Wet rocks, Walker Mt., Shannon Gap, alt. 2,800 ft.

Funaria hygrometrica (L.) Sibth. Along Holston River, Marion, On ground, alt. 2,100 ft. Banks of Nick's Creek. On wet ground, alt. 2,500 ft. On Bear Creek. In wet clay, alt. 2,250 ft. Banks of Peak Creek, on Peak Mt. On ground, alt. 2,200 ft. Staley's Creek, alt. 2,200 ft.

Physcomitrium turbinatum, Michx. (*Physcomitrium pyriforme* of L. & J. Man.) Staley's Creek and Pond Mt., alt. 2,200 ft.

Barbula humilis, Hedw. (*B. cæspitosa*, Schwægr.) Along Nick's Creek. On rotten wood, alt. 2,400 ft. Hungry Hollow. On old wood, alt. 2,200 ft. Along Holston River, at Marion. On rocks, alt. 2,100 ft. Staley's Knob. On ground, alt. 2,500 ft. Eastern slope of Walker Mt. On ground, alt. 3,000 ft.

Barbula reflexa, Brid. (*B. recurvifolia*, Sch.) Along Holston River, at Marion. In spring, alt. 2,075 ft. On limestone rocks, forming dense brown cushions. Sterile. Bear Creek, alt. 2,300 ft.

Tortella cæspitosa (Schwægr.) Limpr. (*Barbula cæspitosa*, Schwægr.) Summit of Walker Mt., alt. 2,000 ft. Nick's Creek, alt. 2,300 ft. Roadsides at Marion, alt. 2,100 ft.

Encalypta streptocarpa, Hedw. Bear Creek. On limestone rocks, alt. 2,250 ft. Dickey Creek. On rocks with *Fabronia octoblepharis*, alt. 2,600 ft.

Mollia viridula (L.) Lindb. Along Holston River, Marion. On stones, alt. 2,100 ft. Banks of Nick's Creek. On rocks, alt. 2,600 ft.

Mollia tenuirostris (Hook. & Taylor) Lindb. (*Didymodon cylindricus*, Br. & Sch.) In crevices of wet rocks. Sterile. Summit of White Top, alt. 5,678 ft.

Gymnostomum rupestre, Schwægr. Along Hutton's Branch. On damp rock, alt. 2,200 ft. Forming calcareous tufa. Falls of the Holston River, alt. 2,050 ft. Associated with *Fissidens grandifrons*.

Leucobryum glaucum (L.) Br. & Sch. Along Staley's Creek, near Marion. On ground, alt. 2,200 ft. Sterile.

Leucobryum albidum (Brid.) Lindb. Along Dickey Creek. In damp sand, alt. 3,000 ft. c. fr. Banks of Nick's Creek. On ground, alt. 2,500 ft. c. fr.

Dicranum scoparium (L) Hedw. Summit of White Top Mt., on trees, alt. 5,678 ft. Also on wet rocks mixed with *Polytrichum Ohioense*. Banks of Nick's Creek, on ground, alt. 2,500 ft. Along Staley's Creek, alt. 2,300 ft. On logs in dense woods, Pine Mt., alt. 4,000 ft.

Dicranum scoparium (L.) Hedw. var. *rupestre*, Sull. & Lesq. Summit of Pond Mt. On rocks, mixed with *D. spurium*, alt. 3,400 ft.

Dicranum spurium, Hedw. Summit of Pond Mt., near Marion. On ground, alt. 3,400 ft.

Dicranum Bonjeani, De Not. (*D. palustre*, La Pyl.) Summit of White Rock. Forming dense sterile patches, in depressions where the water stands, alt. 4,400 ft.

Dicranum flagellare, Hedw. Along Nick's Creek, in cracks of old logs, alt. 2,500 ft. Pond Mt., Staley Creek, alt. 2,200 ft. On rotten logs, wet places on Walker Mt., alt. 3,000 ft. Summit of the ridge of Iron Mt., alt. 3,100 ft. Comer Creek, alt. 2,600 ft.

Dicranum fulvum, Hook. Chatham Hill Gap, on Walker Mt., on sandstone, alt. 3,000 ft. Summit of Pine Mt., on rocks, alt. 4,900 ft. Bear Creek, on sandstone rocks, alt. 2,300 ft. East slope of White Top, alt. 5,000 ft. Summit of White Top, alt. 5,678 ft. On rocks in the bed of stream in Dickey's Creek, alt. 3,000 ft. Also on sandstone rocks with *Umbilicaria*, along Dickey's Creek, alt. 2,600 ft. Eastern slope of White Top Mt., on trunks of trees, alt. 5,000 ft.

A peculiar form in habit and general aspect was found at the same locality, alt. 3,500 ft. Growing on living trees of *Betula lutea* and *Fagus ferruginea*, about 10 or 12 feet from the ground, forming dense cushions and abundantly fruiting. In aspect and habit quite distinct from all other forms of *D. fulvum*, collected on rocks. Color yellowish-brown, stems densely matted with ferrugineous tomentum, leaves quite curly and serrate at tip, but frequently broken off as in *D. viride*. Diœcious: Antheridia terminal in buds on separate plants or occasionally in small buds on the tomentum, of either the archegonial or antheridial plants.

Dicranum viride (Sull. & Lesq.) Sch. Slemp Creek, Nick's Creek and Hungry's Mother Creek, alt. about 2,500 ft. Sterile. Falls of the Holston River, alt. 2,050 ft. on old log, fruiting. The Manual says, on page 69: "Not rare in the Northern States, but not yet found in fruit." We have 8 localities in our herbarium in which fruit has been collected!

On June 8th the plants were still young, and the capsules either immature or old but still complete enough to enable me to supplement the description in the Manual with the fruit. Inflorescence diœcious? Perichætium sheathing, bracts 3–5mm. long innermost tapering and broken off at tip, outer suddenly subulate, pedicels 8–10mm. long, erect, scarcely twisted, capsules erect, straight, cylindric or narrowly ovoid, smooth or slightly wrinkled when old, not sulcate, 2–5mm. long, with a straight beak, 1mm. long, mouth small, operculum conic rostrate, annulus narrow, falling with the lid, peristome short, regular, teeth split to middle, pale above, striolate below, trabeculate. Spores not seen. The base of the leaves as figured in Sullivant's Icones is not correct, as the cells next the vein are lax and hyaline, those of the basal angles thick-walled and brown, as figured in the Bryologia Europæa Supplement T. 1. None of our capsules are quite as mature as that figured by Schimper, but one collected by Austin in the Catskill Mts. in 1875 is exactly as drawn.

Dicranum fuscescens, Turner. Summit of Mt. Rogers. On trees, alt. 5,719 ft. In dense masses on wet rocks, summit of White Top, alt. 5,678.

Dicranum longifolinm, Ehrh. Summit of White Top Mt. Fruiting. Eastern slope of White Top Mt., on trunks of *Picea*, alt. 4,800 ft. On twigs and trunks of *Picea*, alt. 5,678 ft. Fruiting, also sterile. On wet rocks, southwestern side of summit of White Top, alt. 5,678, ft., with *Campylopus Virginicus* and *Zygodon excelsus* not showing its glaucous green color and lustre till dried. On summit and slope of Mt. Rogers. On trunks of evergreen trees, alt. 5,000–5,719 ft. Summit of Pine Mt. On trunks of *Picea Canadensis*, alt. 4,900 ft.

Dicranum montanum Hedw. Slemp Creek (Brushy Mt.). On old log in swamp, alt. 2,800 ft. Sterile and rare.

Onchophorus crispatus (Dicks.) Lindb. [*Rhabdoweisia denticulata* (Brid.)] Summit of White Rock Mt. On soil collected on white sandstone, alt. 4,400 feet, fruiting abundantly June 22d. Summit of White Top Mt., mixed with *Didymodon cylindricus*, fruiting May 28th, alt. 5,678 ft. On wet rocks, Dickey Creek, alt. 3,000 ft. Archegonial plants, June 17th.

Campylopus Virginicus (Aust.) L. & J. Summit of White Top Mt. On sandstone (wet), alt. 5,678 ft. Summit of White Rock Mt. On white sandstone, alt. 4,400 ft.

Dicranella heteromalla (L.) Schimp. Eastern slope of White Top Mt. On ground, alt. 3,000 ft. Along White Top Creek. On sand, alt. 2,600 ft. Chatham Hill Gap, Walker Mt., alt. 3,000 ft. Brushy Mt. Along Slemp Creek, alt. 2,700 ft. Growing with *Campylopus Virginicus* on wet cliffs, northwest side of White Top Mt., alt. 5,678 ft. An unusual habitat and peculiar form of this common species, remarkable for its short recurved pedicels!

Ditrichum pallidum, Schreb. Along Nick's Creek. On clay soil, alt. 2,500 ft. Shannon Gap, Walker Mt., alt. 3,100 ft. On rocks. Summit of Iron Mt., near Troutdale, alt. 3,300 ft. Bristol, alt. 1,800 ft.

Ceratodon purpureus (L.) Brid. Marion. On rotten roof, alt. 2,100 ft. Along Hungry's Mother Creek. On burned wood, alt. 2,200 ft. On East Fork Walker Creek. On ground, alt. 2,200 ft. Bear Branch of Bear Creek, alt. 2,300 ft.

Orthotrichum Ohioense, Sull. & Lesq. Eastern slope of White Rock Mt. On trees, alt. 4,000 ft. Western slope of Pond Mt. On trees, alt. 2,500 ft.

Orthotrichum strangulatum, Sull. On summit of Brushy Mt., on trees, alt. 3,000 ft. Marion, on *Prunus Cerasus*, alt. 2,100 ft. On Hutton's Creek, on *Juglans*, alt. 2,300 ft. Along Staley's Creek, near Marion, on beech, alt. 2,200 ft. Summit of Pond Mt., east of Marion, on dead wood, alt. 3,000 ft.

Weissia ulophylla, Ehrh. (*Ulota crispa* Brid.). Summit of Pond Mt., on trees, alt. 3,000 ft. Eastern slope of White Top Mt., on trees, alt. 4,500 ft. Summit of Pine Mt., on trees, alt. 4,900 ft. Along Hutton's Branch, on old bark, alt. 2,200 ft. East Fork Walker Creek, on birch, alt. 2,200 ft.

Weissia crispula, Lindb. (*Ulota crispula*, Br. & Sch.) Along Fox Creek, at foot of Pine Mt, on birch and hemlock, alt. 3,000 ft. Summit of White Top Mt., on *Picea, Betula lutea*, alt. 5,678 ft. Along White Top Creek, on trees, 2,600 ft.

Weissia coarctata (P. Beauv.) Lindb. (*Ulota Ludwigii*, Brid.). Summit of Pond Mt., east of Marion, on log, alt. 3,200 ft. East Fork Walker Creek, on birch, alt. 2,200 ft. Eastern slope of White Top Mt., on *Fagus*, alt. 5,000 ft. Along Hutton's Branch, on old bark, alt. 2,200 ft. Summit of White Top Mt., on rocks, alt. 5,678 ft.

Weissia Americana (P. Beauv.) Lindb. (*Orthotrichum Americanum*, Beauv. *Ulota Hutchinsiæ*, Smith.) At Chatham Hill Gap, on Walker Mt., on sandstone, alt. 3,000 ft. Summit of White Rock Mt., on white sandstone, alt. 4,400 ft. Summit of White Top Mt., on sandstone, alt. 5,678 ft. Brushy Mt., on rocks, alt. 2,600 ft. Eastern slope of White Top Mt., on sandstone, alt. 5,000 ft. Dickey Creek, alt. 2,500 ft. On huge erratic boulder in woods, growing on *Umbilicaria Dillenii*, alt. 2,800 ft.

Weissia Americana var. *rufescens*, E. G. B. Bull. Torr. Bot. Club, 21 : 69 (1894). Summit of White Top Mt., on trees in dense woods of *Picea Mariana*, mixed with *Dicranum longifolium*, *Zygodon viridissimus* and *Weissia ulophylla*, alt. 5,678 ft.

Zygodon viridissimus (Dicks.) Brown. On summit of White Top Mt., alt. 5,678 ft. On trunks of *Picea rubra* (Lamk.) Link., associated with *Dicranum longifolium*, *Ulota crispa* and *Frullania Asagrayana*. Fruiting. On eastern slope of White Top Mt., alt. 4,800 ft.; also on spruce. Sterile. (Plate 80.)

Zygodon excelsus (Sull.) E. G. Britton. (*Syrrhopon excelsus*, Sull. *Zygodon Sullivantii*, C. Muell.) Western side, summit of White Top Mt., on wet cliffs, alt. 5,600 ft. Also on *Abies rubra*, on summit, alt. 5,678 ft., associated with *Dicranum longifolium*, *Ulota crispa* and *Frullania Asagrayana*.

DRUMMONDIA PROREPENS (Hedw.). (*Drummondia clavellata*, Hook.) On western slope of Cove Mt., on *Prunus serotina*, alt. 1,000 ft. On western slope of Iron Mt., at Skull Gap, on trees, alt. 3,000 ft. Along cliffs of New River, Carroll Co., on branches, alt. 2,200 ft. At Marion, on *Prunus Cerasus*, alt. 2,100 ft. On summit of White Rock mountain, on trees, alt. 4,400 ft. At Shannon Gap, on Walker Mt., on fallen trees, alt. 3,100 ft. Summit of Pond Mt., east of Marion, on dead trees, alt. 3,000 ft. Dickey's Creek, alt. 2,800 ft.

Grimmia apocarpa (L.) Hedw. Shannon Gap, Walker Mt., alt. 2,800 ft. On rocks in woods below the summit of White Top Mt., alt. 5,600 ft.

Grimmia apocarpa (L.) Hedw. var. *rivularis* (Brid.) W. & M. Banks of the Holston River at Marion, on limestone rocks, alt. 2,100 ft. Also at Kobenhaven's Mills, alt. 2,050 ft.

Grimmia Pennsylvanica, Schwægr. Banks of Holston river at Marion, on limestone rocks, alt. 2,100 ft. Slemp Creek, on rocks, alt. 2,800 ft. Dickey Creek, on cliffs, alt. 3,000 ft.

Grimmia Olneyi, Sull. In bed of Dickey Creek, alt. 2,800 ft. Sterile.

Grimmia acicularis (L.) C. Müll. (*Racomitrium aciculare* Brid.) Bed of Dickey Creek. On stones in water, alt. 2,800 ft., forming dark green mats, with stems often 15 cm. long. Sterile.

Grimmia fascicularis (Schrad.) C. Müller. (*Racomitrium fasciculare*, Brid.) Summit of White Rock Mt. On wet, white sandstone, alt. 4,400 ft.

Thuidium recognitum (Hedw.) Lindb. On Staley's Knob, near Marion. On log, alt. 2,500 ft. At the falls of the Holston River. On ground, alt. 2,050 ft. On limestone rocks, Hungry's Mother Creek, alt. 2,200 ft. On Slope of White Top Mt. On old wood, alt. 5,000 ft. Along Nick's Creek. On old logs, alt. 2,300 ft.

Thuidium delicatulum (L.) Nutt. On the under side of shelving rocks and ledges. Slopes of Pine Mt., near Troutdale, alt. 3,000 ft.

Thuidium scitum (Beauv.) Austin. Summit of Pond Mt. On ground, alt. 3,400 ft. On Nick's Creek. On ground, alt. 2,400 ft.

Leskea obscura, Hedw. South Fork of the Holston, near Add Wolf. At base of *Platanus occidentalis*, alt. 2,200 ft.

Leskea polycarpa, Ehrh. Near Lyons Gap, Walker Mt. On base of tree, alt. 2,500 feet. On Hungry's Mother Creek, in wet places, alt. 2,200 ft. Island in the Holston River near Marion, alt. 2,100 ft. At base of tree in swamp. Beside spring between the turnpike and the South Fork of the Holston, not far from Seven-Mile Ford, alt. 2,100 ft.

Leskea denticulata, Sulliv. Slopes of White Top. On trees, alt. 4,000–5,800. On *Cratægus punctata*, summit of White Top, in dense wet woods, alt. 5,678 ft. Mixed with *Brachythecium acuminatum* var. *setosum*, *Zygodon viridissimus*, and *Radula complanata*.

Leskea tristis, Cesati. At Falls of the Holston River. On trees, alt. 2,050 ft. Along Hungry's Mother Creek. On *Acer saccharinum*, alt. 2,200 ft. Eastern slope of White Top. On *Fagus*, alt. 4,600 ft.

Anomodon attenuatus (Schreb.) Hedw. Along Staley's Creek, near Marion. On trees, alt. 2,150 ft. On summit of Pine Mt. On trunks of trees, alt. 4,900 ft. With long slender branches, on trees, near the house on summit of White Top, alt. 5,300 ft. On trees along McGrady's Creek, North Fork of the Holston, alt. 2,200 ft. A form with leaves remarkably dentate at apex found on rocks along Dickey Creek, alt. 2,700 ft.

Anomodon obtusifolius, Br. & Sch. On the eastern slope of White Top Mt., on trees, alt. 4,800 ft. In valley between White Top and the Iron Mts., on trees, alt. 2,600 ft. On the summit of Pine Mt., on trees, also on the under side of huge bowlders, long creeping stems, alt. 4,900 ft. On Staley's Knob, East Marion, on trunks of beech, alt. 2,300 ft. Summit of White Top Mt., on the trunks, alt. 5,678 ft.

Anomodon rostratus (Hedw.) Schimp. Along Slemp Creek, on stumps, alt. 2,400 ft. Along Hungry's Mother Creek, on trees (roots), alt. 2,100 ft. Banks of Nick's Creek, on trees, alt. 2,600 ft. Along Staley's Creek near Marion, on trees, alt. 2,200 ft. Falls of Holston River, on rocks, alt. 2,050 ft. On stones in fields near Marion, alt. 2,100 ft. On rocks, Pine Mt., near Troutdale, alt. 3,500 ft.

Anomodon viticulosus (L.) H. & T. Banks of the Holston River, at Marion, on limestone rocks, alt. 2,100 ft. In valley between White Top and the Iron Mts. along White Top Creek, on trees, alt. 2,600 ft. In Hungry Hollow, on wet rocks, alt. 2,200 ft. At Falls of the Holston River, on wet rocks, alt. 2,050 ft.

Amblystegium filicinum (L.) Lindb. In Hutton's Hollow, on wet bank, alt. 2,500 ft.

Amblystegium hygrophilum (Jur.) Sch. Nick's Creek, on black loamy soil, alt. 2,500 ft.

Amblystegium irriguum (H. & W.) Br. & Sch. Wet bank, Hutton's Branch, alt. 2,100 ft. Bear Branch, Bear Creek, alt. 2,300 ft.

A. irriguum var. *spinifolium*, L. & J. In a spring near Saltville, alt. 2,100 ft.

Amblystegium varium (Hedw.) Lindb. Along Hungry's Mother Creek. In sand, alt. 2,200 ft. Falls of Staley's Creek. On rocks, alt. 2,300 ft. Summit of White Top Mt. On old wood, alt. 5,678 ft. Along Holston River, Marion, On ground, alt. 2,100 ft.

Amblystegium serpens (L.) Br. & Sch. On East Fork of Walker Creek. On old log, alt. 2,200 ft. Hungry's Mother Creek. On old logs, alt. 2,300 ft.

Amblystegium orthocladon (Beauv.) Aust. Along Staley's Creek, near Marion. On ground, alt. 2,100 ft. Falls of the Holston River. On sand, alt. 2,050 ft.

Amblystegium riparium (L.) Br. & Sch. var. *elongatum*, Sch. Syn. Musc. Eu. p. 748 (var. *fluitans* L. & J. Man. p. 377; var. *fontinaloides*, Aust. in Herb.) Stems often over a foot long, branching pinnately, branches either simple or also pinnately divided, frequently 6–10 cm. long, leaves acuminate 3–4 mm. long, slightly decurrent with angular cells at angles, all lax, vein single, ending below the apex, margins entire. Sterile in calcareous spring near Wallace Switch, alt. 1,900 ft. J. K. Small. Marion, on wet boards, alt. 2,100 ft.

Amblystegium Lescurii, Sull. Bear Creek. On wet rocks, alt. 2,300 ft. On wet sloping rocks in rivulet. Slopes of Pond Mt., alt. 2,500 ft. In Nick's Creek, alt. 2,600 ft.

Amblystegium eugyrium (Br. & Sch.) Lindb. Along White Top Creek, on rocks, alt. 2,600 ft. Bear Creek, on wet rocks, alt. 2,200 ft. Eastern slope of White Top Mt., on rocks, alt. 4,000–5,000 ft., fruiting. Dickey Creek, on wet rocks, with *Racomitrium aciculare*, alt. 2,800 ft, fruiting.

Amblystegium dilatatum (Wils.) Lindb. Falls of Staley's Creek, east of Marion, on (rocks) wet, alt. 2,300 ft. Along Bear Creek, on wet rocks, alt. 2,200 ft.

Amblystegium adnatum, Hedw. Banks of the Holston River, near Copenhaven's Mills, on white cedars, alt. 2,050 ft. Shannon Gap, Walker Mt., alt. 2,800 ft., on rocks. Summit of White Rock, alt. 4,400 ft., on rocks.

Amblystegium aduncum (L.) Lindb. (*Hypnum uncinatum*, Hedw.) East bank of the Holston River near the Falls, alt. 2,050 ft.

Hypnum Boscii, Schwægr. In Hungry Hollow, on ground, alt. 2,300 ft. North of Bristol, on old wood, alt. 1,800 ft. Along Bear Creek, on rocks, alt. 2,200 ft. At Falls of Holston River, on rocks, alt. 2,050 ft. Western slope of Cove Mt., near Buchanan, on stumps, alt. 1,000 ft. Comer's Creek, in dense close mats on wet rocks near the dam, alt. 2,500 ft.

Hypnum strigosum, Hoffm. Along Nick's Creek, on ground, alt. 2,600 ft. East fork Walker Creek, on ground, alt. 2,200 ft.

Hypnum hians, Hedw. Nick's Creek, on black loamy soil, sterile. Bear Creek, alt. 2,800 ft., also sterile. Hungry's Mother Creek, on old logs with *H. hispidulum*, Brid., sterile.

Sullivant, in the Icones Muscorum, p. 163, says of the vein: "Costa tenui supra medium abrupte desinente." Figures 5 and 8, t. 104, show this character well but fail to indicate as a very marked character in the profile of the leaves, that the keeled vein ends in a dorsal spine a short distance below the apex. Austin's Musci Appalachiani, No. 335, with which this was compared, verifies this statement.

Hypnum demissum, Wilson. On wet rocks, Bear Branch of Bear Creek, alt. 2,200 ft., with *H. eugyrium*. On wet rocks in Dickey's Creek, alt. 3,000 ft. In bed of Nick's Creek, alt. 2,500 ft. McGrady's Creek, foot of White Rock, alt. 3,000 ft.

Hypnum recurvans, Schwægr. On Staley's Knob, east of Marion. On log, alt. 2,400 ft. Banks of Holston River at Marion. On *Tsuga Canadensis*, alt. 2,100 ft. Along Nick's Creek. On old log, alt. 2,500 ft. Also on black loam, a lax form with long, creeping, nearly simple branches and very glossy yellow leaves, fruit scarce. Sinclair's Creek, alt. 2,300 ft. On old logs. White Top Creek, alt. 2,600 ft. On the ground, densely fruited with pedicels over 2 cm. long, and capsules contracted below the mouth when old. On old logs in dense woods, base of Pine Mt., near Troutdale, alt. 3,000 ft.

Hypnum laxepatulum, L. & J. Sull. Icon. Musc. Suppl. 93, t. 69. Bot. Gaz. I. 30. Summit of White Top Mt., alt. 5,678 ft. In thin flat mats on the vertical faces of wet rocks in shade, with

Herberta adunca and *Campylopus Virginicus;* also on roots of *Picea rubra.*

It seems to me that the species is distinct from *Hypnum recurvans* and well-named, maintaining a different habit, less glossy in general aspect, more loosely branched and leaves less uncinate, with a short pedicel, only 1 cm., while in *Hypnum recurvans* it is usually 2 cm. I have been favored with a portion of the type from Sullivant's Herbarium by Dr. Watson.

In comparison, I find that the cilia, however, are developed on James' own specimens and are single, but with a divisional line as if two were united. Sullivant figured it without cilia and the Manual says "cilia none or rudimentary."

Hypnum cylindricarpum, CM. McGrady's Creek, alt. 3,000 ft. On old log in fine fruit. Capsules inclined and contracted below the mouth.

Hypnum microcarpum, CM. Banks of the Holston at Marion, alt. 2,100 ft. In dense glossy mats at base of *Tsuga Canadensis.* Sterile. Falls of the Holston, alt. 2,050 ft. On fallen log in dense woods. Fertile.

Hypnum serrulatum, Hedw. Summit of White Top Mt., alt. 5,678 ft. On trees with *Dicranum fuscescens.*

Hypnum rusciforme, Weiss. On Pine Mt., in stream, alt. 4,000 ft. In valley between White Top and the Iron Mts., along White Top Creek, in sand, alt. 2,600 ft.

Hypnum acuminatum, Beauv. Nick's Creek. On ground, alt. 2,600 ft. Below summit of White Top Mt., alt. 5,500 ft. On old logs, below the house.

VAR. FILIFORME, n. var. Summit of White Top Mt., alt. 5,670 ft. On *Cratægus punctata* with *Leska denticulata*, *Zygodon viridissimus* and *Radula complanata.* A very slender form growing in dense wet woods. Branches often 3 cm. long and undivided, leaves serrulate nearly to base, angles decurrent, cells rectangular, vein ending above the middle, with the two lateral folds faint. Sterile. E. G. BRITTON.

Hypnum lætum, Brid. In dense mats on rocks in woods. Slopes of Pine Mt. near Troutdale, alt. 3,500 ft. Walker Mt., Shannon

Gap, alt. 2,800 ft. Ledges of limestone cliffs. Staley's Creek, near Marion, alt. 2,100 ft. On logs.

Hypnum plumosum, Hudson. On wet rocks. Shannon Gap, Walker Mt., alt. 2,800 ft.

Hypnum rutabulum, L. Along Hutton's Creek. On wet rocks, alt. 2,500 ft. Bear Creek, alt. 2,200 ft. Sterile. Slemp Creek, alt. 2,800 ft. Sugar Grove, South Fork of the Holston River. On logs in mill dam, alt. 2,200 ft.

Hypnum rivulare, Bruch. Falls of Staley's Creek east of Marion. On wet rocks, alt. 2,300 ft.

Hypnum Alleghaniense, C. Mull. *Thamnium Alleghaniense*, Br. & Sch. Along Bear Creek. On wet rock in run, alt. 2,250 ft. At Falls of the Holston River, on perpendicular rocks, alt. 2,050 ft.

Myurella Careyana, Sull. Banks of Holston River, at Marion. On damp silt from limestone rocks, alt. 2,100 ft. Sterile.

Fabronia octoblepharis, Schwægr. Along Dickey Creek. On perpendicular slate cliffs, alt. 2,800 ft.

Anacamptodon splachnoides, Brid. On North Fork of Holston River near Plasterburg. In old knot hole of *Platanus occidentalis* along the river, alt. 2,200 ft. and McGrady's Creek. Base of Pine Mt., near Troutdale, in dense maple woods, in small knot-hole of fallen branch, alt. 3,000 ft.

Thelia hirtella (Hedw.) Sull. Along Holston River, Marion. At base of trees, alt. 2,100 ft.

Hylocomium brevirostre (Ehrh.) Br. & Sch. Along Nick's Creek, on stumps, alt. 2,600 ft. On the summit of White Top Mt., on the ground. alt. 5,678 ft. Slope of Pine Mt., on rocks, alt. 3,600 ft. White Top Creek, alt. 3,600 ft. On the ground and on logs.

Hylocomium proliferum (L.) Lindb. Summit of White Top Mt., on ground, alt. 5,678 ft. Summit of Mt. Rogers, on ground, alt. 5,719 ft. Summit of Pine Mt., on ground, alt. 4,900 ft. Ravine of White Top Creek, alt. 3,000 ft.

Hylocomium parietinum (L.) Lindb. Walker Mt., Lyons' Gap, alt. 2,800 ft. Summit of White Top Mt., alt. 5,678 ft. In dense mats under shade of *Picea rubra*.

Hylocomium triquetrum (L.) Br. & Sch. On the summit of White Top Mt., on the ground, alt. 5,678 ft. Summit of Pine Mt., on ground, alt. 4,900 ft.

Hylocomium rugosum (L.) De Not. On Kate's Mt., W. Va., on ground and rocks, alt. 3,300 ft.

Campylium hispidulum (Brid.) Mitt. Wet ledges of Walker Mt. at Shannon Gap, alt. 2,800 ft. Hungry's Mother Creek, at base of stump, alt. 2,200 ft. Comer Creek, alt. 3,000 ft. On old stump.

Campylium stellatum, Schreb. Wet banks, Comer Creek, alt. 2,800 ft.

Campylium chrysophyllum (Brid.). Summit of Pond Mt., on logs, alt. 3,400 ft. North of Bristol, on old log, alt. 1,800 ft. On Kate's Mt., W. Va., on ground, alt. 3,300 ft. Along East Fork of Walker Creek, on rock, alt. 2,200 ft. Nick's Creek, on rotten log, alt. 2,600 ft. Falls of Holston River, on trees, alt. 2,050 ft. Marion, on rocks, alt. 2,100 ft.

Ctenidium molluscum (Hedw.) Mitt. Falls of Holston River, on ground, alt. 2,050 ft. White Top Creek, on fallen log, alt. 3,000 ft.

Ctenidium molluscum (Hedw.) var. *condensatum*, Schimp. At Chatham Hill Gap, on Walker Mt., on rocks, alt. 3,000 ft.

Ptilium crista-castrense (L.) De Not. On the summit of White Top Mt. On ground, alt. 5,678 ft. On the western slope of Mt. Rogers. On ground, alt. 5,500 ft. Pine Mt. near Troutdale, alt. 3,000 ft.

Stereodon pallescens (Hedw.) Lindb. Eastern slope of White Top Mt. On dead wood, alt. 4,800 ft. Along White Top Creek, in valley between White Top and Iron Mts. On trees, alt. 2,600 ft. Summit of White Top Mt. On trees, alt. 5,678 ft. Mixed with *H. laxepatulum*.

Stereodon fertile (Sendt.) Eastern slope of White Top Mt. On logs, alt. 5,000 ft. Along White Top Creek. On trees, alt. 2,600 ft. Slemp Creek. On decayed logs, alt. 2,800 ft. Comer Creek. On decayed logs, alt. 2,500 ft.

Stereodon curvifolius (Hedw.) Brid. On eastern slope of White Top Mt. On logs, alt. 5,000 ft. In Hungry Hollow. On stump, alt. 2,200 ft. Along East Fork of Walker Creek. On old wet log, alt. 2,200 ft. Staley's Creek, slopes of Pond Mt., alt. 2,200 ft. Bear Creek, alt. 2,200 ft. On fallen logs, slopes of Pine Mt., near Troutdale, alt. 3,000 ft.

Stereodon imponens (Hedw.) Brid. Eastern slope of White Top Mt. On trees, alt. 5,000 ft. In valley between White Top and the Iron Mts., alt. 2,700 ft. Along Staley's Creek, near Marion. On stump, alt. 2,200 ft. On Staley's Knob, east of Marion. On logs, alt. 2,400 ft. Eastern slope of White Top Mt. On old log, alt. 5,000 ft. Nick's Creek, alt. 2,300 ft. McGrady's Creek, alt. 2,500 ft. Kern Valley. In dense patches on old logs, alt. 2,200 ft.

Stereodon pratense (Koch) Brid. Knobs near Marion, alt. 2,200 ft. On old logs. Hungry Hollow, alt. 2,300 ft.

Pylaisia intricata, Br. & Sch. At base of decayed trees. Beaver Creek, alt. 2,500 ft

Pylaisia velutina, Br. & Sch. At Chatham Hill Gap, on Walker Mt. On rotten wood, alt. 2,500 ft. On island at Marion. On *Platanus occidentalis*, alt. 2,100 ft. Slope of White Top Mt. On trees, alt. 4,800 ft. Along Holston River, at Marion. On very rotten wood, alt. 2,100 ft.

Plagiothecium elegans, Hook. Lindb. Summit of Pine Mt. On rocks, alt. 4,900 ft.

Plagiothecium denticulatum, Br. & Sch. Wet rocks. West side of White Top Mt., alt. 5,678 ft. On rocks. Dickey Creek, alt. 3,000 ft.

Cylindrothecium cladorhizans (Hedw.) Schimp. Summit of Walker Mt. at Chatham Hill Gap. On old wood, alt. 3,000 ft.

Cylindrothecium seductrix (Hedw.) Sull. At Marion. On rotten roof, alt. 2,100 ft. On wet rocks, Walker Mt., alt. 2,800 ft. Shannon Gap. On fallen logs and at base of trees. Island in the Holston River near Marion, alt. 2,100 ft. Knobs near Marion, on old trees, alt. 2,100 ft.

Hookeria Sullivantii, Müller. Plants forming bright glossy green patches; stems not matted nor tomentose, prostrate at base, 2–4 cm. long, innovations ascending, leaves intricate, flattened in one place, occasionally rooting at apex, 3–5 mm. long, ovate-lanceolate, veinless, entire, bordered by a row of slightly larger, clearer cells, apex acute, areolation regularly rhomboidal, basal cells not enlarged, base contracted. Monœcious, autoicous, the antheridia few in small leafy buds near the base of the pedicel. Perichætial bracts few, smaller than the leaves, more acuminate; pedicel stout, red brown, 8–12 mm. long, twisted and curved; capsule pendent, not contracted below the mouth when dry, 1–5 mm. long, lid 75 mm. conic, calyptra not seen. Peristome double, teeth trabe culate. Along Nick's Creek, at foot of Pine Glade Mt. In dark, damp spring ravine, on perpendicular face of wet rock, alt. 2,600 ft. Only two capsules found with old fruit and one operculum entangled among the leaves. Differs from *Pterigophyllum lucens,* Brid. in the acute leaves with longer narrower cells, capsules shorter and broader, not contracted below the mouth when dry, lid not rostrate, blunt. This species has been confounded with the above and was distributed by Sullivant in his Musci Alleghanienses as 58 *Hookeria lucens,* and by Sull. & Lesq. Musci Bor. Am. Ed. II. 401 as *Hookeria acutifolia,* also recently as *Pterigophyllum lucens* by Dr. Barnes, collected by Prof. Underwood at Tallulah Falls, Ga. It has also been collected in Doe River Gorge, Tenn., by me 1885, and in Ohio and North Carolina by Sullivant and Lesquereux, Bolander's Californian specimens and those with blunt leaves from Idaho, Oregon, Washington, Vancouver, are all *Pterigophyllum lucens.* We have seen no specimens of the lattter from any locality east of the Rocky Mountains. (Plate 80.)

Neckera pennata (L.) Hedw. Eastern slope of White Top Mt., alt. 4,800 ft., on *Picea.* In valley between White Top Mt. and the Iron Mts., on trees, alt. 2,600 ft. Along Nick's Creek, on old trees, alt. 2,500 ft. Slopes of Pine Mt., on trees, alt. 4,000 ft. Summit of White Top, on old trees of *Cratægus punctata,* alt. 5,678 ft.

Climacium Americanum, Brid. At Falls of Holston River, on sand, alt. 2,050 ft. On limestone rocks, Hungry's Mother Creek, alt. 2,300 ft. On rocks and old stumps along Staley Creek, alt. 2,200 ft. On rocks, Pine Mt., alt. 3,500 ft.

Fon.inalis Dalecarlica, Br. & Sch. In Nick's Creek, on slate rock in flowing water, alt. 2,500 ft. In Dickey Creek, on rocks in flowing water, alt. 3,000 ft.

Fontinalis Novæ-Angliæ, Sull. Dickey Creek, in flowing water, alt. 2,600 ft. White Top Creek, alt. 2,500 ft. Pine Mt., near Troutdale, alt. 3,500 ft. Also in Fox Creek, near Troutdale, alt. 3,000 ft.

Homalothecium subcapillatum, Sulliv. Summit of White Top Mt., alt. 5,678 ft., on *Cratægus punctata*, in deep woods.

Leptodon trichomitrium (Hedw.) Mohr. In valley between White Top and the Iron Mts., along White Top Creek, on trees, alt. 2,600 ft. In Hungry Hollow, on *Æsculus*, alt. 2,200 ft. On Brushy Mt., on trees, *Acer*, alt. 2,800 ft. Along Staley's Creek, near Marion, on trees, alt. 2,150 ft. At Chatham Hill Gap, Walker Mt., on trees, alt. 3,000 ft.

Leucodon brachypus, Brid. Summit of White Top Mt., on *Cratægus punctata*, alt. 5,600 ft. Along Staley's Creek, near Marion, on *Acer Saccharum*, alt. 2,300 ft. Summit of Pond Mt., east of Marion, on trees, alt. 3,400 ft. On Staley's Knob, east of Marion, on trees, alt. 2,400 ft. Banks of Nick's Creek, on trees, 2,500 ft.

LEUCODON BRACHYPUS FLAGELLATUS. Branches tapering into long slender tips with small leaves, with recurved subulate tips. On trees below the house on White Top Mt., alt. 5,300 ft.; also Eagle Cliff, Roan Mt., alt. 1,600 metres (5,000 ft.). Dr. C. H. Merriam.

Leucodon julaceus (Hedw.) Sull. Summit of White Top Mt., on *Cratægus punctata*, alt. 5,678 ft. Slope of Cove Mt., near Buchanan, on *Platanus occidentalis*, alt. 1,000 ft. Slope of White Top Mt., with flagellate branches, on trees, alt. 5,000 ft.

Hedwigia ciliata, Ehrh. Slope of Brushy Mt. On sandstone, alt. 2,400 ft. On banks of Holston River, Marion. On limestone, alt. 2,100 ft. Eastern slope of Walker Mt., Chatham Hill Gap. On sandstone rocks, alt. 3,000 ft. Along Slemp Creek, Dickey Creek and Staley's Creek. On dry rocks, alt. 2,300–3,000 ft. Summit of White Top Mt. On trees mixed with *Dicranum longifolium*, alt. 5,678 ft. On rocks. Pine Mt., alt 3,500 ft.

Hedwigia ciliata, Ehrh., var. *viridis*, Schimp. At Marion. On old roof, alt. 2,100 ft.

HEPATICÆ.*

Frullania Asagrayana, Mont. Walker Mt., Shannon Gap, alt. 2,800 ft. On sandstone rocks in shade. Dickey Creek, alt. 2,500 ft. On trees and on rocks. Comer Creek, alt. 2,500 ft. On old trees. Slopes of Pine Mt., near Troutdale, alt. 3,500 ft. On hemlocks. White Top summit, alt. 5,678 ft. On spruces. Ravine Middle Fork of the Holston River, alt. 2,000 ft. On *Thuja occidentalis.*

Frullania æolotis, Nees. Dickey Creek, alt. 2,500 ft. On wet rocks with *Metzgeria conjugata.* Shannon Gap, Walker Mt., alt. 2,800 ft. On rocks. Summit White Top, alt. 5,678 ft. On rocks. Hungry's Mother Creek, alt. 2,200 ft. On Beech trees. Falls of the Middle Fork of the Holston, alt. 2,000 ft.

Frullania Eboracensis, Gottsche. Island in the Middle Fork of the Holston River near Marion, alt. 2,100 ft. On *Platanus occidentalis* and *Salix nigra.* On cultivated cherry trees in a garden at Marion, alt. 2,100 ft. On old stumps, Walker Mt., Shannon Gap, alt. 2,800 ft. Hungry's Mother Creek, alt. 2,200 ft.

Frullania squarrosa, Nees. Island in the Holston River near Marion, alt. 2,100 ft. On old stumps with *Thelia hirtella.*

Frullania Virginica, Gottsche. Summit of White Top, alt. 5,678 ft. Slemp Creek, alt. 2,200 ft. On *Juglans cinerea.* Bear's Creek, alt. 2,200 ft.

Jubula Hutchinsiæ (Hook.) Dumort. var. *Sullivantii*, Spruce. Nick's Creek, alt. 2,300 feet. In spring. Bear Branch of Bear Creek, alt. 2,200 ft. In brook. Pond Mt., alt. 2,200 ft. On stones in brook. Banks of the Holston River at Marion, alt. 2,100 ft. On stones in water. Dickey Creek, alt. 2,500 ft. In stream.

*Determined by Dr. Alexander W. Evans.

Lejeunia clypeata (Schw.) Sulliv. Dickey Creek, alt. 2,500 ft. On trees.

Lejeunea (*Harpa-Lejeunea*) *ovata* Tayl. Dioicous, pale green, loosely cæspitose; stems prostrate, with few radicles, irregularly branched; leaves contiguous or somewhat imbricatad, obliquely spreading, convex and often reflexed at apex, ovate, mostly acute, entire, the antical margin arching over the stem but not beyond it; leaf-cells hexagonal, with slight thickenings at the angles, ocellæ 1 to 3, near the base of the leaf, elliptical; lobule ovate, inflated, strongly arched at the keel, the margin curved, mostly involute, 1-toothed at the apex and excurrent into the leaf; underleaves broadly cuneate, emarginate-bilobed with rounded lobes and sinus; female inflorescence terminal, with 1 or 2 subfloral branches; bracts erect, ovate, obtuse, the lobule plane (?) obtuse in Taylor's herbarium, and I find them to be the same in all particulars except the form of the bracteole; in Taylor's specimens this is distinctly emarginate at the apex for about $\frac{1}{5}$ its length; while in the Virginian specimens, as stated in the description, the bracteole is rounded or very slightly retuse at the apex. The species may be distinguished from our other *Lejeuneæ* by its more acute leaves and by the blunt lobes of its underleaves. (Plate 81.)

DESCRIPTION OF FIGURES.

Fig. 1. Plants, about twice natural size.
" 2. Portion of stem, antical view.
" 3. Portion of stem, postical view.
" 4. Cells from base of leaf, showing ocellæ.
" 5. ♀ inflorescence, postical view.
" 6. Bracteole, from Taylor's specimen, narrowly winged at the keel; bracteole obovate, entire, rounded or slightly retuse at the apex.

Stems about 5 mm. long, 0.05 mm. in diameter; leaves 0.30×0.15, lobule 0.15×0.08; leaf-cells in middle of leaf averaging 0.018 mm. in diameter, ocellæ 0.030×0.024; underleaves 0.08×0.01; bracts 0.50×0.25 (lobule 0.40×0.16); bracteole 0.30×0.20.

Hab., on fallen birch, White Top Creek, Mrs. Britton and Miss Vail. ♀ plants, without perianth.

This delicate little species, which has been kindly identified by Herr Stephani, of Leipzig, marks the first appearance of the sub-genus *Harpa-Lejeunea* in the United States. Through the kindness of Dr. Robinson, I have been enabled to compare these specimens with the type of the species.

Radula complanata (L.) Dumort. Banks of Holston River near Kopenhaver's Mills, alt. 2,050 ft. On *Thuja occidentalis.*

Radula tenax, Lindb. Summit of White Top Mt., alt. 5,678. On rocks in shade. Nick's Creek, alt. 2,800 ft. On rocks in shade. White Rock, alt. 4,400 ft.

Radula obconica, Sulliv. Nick's Creek, alt. 2,200 ft.

Porella pinnata, Schwægr. Kopenhaver's Mill near Marion, alt. 2,000 ft. In a limestone spring, floating in the water.

Porella platyphylla, (L.) Lindb. White Top, alt. 5,300 ft. On trees. Hutton's Branch, alt. 2,200 ft. At base of trees, Banks of the Holston River near Marion, alt. 2,100 ft., on logs. Dickey Creek, alt. 2,500 ft. On trees and rocks, slopes of Pine Mt., near Troutdale, alt. 3.500 ft. On logs and trees in dense woods. Very variable in the amount of branching, sometimes very pinnate with short branches, at others almost unbranched, stems long and slender.

Blepharozia ciliaris (L.) Dumort. Pine Mt., near Troutdale, alt. 3,500 ft. On fallen logs.

Trichocolea tomentella, Dumort. White Top Creek, alt. 2,800 ft. Slopes of Pine Mt., near Troutdale, alt. 3,500 ft. Wet bank near stream. Fruiting.

Herberta adunca, S. F. Gray. Summit of White Top, alt. 5,678 ft. Abundant on wet rocks, in dense brown cushions, or on branches of *Picea rubra.*

Bazzania deflexa (Nees.) Underwood. Summit White Top, alt. 5,678 ft. Associated with *Campylopus Virginicus* and *Herberta adunca.*

Bazzania trilobata (L.) B. Gr. Dickey Creek, alt. 2,500 ft. Wet banks. Bear Branch, alt. 2,200 ft. White Top Creek, alt. 2,500 ft. White Top Summit, alt. 5,678 ft.

Lepidozia reptans, Dumort. Summit of White Top, alt. 5,678 ft. On wet rocks, in shade, with *Hypnum laxepatulum*.

Lepidozia setacea (Web.) Mitt. Nick's Creek, alt. 2,200 ft. On rotten wood. Dickey Creek. alt. 2,500 ft. On roots of trees.

Cephalozia curvifolia (Dicks.) Dumort. Dickey Creek, alt. 2,200 ft. On old logs. Summit White Top, alt. 5,678 ft. Nick's Creek, alt. 2,300 ft. On old logs. Walker's Creek, alt. 2,300 ft. Falls of the Holston, alt. 2,000 ft. On rotten logs. Bear Creek, alt. 2,200 ft.

Cephalozia multiflora, Spruce. Shannon Gap, Walker Mt., alt. 2,800 ft. Under high rocks in shade. Iron Mt. near Troutdale, alt. 3,500 ft. On the ground along roadsides.

Cephalozia Virginiana, Spruce. Summit White Top, alt. 5,678 ft. On rotten logs.

Odontoschisma Sphagni (Dicks.) Dumort. Nick's Creek, alt. 2,200 ft. On wet banks, with *Hookeria Sullivantii*, Müller. Slemp Creek, alt. 2,200 ft. Knobs near Marion, alt. 2,200 ft. On logs in damp ravine.

Kantia Trichomanis, S. F. Gray. Summit of White Top, alt. 5,678 ft. Banks of stream, slopes of Pine Mt., near Troutdale, alt. 3,500 ft. Growing with *Trichocolea tomentella*. Dickey Creek, alt. 2,500 ft. McGrady's Creek, alt. 2,300 ft.

Scapania nemorosa, Nees. White Top Creek, alt. 2,600 ft. On logs. Summit of White Top, alt. 5,678 ft. On rocks. Nick's Creek, alt. 2,200 ft. On old logs. Shannon Gap, Walker Mt., alt. 2,000 ft. On earth. Pond Mt., alt. 3,000 ft. Along roadsides. Fox Creek near Troutdate, alt. 3,500 ft. On wet logs of bridge over a stream.

Scapania undulata (L.) Nees & Mont. Pond Mt., alt. 2,500 ft. Wet rocks in stream.

Diplophyllum taxifolium (Wahl.) Dumort. Comer Creek, alt. 2,300 ft. On the ground.

Geocalyx graveolens (Schrad.) Nees. Summit White Top Mt., alt. 5,678 ft.

Lophocolea bidentata, Dumort. Banks of the Holston at Marion, alt. 2,100 ft.

Lophocolea minor, Nees. South Fork of the Holston, alt. 2,100 ft.

Plagiochila asplenioides (L.) Dumort. On rocks in bed of Nick's Creek, alt. 2,200 ft. In water, banks of the Holston River near Marion, alt. 2,100 ft.

Plagiochila porelloides, Lindenb. Nick's Creek, alt. 2,200 ft., on rocks in spring. Pine Mt., near Troutdale. alt. 3,500 ft., wet banks of streams.

Jungermannia exsecta, Schmid. Summit of White Top Mt., alt. 5,678 ft.

Jungermannia Michauxii, Web. Summit of White Top Mt., alt. 5,678 ft., wet rocks and logs, with *Dicranum fuscescens*.

Jungermannia Schraderi, Mart. Slemp Creek, alt. 2,500 ft., on old wood. Summit of White Top Mt., alt. 5,678 ft.

Marsupella emarginata, Dumort. Summit of White Top, alt. 5,678 ft., wet rocks.

Pellia epiphylla (L.) Nees. Bear Branch of Bear Creek, alt. 2,200 ft. Pond Mt., alt. 2,300 ft., wet banks of brook.

Metzgeria conjugata, Lindb. Hungry's Mother Creek, at base of trees on cliff, alt. 2,200 ft. Nick's Creek, alt. 2,200 ft., on yellow birch. Bear Branch of Bear Creek, alt. 2,200 ft. Pine Mt., near Troutdale, alt. 3,500 ft., on rocks in dense woods. Dickey Creek, on wet rocks, alt. 2,500 ft.

Aneura multifida (L.) Dumort. Nick's Creek, alt. 2,300 ft. Bear Branch, along Bear Creek, alt. 2,200 ft.

Aneura latifrons, Lindb. White Top Creek, alt. 2,500 ft., on rotten logs.

Anthoceros lævis, L. Bear Creek, alt. 2,200 ft., in burnt over patches with *Funaria hygrometrica*.

Marchantia polymorpha, L. White Top Creek, alt. 2,500 ft. Wet banks, Brushy Mt., alt. 3,000 ft.

Preissia hemisphærica (L.) Cogn. Pond Mt., alt. 2,300 ft. Along Staley's Creek.

Conocephalus conicus (L.) Dumort. Nick's Creek, alt. 2,300 ft.

LICHENES.*

Ramalina calicaris (L.) Fr. var. *fraxinea*, Fr. Pond Mt., alt. 2,800 ft. Orchard at Marion, alt. 2,100 ft. Island of Holston River, banks of Holston River, alt. 2,100 ft.

Ramalina calicaris (L.) Fr. var. *canaliculata*, Fr. Dickey Creek, alt. 2,500 ft.

Ramalina calicaris (L.) Fr. var. *farinacea*, Schær. Dickey Creek, alt. 2,500 ft.

Cetraria ciliaris (Ach.). Walker Mt., alt. 3,000 ft. Cliffs of New River, alt. 2,200 ft.

Cetraria lacunosa, Ach. Walker Mt., alt. 3,000 ft. Dickey Creek, alt. 2,300 ft.

Cetraria Oakesiana, Tuck. Pond Mt., alt. 2,800 ft.

Evernia furfuracea (L.) Mann. Walker Mt., alt. 3,000 ft. Round Top Mt., alt. 2,800 ft.

Usnea barbata (L.) Fr. The Pinnacle, Cumberland Gap, alt. 2,500 ft.

Usnea barbata (L.) Fr. var. *florida*, Fr. Walker Mt., alt. 3,500 ft. Pond Mt., alt. 2,500 ft.

Usnea barbata (L.) Fr. var. *rubiginea*, Michx. Walker Mt., alt. 3,000 ft. Pond Mt., alt. 2,800 ft.

Usnea angulata, Ach. White Top Mt., alt. 5,678 ft.

Alectoria jubata (L.) var. *chalybeiformis* (Ach.) Dickey Creek, alt. 2,500 ft. Summit of White Top Mt., alt. 5,678 ft.

Alectoria, imperfect. Walker Mt., alt. 3,000 ft.

Theloschistes concolor, Dicks. East slope of White Top Mt., alt. 5,000 ft.

Parmelia perlata (L.) Ach. Walker Mt., alt. 3,400 ft.

Parmelia latissima, Fée. Nick's Creek, alt. 2,300 ft.

Parmelia perforata (Jacq.) Ach. Summit of White Top Mt., alt 5,678 ft. Nick's Creek, alt. 2,500 ft. Cliffs of New River, alt. 2,200 ft. Reed Creek, alt. 2,100 ft.

Parmelia cetrata, Ach. Slope of White Rock Mt., alt. 4,000 ft. Walker Mt., alt. 3,000 ft.

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*Determined by Dr. J. W. Eckfeldt.

Parmelia crinata, Ach. Along Reed Creek, alt. 2,100 ft.

Parmelia tiliacea (Hoffm.) Floerk. Island of Holston River, alt. 2,100 ft.

Parmelia tiliacea (Hoffm.) Floerk, var. *sublævigata*, Nyl. Summit of Pine Mt., alt. 4,500 ft. Pond Mt., alt. 2,800 ft.

Parmelia Borreri, Turn., var. *rudecta*, Tuck. Cliffs of New River, alt. 2,200 ft. Along Reed Creek, alt. 2,100 ft. Everywhere around Marion, alt. 2,100 ft.

Parmelia saxatilis (L.) Fr. Walker Mt., alt. 3,000 ft.

Parmelia physodes (Ach.) Nyl. Walker Mt., alt. 3,000 ft. Summit of White Top Mt., alt. 5,678 ft.

Parmelia physodes (L.) Ach. var. *enteromorpha*, Tuck. Summits of White Top Mt., alt. 5,678 ft., and Mt. Rogers, alt. 5,719 ft.

Parmelia pertusa (Schrank.) Schaer. Foot of Pine Mt., alt. 3,000 ft.

Parmelia stygia (L.) Ach. Summit of White Top Mt., alt. 5,678 ft.

Parmelia caperata (L.) Ach. Walker Mt., alt. 3,000 ft. Slope of White Rock Mt., alt. 4,000 ft. Summit of White Top Mt., alt. 5,678 ft. Cliffs of New River, alt. 2,200 ft. The Pinnacle, Cumberland Gap, alt. 2,500 ft.

Physcia hypoleuca (Muhl.) Tuck. Summit of White Top Mt., alt. 5,678 ft.

Physcia leucomela (L.) Michx. East slope of White Top Mt., alt. 5,000 ft. Pond Mt., alt. 2,500 ft.

Physcia aquila (Ach.) Nyl. Near Marion, alt. 2,100 ft.

Physcia stellaris, L. Island of Holston River, alt. 2,100 ft.

Physcia setosa (Ach.) Nyl. Hungry's Mother Creek, alt. 2,000 ft.

Pyxine sorediata, Fr. Summit of White Top Mt., alt. 5,678 ft. Mt. Rogers, alt. 5,719 ft. Along Holston River, alt. 2,100 ft.

Umbilicaria Dillenii, Tuck. Slope and summit of White Rock Mt., alt. 3,000–4,400 ft. Summit of White Top Mt., alt. 5,678 ft. Peak Mt., alt. 2,200 ft.

Umbilicaria pustulata (L.) Hoffm. Summit of White Top Mt., alt. 5,678 ft. Dickey Creek, alt. 2,300 ft.

Sticta amplissima (Scop.) Mass. Summit of White Top Mt., alt. 5,678 ft. Cliffs of New River, alt.

Sticta aurata (Sm.) Ach. Summit of White Top Mt., alt. 5,678 ft.

Sticta pulmonaria (L.) Ach. Walker Mt., alt. 3,000 ft. Pond Mt., alt. 2,500 ft.

Nephroma Helveticum, Ach. Slope of White Rock Mt., alt. 4,000 ft. Walker Mt., alt. 3,000 ft.

Nephroma lævigatum, Ach. Summit of Pine Mt., alt. 4,500 ft.

Peltigera apthosa (L.) Hoffm. Along Walker's Creek, alt. 2,500 ft. Nick's Creek, alt. 2,500 ft. Cliffs of New River.

Peltigera polydactyla, Neck. Nick's Creek, alt. 2,300 ft.

Peltigera rufescens (Neck.) Hoffm. Walker Mt., alt. 3,000 ft. Along Holston River, alt. 2,100 ft.

Peltigera canina (L.) Hoffm. Nick's Creek, alt. 2,300 ft. Along Holston River, alt. 2,100 ft.

Physma luridum, Mont. Dickey Creek, alt. 2,300 ft. Summit of White Top Mt., alt. 5,678 ft.

Pannaria lanuginosa (Ach.) Koerb. Walker Mt., alt. 3,000 ft. Near Marion, alt. 2,100 ft.

Pannaria leucosticta, Tuck. Along Holston River, alt. 2,000 ft.

Pannaria nigra (Huds.) Nyl. Limestone ledges, near Wytheville, alt. 2,200 ft.

Collema cyrtaspis, Tuckm. Peak Creek Mt., alt.

Leptogium pulchellum (Ach.) Nyl. Dickey Creek, alt. 2,300 ft.

Leptogium tremelloides (L. fils.) Fr. Near Marion, along Holston River, alt. 2,100 ft. Reed Creek, cliffs of New River, alt.

Lecanora pallida (Schreb.) Schær. Summit of White top Mt., alt. 5,678 ft. Pond Mt., alt. 2,800 ft. Banks of Holston River, alt. 2,100 ft.

Lecanora sub-fusca (L.) Ach. Along Holston River, alt. 2,100 ft. The Pinnacle, Cumberland Gap, alt. 2,500 ft.

Lecanora Hageni, Ach. Vicinity of Marion, alt. 2,100 ft.

Lecanora elatina, Ach. var. *ocræphœa*, Tuck. Summit of White Top Mt., alt. 5,678 ft.

Lecanora pallescens (L.) Schær. Near Marion, alt. 2,100 ft.

Lecanora cinera (L.) Sommerf. Limestone cliffs of Holston River at Marion, alt, 2,100 ft.

Pertusaria velata (Turn.) Nyl. Summit of White Top Mt., alt. 5,678 ft. Orchard at Marion, alt. 2,100 ft. Reed Creek near Wytheville, alt. 2,000 ft.

Pertusaria communis, D. C. Along Reed Creek, near Wytheville, alt. 2,000 ft.

Pertusaria leioplaca (Ach.) Schær. Pond Mt., alt. 2,500 ft. The Pinnacle, Cumberland Gap, alt. 2,500 ft. Reed Creek, near Wytheville, alt. 2,000 ft.

Urceola scruposa (L.) Nyl. Walker Mt., alt. 3,500 ft.

Cladonia decortia, Floerk. Near Marion, alt. 2,100 ft.

Cladonia pyxidata (L.) Fr. Slemp Creek, alt. 2,200 ft. Walker Creek, alt. 2,300 ft. Nick's Creek, alt. 2,300 ft.

Cladonia fimbriata (L.) Fr. Iron Mt., alt. 3,000 ft.

Cladonia squamosa, Hoffm. Dickey Creek, alt. 2,300 ft. Pond Mt., alt. 2,800 ft.

Cladonia furcata (Huds.) Fr., var. *racemosa*, Tuck. Dickey Creek, alt. 2,300 ft. Walker Mt., alt. 3,000 ft.

Cladonia rangiferina (L.) Hoffm. Dickey Creek, alt. 2,800 ft. Summit of White Top Mt., alt. 5,678 ft.

Cladonia cristatella, Tuck. Slemp Creek, alt. 2,300 ft. Nick's Creek, alt. 2,300 ft.

Bæomyces roseus, Pers. East slope of White Top Mt., alt. 5,000 ft. Pond Mt., alt. 2,800 ft.

Lecidea albo-cœrulescens Fr. The Pinnacle, near King Solomon's Cave, Cumberland Gap, alt. 2,500 ft.

Lecidea enteroleuca Fr. G. var. *æquata*. Grayson, on New River, alt. 2,100 ft.

Buellia parasema (Ach.) Th. Fries. Summit of White Top Mt., alt. 5,678 ft.

Arthonia tædiosa (Nyl.) Fr. Banks of Holston River, alt. 2,100 ft.

Arthonia spectabilis, Fl. Near Marion, alt. 2,100 ft.

Calicium trichiale (Ach.) Ait. Orchard at Marion, alt. 2,100 ft.

Endocarpon miniatum (L.) Schær. Dickey Creek, alt. 2,500 ft. Holston River near Marion, alt. 2,100 ft.

Endocarpon miniatum var. *aquaticum*, Schær. Hungry's Mother Creek, alt. 2,200 ft.

Normandia lacte-virens (Turn.) Ait. Dickey's Creek, alt. 2,500 ft.

Trypethelium virens, Tuck. S. Ait. Nick's Creek, alt. 2,300 ft.

Verrucaria fuscella Fr. Round Top near Seven-Mile Ford, alt. 2,800 ft.

MYXOMYCETES.

Fuligo varians, Sommf. Marion.

Stemonitis fusca, Roth. On rotten wood. Pond Mt.

ALGÆ.

Sirosiphon pulvinatus, Breb. Dickey Creek.

Gomphonema constricta, Ehr. Dickey Creek.

Synedra Ulna (Nitzsch.) Ehrenb. Dickey Creek.

Fragilaria Harrisonii, Gum. Dickey Creek.

Cocconeis Pediculis, Ehr. Dickey Creek.

Chroolepus aureus (L.) Kg. Holston River.

Lemanea torulosa (Roth.) Aq. Dickey Creek.

FUNGI.

Phragrindium subcorticatum (Schrank) Mill. On *Rosa* sp. Marion.

Puccinia Anemones, Pers. On *Anemone trifolia*. White Top.

Cæoma luminatum, Lk. On leaves of *Rubus villosus*. Marion.

Rœstelia lacerata (Sch.) Fr. ? On leaves ot *Cratœgus*. Bristol.

Æcidium Violæ, Schum. On *Viola hastata*. White Top.

Æcidium Acteæ (Opiz) Wallr. On leaves of *Actæa alba*. Marion.

Æcidium Clematidis, D.C. On *Clematis Virginiana*. Marion.

Æcidium Sambuci, S. On leaves of *Sambucus Canadensis*. Bristol.

Erysiphe lamprocarpa, Lev. On *Hydrophyllum Virginianum*. Marion.

Asterina Leemingiæ, E. & E. Proceed. Acad. Nat. Sci. Phila. 128 (1893). On leaves of *Galax aphylla*, Marion.

Myceliu mhypophyllous, forming black, orbicular patches 2–4 mm. in diameter, composed of superficial radiating dendroid-branched hyphæ furnished with globose hyphopodia, 8–10 μ. in diameter. Perithecia numerous, seated on the hyphæ, flattened scutellate, of radiate cellular structure, about 150 μ. in diameter, with a papilliform ostiolum which is soon deciduous, leaving the perithecium perforated and convex. Asci oblong, $35–40 \times 20–24$ μ., aparaphysate, 8-spored. Sporidia crowded oblong-fusoid, yellowish hyaline, uniseptate, scarcely constricted, slightly curved, $18–22 \times 5–6$ μ. (Plate 82.)

Has the habit of *Dimerosporium orbiculare*, B. & C., but differs in several respects. Other localities may be given: Brushy Mt., Va., Table Rock, N. C., 1891, John K. Small; Dickey Creek, Chas. Scott. The species is named in honor of Miss Helena D. Leeming.

I have received from Prof. Farlow sterile specimens of this fungus named by Curtis *Glenospora melioloides*, B. & C. There is no question but that the specimens are of the same fungus; Cooke claims that *G. melioloides* is a misname for *G. Curtisii*, B., in which case the fungus was probably thought to be another species and so labelled without further scrutiny.

Mr. Massee reports that specimens of *A. Leemingiæ*, E. & E., sent to him March 7, 1893, "Are quite distinct from *G. melioloides*, B. & C., and *G. Curtisii*, B." What the true status of the question is will probably soon come to light. In the meantime we prefer to maintain the specific name quoted above. S. E. J.

Asterina sp. indet. On petioles of *Galax aphylla*, Brushy Mt.

Belonging to type B. Journal of Mycology **1**: 135 (J. B. E.).

Dimerosporium Galactis, E. & E., n. sp.

Penicillium candidum, Lic. On *Lemanea torulosa*, Dickey Creek.

Hypoxylon cohærens, Pers. On tree stumps, White Top.

Marasmius rotula, Scop. On decorticated bark, White Top.

Lentinus Lecontei, Fr. White Top.

Polyporus hirsutus, Fr. Top of Pond Mt.

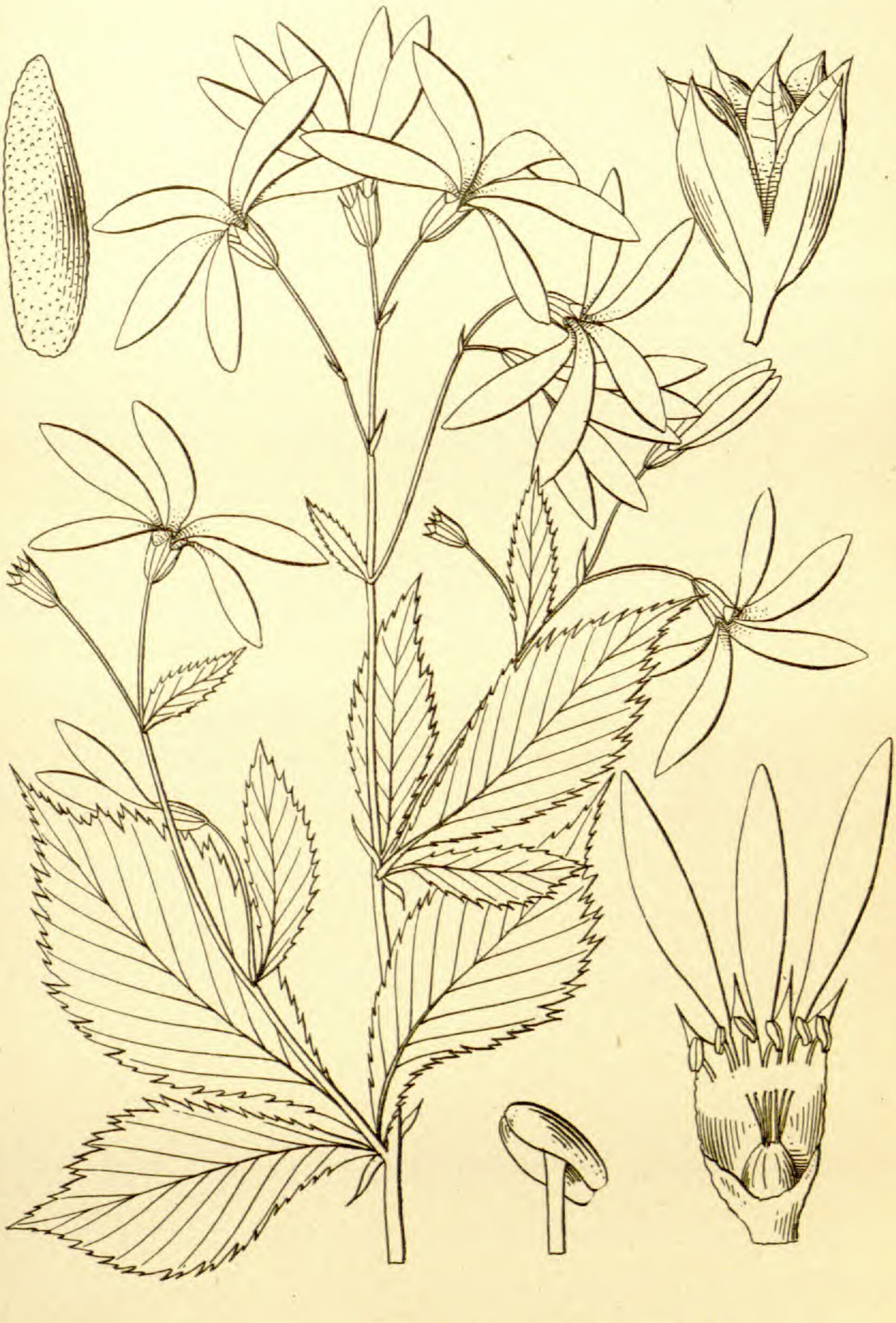
Polyporus versicolor, Fr. Marion.

Irpex Tulipiferæ, Fr. On cherry trees, Marion.

Stereum complicatum, Fr. Marion.

Stereum versicolor, Fr. Marion.

TRIFOLIUM VIRGINICUM, SMALL.



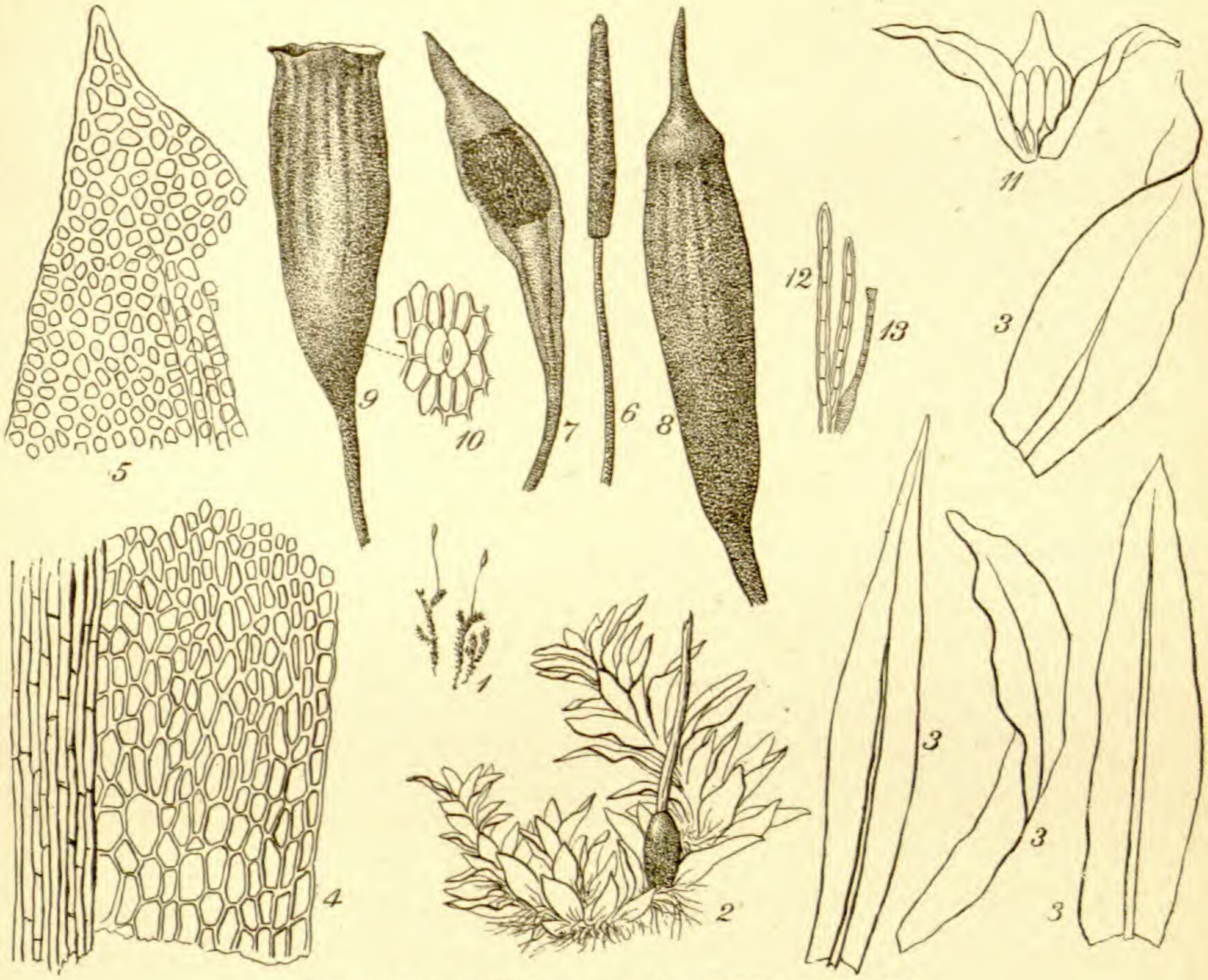
PORTERANTHUS TRIFOLIATUS (L.) BRITTON.

PORTERANTHUS STIPULATUS (MUHL.) BRITTON.

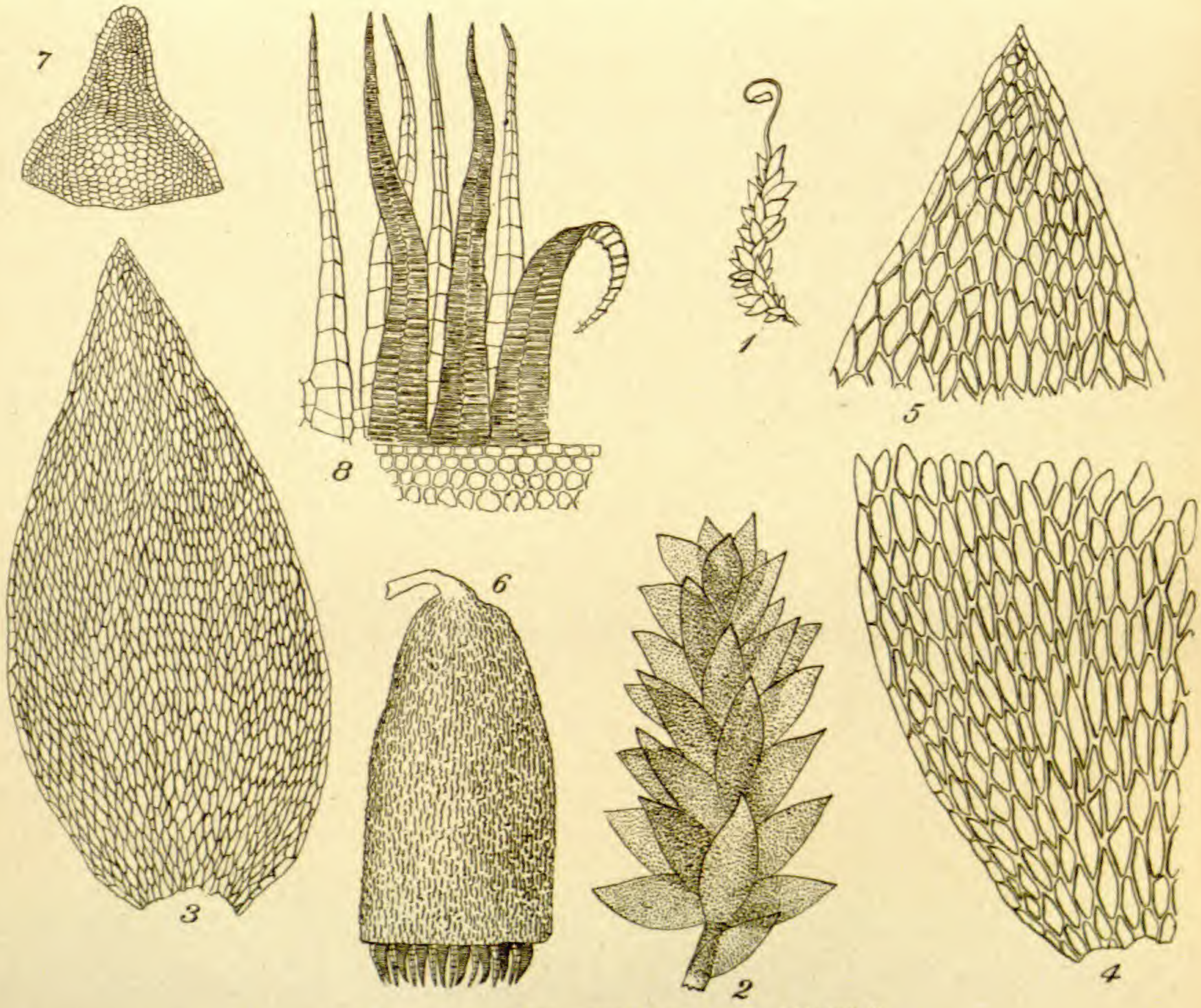
VIBURNUM FERRUGINEUM (T. & G.) SMALL.

RUDBECKIA BRITTONII, SMALL.

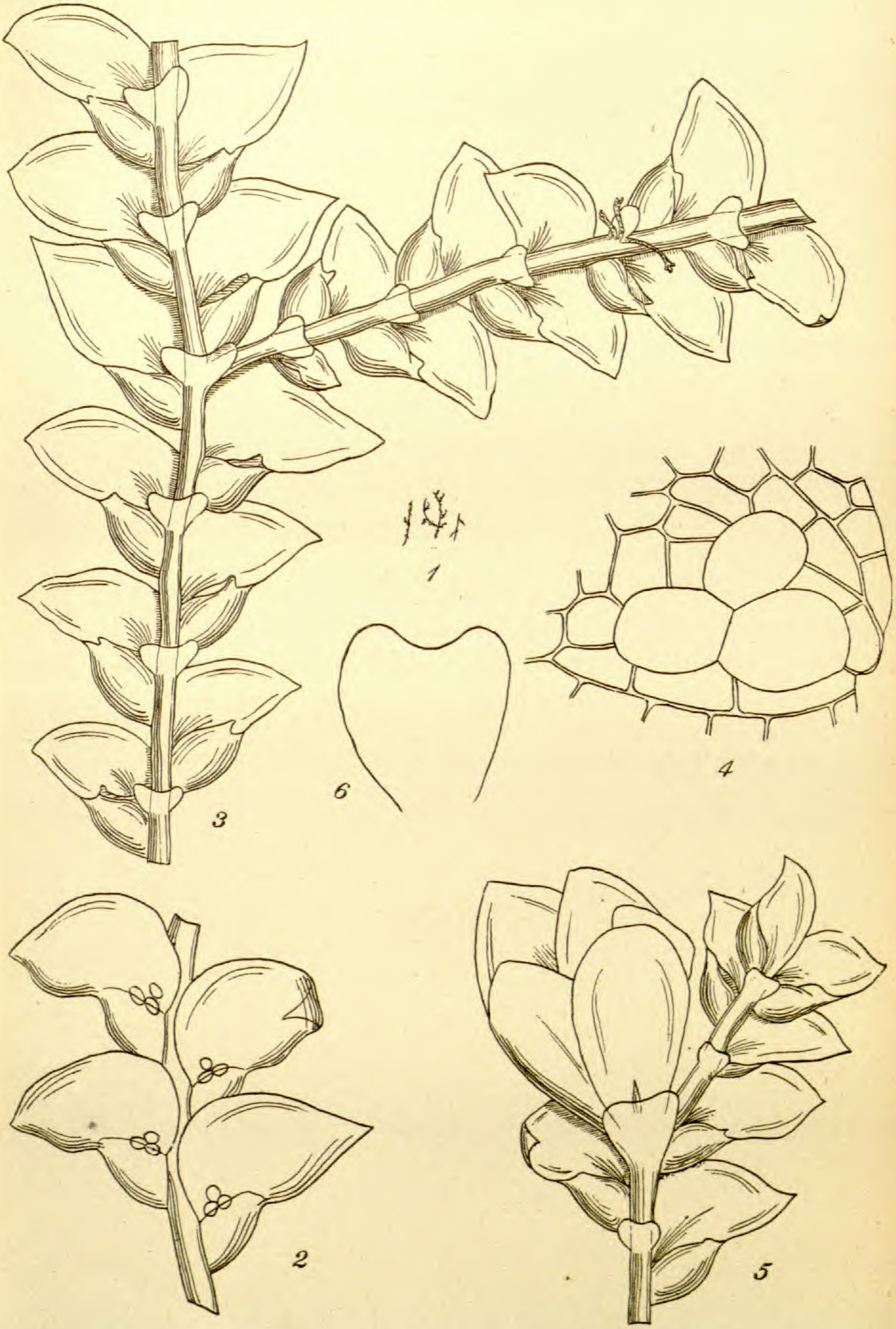
[Plant one-half natural size.]



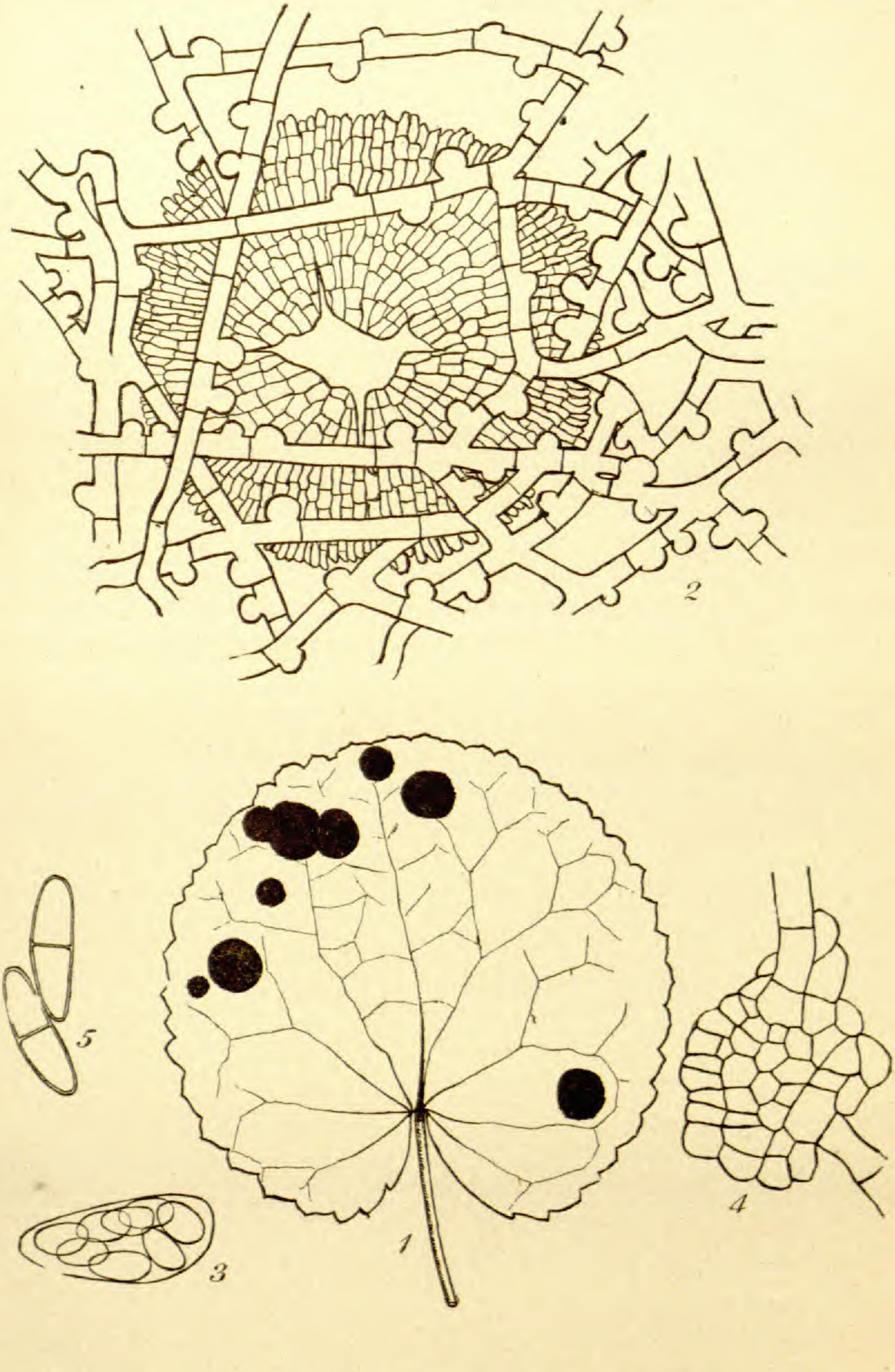
ZYGODON VIRIDISSIMUS (DICKS.) R. BR.



HOOKERIA SULLIVANTII, C. MUELL.



LEJEUNEA OVATA, TAYL.



ASTERINA LEEMINGIÆ, ELLIS & EVER.

MEMOIRS

OF THE

TORREY BOTANICAL CLUB.

VOL. IV. NO. 3.

AN ENUMERATION

—OF THE—

PLANTS COLLECTED IN BOLIVIA

BY MIGUEL BANG,

WITH DESCRIPTIONS OF NEW GENERA AND SPECIES.

BY HENRY H. RUSBY.

PART 2.

ISSUED APRIL 27, 1895.

PRICE. - - - - 50 CENTS.

MEMOIRS

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On the Collections of Mr. Miguel Bang in Bolivia.—Part II.

By Henry H. Rusby.

CORRECTIONS, ADDITIONS AND NOTES REFERRING TO PART I.*

The examination of additional material communicated by Mr. Bang since the publication of the first part, and an opportunity for critical examinations at the Kew Herbarium, have made possible the clearing up of many doubtful points. Several errors have also been detected by the author or by the correspondents cited, and some of the descriptions of new forms are perfected through the receipt of the parts missing when the original descriptions were drawn up.

Several numbers of the first thousand inadvertently omitted from Part I. are here inserted.

863. Published as "*Berberis Boliviana* Lech.?" is

Berberis divaricata sp. n.

Stem stout, light gray-brown, striate, the branchlets nearly divaricate, golden brown, slightly shining, blackish-dotted, the internodes 2.5–3 cm. long; spines 3, barely united, slightly flattened, channelled, light brown, shining, very pungent, the middle about 1.5 cm. long, the lateral only a little shorter; scales closely sheathing, 5 mm. long, broadly triangular, pungent, keeled and with a pair of ribs converging near the apex; leaves 3 or 4 together, the largest nearly 3 cm. long by 1 cm. broad, inequilaterally oblanceolate, the base cuneate, sessile, the apex cuspidate, thick, minutely revolute, the midrib and 6–8 pairs of principal

*Mem. Torr. Bot. Club, III., Part 3.

veins prominent, reticulate, glabrous both sides; raceme solitary, sessile, about 8 (5–10) flowered, pendulous, the rhachis and pedicels (1 cm. long) blackish when dry, the bracts subulate, 3 mm. long; sepals about 3, petals about 6 mm. long; fruit not seen.

The same collected by Pearce, at Pelechuco, Peru.

857. *Berberis rectinervia* Rusby. This now appears to me distinct from Pearce's La Banca specimen, which has spines 3-parted above the base, the leaves spiny-toothed and with a different venation.

826. *Vochysia Bolivana* Rusby. Fruit characters, taken from a specimen collected by Pearce at Moro, 4000–5000 feet altitude, and deposited at Kew, are as follows:

24 mm. long by 8–10 mm. broad, oblong, both ends rounded, angled and channelled, rugose and papillose, blackish, on a peduncle more than half as long.

683. Published as "*Caopia tomentosa* (R. and P.) Kuntze, provisionally" is

CAOPIA CRASSA sp. n.

Except upper surface of leaf, entire plant densely ferruginous; branchlets angular, stout; petioles stout, channelled, 1–1.5 cm. long; blade 7–15 cm. long, 2.5–5 cm. broad, lanceolate, base rounded, apex acuminate, thick and rigid, faintly revolute, midrib strong and prominent below, principal veins 15–18 pairs, reticulate, above smooth and shining, yellowish green when dry; panicles peduncled, 5–7 cm. broad, 3–4 cm. long exclusive of peduncles; pedicels very stout, strongly angled, 4–5 mm. long, articulated to branchlets 1.5–2 mm. long, the articulation swollen; sepals oval, obtusish, 8 mm. long, 5 mm. broad, very thick, smooth and shining within; petals about as long, broader, densely pilose-fringed, spotted only above the middle; squamae small, thick and fleshy, triangular-ovate, pilose; ovary broadly ovoid, papillose, the styles, just after the fall of the petals slightly longer than the ovary.

Very near *C. Brasiliensis*, which has leaves less shining above and oblanceolate sepals. The same as Rusby's 1810; also collected by Pearce at Sandillani.

741. CLUSIA RAMOSA sp. n.

Much branched, the branchlets recurved, dark reddish brown; petioles 5–8 mm. long, boat-shaped, the upper partly enfolding the buds; blade of larger leaves 10–15 cm. long, 5–7 cm. broad, the upper rapidly diminishing in size, obovate, the base obtusish, the apex beautifully rounded, very thick, the margin sharply revolute, midrib and veins very prominent below, the latter 35–50 pairs, anastomosing about 1 mm. from the margin, glabrous both sides, pale or glaucous above, flavescent beneath in drying; peduncles 1–2 cm. long, panicle proper 3–4 cm. long and broad, rather few-flowered; bracts resembling the upper petioles, but shorter, thinner and lighter colored; flowers sub-sessile, in threes, the mature obovoid-globose buds about 4 mm. in diameter; staminate flowers only seen; anthers distinct, quadrangular in transverse section, narrowed downward, the filaments for the most part united into a conical or oblong mass. Very near *C. Criuva* Camb. One collection by Pearce at Santa Cruz is possibly the same.

Unduavi, March, 1891.

390. Distributed and enumerated as *Marcgraavia peduncularis* Poepp. Mss. is *Norantea peduncularis* Poepp. ex Wittm. Mart. Fl. Bras. Marc. 238.

953. Published as probably a *Malveopsis* is determined by Mr. E. Baker to be *Modiolastrum malvaefolium* (Griseb.) R. Schum. Mart. Fl. Bras. **13**: 3, 277 (*Modiola malvaefolia* Griseb. Symb. Fl. Arg. 45).

114. *Malva parviflora* L. Pl. Nov. Am. Acad. 3: 416. Vic. La Paz. 10,000 ft. 1889.

409. *Pavonia paniculata* Cav. Diss. 3: 135. *pl. 46. f.* 2. Yungas, 1890.

545. *Pavonia Typhalea* (L.) Cav. Diss. **2**: 134. Yungas, 1890= Rusby's 1487.

647. *Gossypium maritimum* Todaro, var. *polycarpum* Todaro, Rel. Cult. Cott. *pl. VIII.* Yungas, 1890=Rusby's 659.

931. *Ayenia Boliviana* Rusby. The fruit characters, taken from Mandon's No. 1508, Herb. Kew, are as follows:

Depressed-globose, 4 mm. broad, 3 mm. long, deeply 5-lobed, light brown, finely pubescent, coarsely and sparsely green-muricate.

935. *Brittonella pilosa* Rusby, Bull. Torr. Bot. Club, **20**: 430. Vic. Cochabamba, 1891.

315. *Oxalis medicaginea* HBK. Nov. Gen. **5**: 241. Yungas, 1890.

348. *Erythrochiton Brasiliensis* Nees et Mart. Nov. Act. Nat. Cur. **11**: 170. *pl. 25* (1823).

848. Published as "*Trichilia ovalis*" is GUAREA OVALIS.

829. *Alzatea verticillata* R. & P. Fl. Per. 3: 20. *pl. 241.* Songo, Nov. 1891.

987. Published as "*Cardiospermum Halicacabum* L" is *C. Corindum* L. Sp. Pl. ed. 2, 526.

879. PAULLINIA BOLIVIANA Radlk. sp. n.

In sectione "Caloptilon" (capsula trialata, alis endocarpii ingressu chartaceis persistentibus, sepalis 5 liberis) quodammado affinis *Paulliniae acutangulae* Pers. Pube molliore vel subnulla induta; rami e triangulari 3–6-sulcati, corpore lignoso simplici; folia 5-foliolato-pinnata; foliola elliptico-lanceolata, supra medium remote serrato-dentata, punctis lineolisque pellucidis ramificatis ornata; stipulae lineari-subulatae; thyrsi solitarii, graciles, puberuli; fructus trialatus, obovatus, minor; seminis testa glabra.

Forma 1, *genuina.* Molliter pubescens. Cochabamba 1890, Bang. n. 879. (Serjania sp. Rusby in Enum. p. 17, excl. obs. "very near 413," quae *Serjania reticulata* Camb).

Forma 2, *glabrescens.* Pube vix ulla nisi in foliis circa articulationes et ad nervos adspersa. Guanai 1886, Rusby n. 529. (*Paullinia* sp. Britton in Bull. Torr. Club, **16**: 191).

923. SCHINUS DIVERSIFOLIA sp. n.

Glabrous. Branchlets 2–3 dm. long, slender, patulous, at length bright red; petioles 1–2 cm. long, narrowly margined, the leaflets 5–9, the upper frequently not at all or imperfectly separated from the terminal, narrowly decurrent upon the rhachis, very unequal, the lateral 1–2.5 cm. long and 3–8 mm. broad, the terminal 1.5–4 cm. long and 5–15 mm. broad, outline irregular, the lateral mostly oblong to slightly oblanceolate, the terminal lanceolate to angularly ovoid, the base abruptly tapering, the apex rounded but minutely mucronate, thickish, pale, the veins obscure; panicles only 2–4 cm. long and broad, lax, the rhachis flexuous; pedicels slender, one and one-half to twice the length of the flower, which is minute, about 2 mm. broad when fully expanded.

Vic. Cochabamba, 1891. The leaves said to possess medicinal virtues.

756. Published as "*Caesalpinia rosulata* sp. n." is regarded by Dr. Taubert as identical with *C. Fisheriana*, and I defer to his judgment.

822. Published as "*Erythrina Cristi-Galli* L." Dr. Taubert refers to *E. falcata* Benth.

936. Published as "*Stylosanthes hamata* (L.) Taubert?" is:

STYLOSANTHES BANGII Taub. sp. n.

Caulis herbaceus vel basi sublignosus, simplex vel parce ramosus, angulatus, hispido-setosus insuperque praesertim superne villosulus; stipulae striatae, vagina processus subulatos fere duplo superante; folia rhachide brevissima, foliatis vix petiolulatis lanceolato-oblongis, apice mucronatis, subsetoso-ciliatis, utrinque sed supra obsolete hispidis; spicae pauciflorae bracteis primariis hispido-setosis; seta bracteam secundariam bifidam ciliatam plerumque aequans; legumen plerumque biarticulatum, articulo inferiore tamen raro plane evoluto leviter pubescente, superiore glabro, reticulato-nervoso, rostro 1/3 longitudinis coronato.

Radix crassa lignosa multiceps. Caules 5–20 cm. altos, setis inferne incrassatis erectis vel subpatentibus praecipue ad angulos hispidos emittentes. Stipulae parce subhispido-setosae insuperque parce villosulae, vagina 6–7 mm. longa saepius purpureo-colorata, processibus 3–4 mm. attingentibus. Petioli pars libera subsetoso-hirsuta, processus superans. Folia rhachide 1.5 mm. longa; foliolis rigidis, maximis 13 mm. longis, 3.5 mm. latis, supra obscure, subtus prominenti-nervosis, utrinque, subtus praecipue, tribis raris hispidis nodis insidentibus munitis, supra tamen saepe subglabris. Spicae 1–1.5 cm. longae; bractea primaria stipuliformis, saepissime foliolum terminale gerens, plerumque purpureo-colorata; secundaria hyalina, oblonga, bifida, margine ciliata, 3.5–4 mm. longa, 2.5 mm. lata; seta prophylla lineari-lanceolata 3.5 mm. longa aequans, rarius superans, parce plumosa. Calycis tubus parte stipuliformi striata 6 mm. longa, ampliata cum dentibus subciliatis 3 mm. attingente. Corolla flava tubi calycini parte ampliata duplo longior. Legumen articulo inferiore vix 2 mm. longo, superiore (cum rostro uncinato recurvo) 4.5 mm. longo, 2.5 mm. lato, utrinque longitudinaliter bicostato.

Habitat in Bolivia, Vic. Cochabamba.

Obs. Stirps inter sect. *Styposanthes* species *S. sympodiali* Taub. affinis, leguminis articulo superiore glabro aliisque notis distat.

780. Read "Escallonia Mandoni."

337. *Drosera uniflora* Willd. En. Hort. Berol. 340.

533 and 615, a, published as "*Micrampeles macrocarpa* (Britton) Rusby" is *M. Rusbyi* Greene, Prof. E. L. Greene (Erythea, 1: 138) having reminded us that the former name is pre-occupied.

171. *Caiophora* sp. n. Soon to be described by Urban and Gilg.

406. BEGONIA ANTIOQUIENSIS (A. DC.) *Casparya Antioquiensis* A. DC. Ann. Sci. Nat. (IV.) 11: 161 (1859). Compared with the type, Triana's 3041, Antioquia, New Grenada.

18. Published as *Opuntia*, is *Cereus melanotrichus* K. Sch., according to Dr. Schumann.

175. *Cereus lasianthus* K. Sch., according to Dr. Schumann.

176. *Cereus lasianthus* K. Sch. Soon to be described by Dr. Schumann.

177. A mixture of Cacti which cannot well be corrected here.

384. *Sabicea cinerea* Aubl. Pl. Guian. 1: 192. *pl. 75*. Yungas, 1890.

510. *Cinchona Pahudiana* Howard, Nuev. Quin. *pl. 21*.

418. Published as *Malanea grandis* Rusby, is ELAEAGIA GRANDIS, Rusby.

355 and 858. *Psychotria* (*Mapourea*) *niveobarbata* Muell. Arg. in Mart. Fl. Bras. 6: 6, 401. Yungas, 1890, and Songo. Nov. 1891. The same as Glaziou's Rio, 7684.

404. *Psychotria Bangii.* Fruit 4 mm. long, the base slightly contracted, conspicuously sulcate.

376. * *Spermacoce tenuior* L. Sp. Pl. 102.

473. SPERMACOCE BROWNII sp. n.

Stems slender, erect or reclining, 2 to 5 dm. long, light brown, deeply 4-grooved, above sparsely hispidulose-pubescent, the internodes 5–7 cm. long; branches few and slender; stipules rich brown, the united portion ample, 5 mm. long by 7 mm. broad, the laciniae 5 mm. long, very slender; leaves tapering into a very short margined slightly ciliate petiole, the larger 6–8 cm. long by 2–2.5 cm. broad, the floral 3–4 cm. long by 4–7 mm. broad, oblong, tapering to both ends, but scarcely acute, thin, pale, the midrib and 6–7 pairs of primary veins slender but very prominent, sub-longitudinally disposed, both sides rather sparsely pubescent, the pubescence slightly harsh; whorls compact, many-flowered, 1–1.5 cm. broad; floral scales narrowly linear, white, unequal, but approximately as long as the flowers; calyx-tube obconical, in flower about 2 mm. long, the lobes 1 mm. long and two-thirds as broad, enlarging in fruit, ovate, obtuse, densely hirsute; corolla but little exceeding the calyx, the oblong lobes nearly twice the length of the narrow blackish tube, whitish-yellow, tufted at the apex; anthers ovate-oblong, a little longer than broad; seeds oblong-linear, slightly curved, 2 mm. long. Near *S. scabiosoides* C. & S.

945. *Mitracarpum hirtum* (Sw.) DC. Prod. 4: 572. (*Spermacoce hirta* Sw. Obs. 45.)

949. Published as "Diodia," is RICHARDIA (?) COLDENIOIDES sp. n.

Stems prostrate, numerous, and densely massed, sharply angled, purplish, densely beset with rather long white stiff hairs, the internodes about 1 cm. long; sheath of stipules green, 2 mm. long by 4 mm. broad, the few yellowish-white slender setae 3 mm. long; leaves closely sessile, pale green, 5–8 mm. long by 2–3 mm. broad, lanceolate, tapering from the base, scarcely acute when

* Kindly determined by Mr. N. E. Brown.

spread out, rigid, revolute, above nearly glabrous, below setose, densely massed about the flowers; calyx-tube globoid, 1 mm. long, a little broader, teeth 4, triangular-subulate, acute, as long as the tube, ⅓ as broad, densely setose, the intermediate ones obsolete; corolla glabrous, the tube very short, the lobes ovate, obtuse, scarcely 1 mm. long; anthers broadly ovate; mature fruit not seen, apparently hispid, separable from the base into 2 nutlets without leaving an axis.

937. Published as "Borreria" is STAELIA FILIFOLIA sp. n.

Root vertical, stout, woody, stems several to numerous, 5–10 cm. long, slender, ascending, sparingly branched, at first densely, at length sparsely leafy, scabrous; sheaths of the stipules brown, 2 mm. broad, .5 mm. long, a transverse ridge at the middle portion, the few setae white, very slender, 1–2 mm. long; leaves filiform, acute, 3–8 mm. long, grayish-hispid; verticils 5–8 mm. broad; calyx-tube hemispherical, 1.5 mm. broad, densely hispid, the two principal teeth 2 mm. long, setiform, the others obsolete or nearly so; corolla-tube cylindraceous, slightly dilated upward, equalling the calyx-teeth, the lobes ⅔ as long, oblong-lanceolate, obtuse; anthers oblong, nearly 1 mm. long, ½ as broad. Mature fruit not seen. Very near *S. thymoides* C. & S.

247. Published as "*Vernonia paucifolia* sp. n." is V. HERBACEA (Vell.) (*Chrysocoma herbacea* Vell. Fl. Flum. 330; 8: *t. 29* (1825) = *V. obovata* Less. Linnaea (1829) 279).

86. Published as "*Stevia compacta* Benth.?" is STEVIA BANGII sp. n.

Stellate-puberulent throughout; root consisting of many slender straightish dark-colored branches from a short woody crown; stems 1 to several, reddish, terete, slender, and slender-branched from near the base, the branches ascending, internodes 3–4 cm. long; leaves 1.5–2.5 cm. long by 2–10 mm. broad, from lance-linear to broadly lanceolate, obtuse, tapering into a petiole-like base, the larger 3-nerved and coarsely serrate, the smaller 1-nerved and entire, somewhat rigid; heads mostly 5–7 together; involucre 2 mm. broad, 7 mm. long, the scales linear-oblong, acutish; pappus-bristles about 12, about equalling the corolla-tube or longer, purplish, serrate; corolla-tube reddish-yellow, 5 mm. long, 7 mm. broad, cylindrical, the lobes flesh-color, 2 mm. long, lance-ovate. Mature akene not seen.

= Rusby's 1613, but not Mandon's 244.

611. Published as "*Stevia stenocephala* Sch. Bip.?" is STEVIA NEGLECTA sp. n.

Stems tall, coarse and weak, widely branching, terete, bright red, above minutely and sparsely pubescent, foliage scanty, transient, drying blackish; larger leaves 5 cm. long by 2 cm. broad, passing gradually into the floral, which are 1 cm. long by 5 mm. broad, lance-ovate, sessile, blunt, obscurely coarse-toothed to entire, thin, pale beneath; heads at length solitary and loosely racemed along the branches of the panicle, erect on peduncles 1 mm. long; involucre 5 mm. long by 1 mm. broad, the scales lance-oblong, acute, finely many-nerved; mature akene black, narrowly linear-oblanceolate, sharply angled, the edges serrulate, 4 mm. long; narrow lower portion of corolla-tube blackish, 1 mm. long, hirsute, the dilated portion 2 mm. long, twice as broad as the lower glabrous, or nearly so, yellowish white, the lobes similar, oblong, 1 mm. long, spreading or reflexed; pappus reduced to a circle of short teeth.

Not the same as Matthews' 1130 or 1335, nor Mandon's 244, though it resembles all of them.

260. This has since been compared with Mandon's type of *Stevia Boliviensis*, and found to agree perfectly. It has a rhizomatous base.

868. *Addisonia virgata* Rusby, Bull. Torr. Bot. Club, **20**: 432. Vic. Cochabamba, 1891.

254. Distributed as "*Eupatorium Guadalupense?*" is EUPATORIUM STIPULIFERUM sp. n.

Stems slender, widely branching, terete, whitish, above puberulent; leaves ternate (or opposite?), petioles 1.5–2 cm. long, very slender, the base gradually dilated and 3-ribbed, bearing in their axils several small leaves (5 mm. long) similar to the normal ones, which are 3–7 cm. long, 3–5 cm. broad, truncate to cordate, and slightly decurrent on the petiole, acuminate or acute, coarsely toothed, the teeth short, unequal, blunt, thinly membranaceous, slenderly 3-nerved from the apex of the petiole, sparingly veined, sparsely and very minutely strigose both sides, dark above, pale beneath; inflorescence paniculate, the branches leafy-bracted, panicles 10–15 cm. long, 5–7 cm. broad, pyramidal, lax; heads on capillary peduncles 3–5 mm. long, the latter subtended by subulate bracts, the heads 5 mm. long; scales of the involucre about 8, with green midrib and 2–4 nerves, the outer lanceolate, acuminate and pungent, the inner oblong to oblanceolate, less acute, puberulent like the pedicels; mature akene with pappus nearly double the length of the involucre; akene black, 2 mm. long, obconical with acutely tapering base, very acutely angled, the angles hispid; pappus and corolla 3 mm. long, the latter regularly cylindrical.

= Matthews' 1369, and Spruce's 3914.

Species near *E. conglobatum* DC.

867. *Eupatorium longipetiolatum* Sch. Bip. This was also collected by Matthews, Chachapoya, No. 3062.

696. Distributed as "*Willoughbya cordifolia* (L) Kuntze" is W. MICRANTHA (H.B.K.) (*Mikania micrantha* H.B.K).

100. *Erigeron spiculosum* H. & A. Bot. Beech. Voy. 1: 32. Vic. La Paz, 10,000 ft., 1889.

802. Perhaps *Baccharis caespitosa* Pers. Syn. 2: 425. A specimen collected by Ball is doubtfully so named at Kew.

941. Published as "*Aster Vahlii* (Gaud.) H. & A.?" proves to be *Baccharis juncea* Desf. Cat. Hort. Par. Ed. 3, 163.

178. *Pluchea odorata* Cass. var. (?) FERRUGINEA n. var.

A very stout compact densely leafy shrub, upper leaf surfaces scabrous, otherwise ferruginous, heads 6 mm. long and broad, the scales broadly ovate with dark tips, the akenes very dark brown, linear-oblong, 1 mm. long.

261. *Gnaphalium leptophyllum* DC. Prod. 6: 226.

977. VIGUIERA (?) GLUTINOSA sp. n.

Habit unknown; upper portion of stem, lower leaf-surfaces, peduncles and involucres strongly glutinous: stems (or branches) elongated, slender, crooked, greenish brown, coarsely angled; leaves alternate, 7–13 cm. long, 1.5–3 cm. broad, lance-oblong, somewhat inequilateral or falcate, tapering into a margined petiole 1 cm. long, apex mostly acute, entire, very thick and coriaceous, slightly shining, drying yellowish green, the yellow midrib prominent below, slightly impressed above, the primary veins strongly curved, reticulation prominent beneath; heads solitary, long-peduncled in the upper axils, the involucre hemispherical, a little more than 1 cm. long, 1.5 cm. broad, the receptacle convex, the nerved scales in about three rows, the outer lanceolate, coriaceous and appressed below, herbaceous above, approximately as long as the inner, the latter, which belong to the rays but do not enfold them, appearing 3-lobed by a broad hyaline lacerate appendage upon either side, these much surpassed by the acuminate, ciliate herbaceous terminal portion; disk-scales only partially and loosely enclosing their flowers, one-third shorter than the latter, strongly keeled, spatulate, the lateral fringed hyaline lobes much larger than the terminal, which slightly surpasses them; the deep yellow rays 3 cm. long (including the rudimentary pilose akene which is 7 mm. long), 8 mm. broad, regularly oblong, minutely 3-toothed, bearing 2 principal and 7 or 8 secondary nerves, neutral; disk flowers (the outer strongly curved), 13 mm. long, including the densely hirsute ovary, which is 6 mm. long, the corolla regularly funnelform, the triangular, spreading or reflexed teeth $\frac{1}{5}$–$\frac{1}{3}$ the length of the tube; anthers 3 mm. long, blackish, the base slightly sagittate, the whitish triangular cartilaginous appendages partly folded; style-branches ⅔ the length of the lower portion, including the triangular acute appendage, oblanceolate, pubescent; base of style bearing a dark bulb-like enlargement which disarticulates from the akene; mature akene not seen, apparently the outer narrowly 3–winged, the inner narrowly 2–winged; pappus a single seta from each angle, the lower portion concealed by the similar setae which densely clothe and surpass the akene.

This very peculiar species is in its alternate leaves, and general vegetative characters, and its sharply angled or perhaps winged akenes, most unlike the genus to which I have referred it, but I am disinclined to multiply genera in this perplexing sub-tribe, unless the receipt of additional specimens with mature akenes may render it necessary in this instance.

974. VERBESINA BRIDGESII sp. n.

Stems erect, light green, coarsely angled, pubescent with short, someweat retrorse hairs; leaves 7–14 cm. long, 2–5 cm. broad, ovate or the upper lanceolate, the apex tapering to an acute point, the base abruptly contracted into a narrow portion, which is clasping and auriculate, the auricles glandular-viscid, coarsely and irregularly toothed, thickish, rugose-reticulated, grayish-green or slightly yellowish, above scabrous, below soft-tomentose; inflorescence tomentose, the heads compactly arranged, 7 mm. long, nearly 1 cm. broad, the involucre hemispherical, the scales in 3 or 4 series, spatulate-oblong, with rounded green tips; rays about 10, white, 5 mm. long, oval or nearly rotund, with 3 slight rounded teeth, 3–5-nerved; scales of the disk obovate, acuminate, the apex ciliate or lacerate, hyaline, finely many-nerved, as long as the disk flowers; disk-corollas 6 mm. long, regularly narrowly funnelform, the lobes small, triangular ovate, obtusish; anthers slightly exsert, black, 2 mm. long. Mature akene not seen. All these characters to be slightly modified as the flowers described are rather immature.

Collected also by Bridges in Bolivia.

29. *Tagetes graveolens* L'Herit.(?)=Mandon's 65 and Seeman's 704 from Lima, Peru.

965. PLAGIOCHEILUS ERECTUS sp. n.

Glabrous, annual, the stems erect, slender, 4–30 cm. high, somewhat branched, channelled; petioles 1–2 cm. long, channelled; leaves bi-tri-ternately compound, the two lower segments distant from the terminal by about half their length, the ultimate segments lance-oblong, acute, pellucid-punctate and aromatic; heads peduncled, 7 mm. broad, by 4 mm. long, the blackish scales oblong, obtuse, thick, about equalling the yellowish flowers; akene 3 mm. long, 2 mm. broad including the wing, which is yellowish and fimbriate; the akene proper 1 mm. broad, dark brown, bluntly keeled, oblanceolate, bearing a short lighter brown crown. Material too scanty for flower-dissections.

961. Listed as "Senecio," is ASTER BANGII = *Tripolium conspicuum* Lindl. DC. Prod. **6**: 254, but there is an *Aster conspicuus* Lindl. l. c. 250. In my opinion *Aster Bangii* is distinct from ASTER ASTEROIDES (Colla) (*Baccharis asteroides* Colla, Mem. Act. Torin. **38**: 14. *pl. 25. f. 1*).

78. Listed as "*Mutisia viciaefolia* Cav.?" is *M. Candolleana* Gard. & Field, Sert. Pl. *pl. 45, 46* = Mandon's 7, Pearce's 662, Rusby's 155, and also collected by Bridges. The cut published in *Druggists' Bulletin*, 1888, is of this species.

881. Published as "*Mutisia hastata* Cav." is MUTISIA CAMPTOSORIFOLIA sp. n.

Climbing by terminal leaf-tendrils, glabrous throughout, except the axillary buds; branches purple, above very narrowly angled by the adnate petioles, where they are densely leafy; leaves 6–8 cm. long exclusive of the tendril, 5–8 mm. broad, regularly tapering from the base to the apex, where they are abruptly contracted into a slender simple short and weak tendril, the base sagittate, clasping, the lobes scarcely 5 mm. long, very acute, thick and coriaceous, dark green, shining, the midrib very strong and prominent both sides, especially below, the veins fine and much reticulated; axillary buds finely and densely white-floccose; heads sessile among the floral leaves, the involucre infundibular-campanulate, about 3.5 cm. long, a little more than 1 cm. broad at the sub-truncate base, less than 2 cm. broad at the apex, the flowers exceeding it by 1.5–2 cm.; scales in about 5 or 6 series, bright purple, strongly 13–15-ribbed, the outer very broadly ovate, abruptly and pungently acuminate, the inner oblong, mucronate and pilose at the tip; rays (about 10?) scarlet or crimson, strongly 3-toothed; disk corollas scarlet, regularly funnelform, about 17 mm. long, the teeth long, lanceolate, acute; akene 1 cm. long, linear, glabrous, purplish, strongly 4-ribbed with 4 partial intermediate ribs; pappus densely long-plumose.

66 and 791. LOPHOPAPPUS FOLIOSUS Rusby, Bull. Torr. Bot. Club, **21**: 487.

736 and 736 a, published as "*Perezia multiflora* (H. and B.) Less." is

PEREZIA GLOMERATA sp. n.

Stems erect or assurgent, stout, 2–4 dm. long, pale green, coarsely angled, puberulent, closely invested by the numerous erect leaves, which are 4–7 cm. long and 1.5–2 cm. broad, lance-linear, broadest at the clasping base, acute, deeply incised-toothed, many of the teeth bearing one or two small similar teeth at the base, the teeth spinulose and very pungent, thick and somewhat fleshy, faintly scabrous both sides, more so above, the midrib coarse, impressed above, beneath bearing three coarse nerves; inflorescence densely clustered at the apex, the cluster about 5 or 6 cm. broad, leafy; heads a little more than 1 cm. long, 1.5 cm. broad, the scales triangular-ovate, acuminate and pungent, ciliate and sparsely toothed, the teeth ciliate, the inner with broad, hyaline, blue margins; corolla light blue, the tube funnelform, 5 mm. long, the larger lip oval-elliptical, very minutely 3-toothed, 4 mm. long, 2 mm. broad, deeper blue at the base, the smaller lip lanceolate, two-thirds as long, scarcely toothed; anther tips little exserted, the anther 3.5–4 mm. long including the caudae which are 1 mm. long, the body and the black shining appendage about equal in length; pappus golden brown, serrate, a little exceeding the tube of the corolla; mature akene not seen, when young densely clothed with long golden brown hairs.

= Mandon's 26, Spruce's 5551, Lechler's 1726 and 1847, Matthew's 633, Pentland's from Titicaca.

Enumeration of Nos. 1-1000, continued.

CAMPANULACEAE.

Centropogon Surinamensis (L.) Presl, Prod. Mon. Lobel. 48. Yungas, 1890 (500, 642 and 738a).

Siphocampylus tupaeformis Zahlbr. Ann. k. k. Hof. Mus. **6**: 440. Vic. La Paz, 10,000 ft., 1889 (77) = Rusby's 636.

Siphocampylus giganteus (Cav.) Don, var. *latifolius* Britton, Bull. Torr. Bot. Club, **19**: 373. Yungas, 1890 (738) = Rusby's 638.

Siphocampylus volubilis (H.B.K.) Don, Gen. Syst. Gard. **3**: 703. Yungas, 1890 (256); collected also by Pearce at Buturo, July, 1865. = Rusby's 643 and 650.

Siphocampylus gracilis Britton, Bull. Torr. Bot. Club, **19**: 374. Yungas, 1890 (256a and 644) = Rusby's 640, and one collected by Bridges.

Var. *glabra* Britton, Bull. Torr. Bot. Club, **19**: 374. Yungas, 1890 (257) = Rusby's 639.

VACCINIACEAE.

Chupalon pubescens (H.B.K.) Kuntze, Rev. Gen. Pl. 383 (*Thibaudia pubescens* H.B.K. Nov. Gen. **3**: 273). Yungas, 1890 (290) = Rusby's 2033.

Vacciniopsis ovata Rusby, Bull. Torr. Bot. Club, **20**: 433. Songo, Nov. 1891 (876).

Vaccinium floribundum H.B.K. Nov. Gen. **3**: 266. *pl. 251*. Yungas, 1890 (728) = Rusby's 2028.

Vaccinium empetrifolium H.B.K. Nov. Gen. **3**: 263. *pl. 248*. Yungas, 1890 (708) = Rusby's 2022.

Rusbya taxifolia Britton, Bull. Torr. Bot. Club, **20**: 68. Yungas, 1890 (624) = Rusby's 2692.

RUSBYA BOLIVIANA Britton, sp. n.

Branches elongated, slender, glabrous or minutely scabrate above; stipules weak, subulate, 2 mm. long; petioles 1 mm. long, stout, the blade 3–4 cm. long, 10–15 mm. broad, oblong, the base acute, the apex abruptly acuminate but not acute, thick and rigid, entire, slightly revolute, glabrous and shining, especially above, the primary veins only 2 or 3, extended near the margin two-thirds of the way to the apex, other veins indistinct; umbels axillary, sessile, 3–6-flowered; flowers not seen; fruiting pedicels spreading or pendulous, 1 cm. long, slender, dilated upward and slightly compressed where they are continued into the calyx, pubescent; fruit (apparently immature) 3 mm. long and broad, urceolate with broad truncate apex where the short base of the calyx crowns it, glabrous, dry, strictly 5-celled; the numerous seeds (immature) light brown, lance-oblong, curved.

Songo, Nov. 1890 (852).

In its apparently non-fleshy fruit this differs from the other species of the genus; but, though resembling *Ceratostemma*, its nearest approach is evidently toward *Rusbya*.

CAVENDISHIA PANICULATA sp. n.

Of luxuriant habit, glabrous except the lower leaf-surfaces; branches very coarsely and bluntly angled; leaves reflexed, the petioles about 1 cm. long, 4 mm. broad, blade 1–2 dm. long, 5–10 cm. broad, ovate, about equilateral, the base slightly cordate, apex short-acuminate, entire, very thick and rigid, pale, glabrous above, very finely pubescent beneath, especially the veins, strongly

7-ribbed from near the base, the outer pair of ribs near the margin, ribs and coarsely reticulate veins very strong beneath, impressed above; racemes loosely 5–10 cm. long, peduncled, panicled, the panicle stalked; pedicels 1–1.5 cm. long, stoutish; calyx broadly campanulate, about 5 mm. long, 6 mm. broad, the base intruded and 5-lobed, the teeth semi-circular, some with a minute point; mature flower not seen; fruit (mature?) globose-ovoid, a little broader than long, the lobes obsolete, dry, purple-brown, granulate.

Yungas, 1890 (721) = Rusby's 2403.

ERICACEAE.

Pernettya Pentlandii DC. Prodr. 7: 587. Yungas, 1890 (729) Capi, March, 1890 (766) = Rusby's 2017 and 2018.

Gaultheria tomentosa H.B.K. Nov. Gen. 3: 287. *pl. 262.* Yungas, 1890 (223) = Rusby's 2032.

Gaultheria anastomosans (L. f.) H.B.K. Nov. Gen. 3: 285. Yungas, 1890 (487) = Rusby's 2025 and 2095.

Gaultheria rufescens DC. Prodr. 7: 595. Yungas, 1890 (667). = Rusby's 2011 and 2013.

Gaultheria glabra DC. Prodr. 7: 596. Yungas, 1890 (671). = Rusby's 2015.

Gaultheria conferta Benth. Pl. Hartw. 219. Yungas, 1890 (707) = Rusby's 2020.

Clethra Brasiliensis Cham. Linnaea. **8**: 510. Yungas, 1890 (393 and 474) = Rusby's 2091.

Clethra brevifolia Benth. Pl. Hartw. 143. Yungas, 1890 (717).

PLUMBAGINEAE.

Plumbago scandens L. Sp. Pl. Ed. 2, 215. Songo, Nov. 1891 (889) = Rusby's 1073 and 1917.

MYRSINEAE.

Myrsine flocculosa Mart. Herb. Fl. Bras. 257. Yungas, 1890 (389) = Balansa's Paraguay, 2377.

MYRSINE sp. obviously undescribed, but material unfit for description. Yungas, 1890 (444).

Geissanthus Boliviana Britton, Bull. Torr. Bot. Club, **20**: 140. Songo, Nov. 1891. (827 and 847) = Rusby's 562; also collected by Pearce at Coroico and Sandillani. Distributed as "Ardisia."

GEISSANTHUS BANGII sp. n.

Branches stout, crooked, light brown, very rugose, glabrous or very sparsely lepidote above, leafy; leaves 10–20 cm. long, 3–6 cm. broad, oblong to oval, the cuneate base tapering into a margined petiole 1 cm. long, the apex short-acuminate, obtusish, pale, membranaceous, entirely glabrous, the midrib elevated both sides, prominent below, the principal veins about 15 pairs, prominently reticulate; panicles sub-sessile, 10–20 cm. long, 7–10 cm. broad, lax, pyramidal, the rhachis angled, minutely lepidote; pedicels 3–4 mm. long, slender, dilated upward, continuous with the calyx; fully expanded flower 4 or 5 mm. broad; calyx black-dotted, the tube hemispherical, the lobes broadly ovate, obtuse, erect, as long as the tube; corolla black-dotted, the strongly reflexed lobes oval, 1 ½ times the length of the tube, faintly 3-nerved; staminate flowers, filaments 3 mm. long, slightly flattened, anther 1.25 mm. long, oblong; style about equalling the filaments; pistillate flowers and fruit not seen.

Songo, Nov. 1890 (834)=Spruce's 5185, and also collected by Pearce in Yungas. Distributed as "Ardisia."

PARATHESIS MACROPHYLLA (Benth.) Britton. (*Ardisia ferruginea* H.B.K. var. *macrophylla* Benth. Pl. Hartw. 217). Songo, Nov. 1891 (861).

STYRACEAE.

Styrax ovata (R. & P.) A.DC. Prodr. **8**: 267. Yungas, 1890 (467) = Rusby's 838.

OLEACEAE.

Menodora helianthemoides H. & B. Pl. Equin. **2**: 98. *pl. 110.* Songo, Nov. 1891 (942).

APOCYNACEAE.

PRESTONIA MUELLERI sp. n.

Finely but densely short yellowish-strigose throughout; stems stoutish, the internode about twice the length of the leaves next above; petioles less than 1 cm. long, very stout; leaves 9–12 cm. long, 6–8 cm. broad (larger?) ovate, the base rounded, the apex short-acuminate and acute, primary veins about 4 pairs, the others indistinct; racemes short-peduncled, simple, the pedicels 1.5–2 cm. long; calyx ample, 1.5 cm. long, 1 cm. broad, the tube very short, the lobes 12 mm. long, 5 mm. broad, lance-oval, short-acuminate, acute, pilose within and without, bearing 5 squamae opposite its lobes, these broadly oval, with rounded apex, as long as the disk; corolla short, hypocrateriform, 11–12 mm. long exclusive of the lobes, which are strongly reflexed, 1 cm. long and nearly as broad, ovate with rounded apex, pubescent without, glabrous within; tube within glabrous below the stamens, bearing a densely pilose, slightly intruded fold opposite each stamen and slightly longer than the latter, alternating with these 5 pubescent lines, which broaden upward and pass into a membranaceous pilose ring, 1 mm. broad, which crowns the throat; filaments very short, bearing above, between the anther-caudae, 2 narrow wings which nearly converge at the top and terminate in white reflexed tips; anthers long-acuminate, very acute, narrowly winged along the middle of the inner face, pilose without, the caudæ long and acutely acuminate, divergent, the middle portions adherent to the stigma; disk of 5 thick and fleshy oblong lobes with rounded apex, bluntly keeled, about equalling the ovaries; style including stigma, 9 mm. long, the ring thick and fleshy, the stigma ovoid, lightly but distinctly 2-lobed at the summit; fruit 18–20 cm. long, thickness nearly uniform, 6–7 mm., falcate or nearly straight, obtuse, ferruginous; seed blackish, 1 cm. long, flat, twisted and wrinkled, acuminate but not acute, the coma fine, 2–3 cm. long.

Yungas, 1890 (403).

For the generic determination of this plant I am indebted to Dr. Johann Mueller of Geneva.

Forsteronia Sellowii Muell. Arg. in Mart. Fl. Bras. 6 : 1. 101.
Songo, Nov. 1891. (850) = Sellow's 7352.

FORSTERONIA MOLLIS sp. n.

Soft-downy; branchlets slender, upwardly curved, red-brown with light brown dots, minutely downy, leafy, the lower leaves small; petioles 5–8 mm. long, margined; leaves, except the lowest, 7–10 cm. long, 4–6 cm. broad, ovate, abruptly short-pointed and acute, the base rounded, but at the petiole slightly acuminate, minutely downy above, densely so beneath, finely reticulately veined, the veins obscure; panicle amply peduncled, 3 cm. long and broad, not fully developed in my specimens; mature bud oblong, the apex rounded, 5 mm. long, the calyx comprising one-third of its length; pedicel and calyx densely pubescent, the latter hemispherical, its lobes sub-rotund; disk sub-globose, strongly 5-lobed; corolla downy within, the oblong lobes 3 times the length of the tube, 3 mm. long, 1 mm. broad, the apex rounded; filaments inserted near the base of the tube, very slender, 1.5 mm. long, the anther 1.25

mm. long, oblong-oblanceolate, strongly sagittate, the apex slightly incurved, the caudae slightly recurved; entire pistil about the length of an anther.

Yungas, 1890 (274). Apparently the same as Glaziou's 14064. Near *F. Brasiliensis* A.DC.

FORSTERONIA OBSCURA sp. n.

Branchlets numerous, slender, strongly recurved, 1.5–2 dm. long including the panicle, leafy, dark brown, minutely puberulent; petioles stout, margined, 5–7 mm. long; leaves 6–10 cm. long, 2–3 cm. broad, lanceolate, the base blunt to rounded, the apex tapering and acute, membranaceous, rigid, very dark green, glabrous, minutely puberulent on the midrib below, the principal primary veins 8–10 pairs, these connected by sub-parallel secondary ones; panicles shortly and stoutly peduncled, narrowly pyramidal, curved, 6–10 cm. long, about 2 cm. broad, brown; flowers on short stout slightly angled pedicels, each subtended by one or two subulate downy bracts; calyx-teeth open and reflexed in the bud, lance-linear, tapering from the base, acute, 3 mm. long; disk 5-lobed, the lobes slightly exceeding the ovaries, rounded at the apex; corolla 4 mm. long, the tube very short, barbellate within, the lobes oblong-lanceolate, acute; stamens 3 mm. long, the anthers one-half longer than the filament; ovaries short, broad.

Songo, Nov. 1890 (855).

ECHITES BOLIVIANA Britton, Ms.

Branches slender, reddish, glabrate; the younger portions, petioles, pedicels and calyx very finely strigose; petioles 5–7 mm. long, stout; leaves 6–10 or 12 cm. long, 3–4 cm. broad, oblong-ovate, the base rounded and subcordate, the apex abruptly short-acuminate, acute, entire, upper surface as above described, lower surface soft gray-downy, principal veins 6 or 7 pairs, connected by the secondary ones; peduncles more than half the length of the leaves; flowers very shortly and stoutly pedicelled, the calyx 3 mm. broad, its lobes triangular, acute, 1.5 mm. long and broad, the base pilose within and lined by a ring of small ligulate glands of irregular size; disk cup-shaped, closely enclosing the ovaries, half as long as the calyx, a little shorter than the ovaries, the margin shallowly and sinuately lobed; tube and throat of corolla 3 cm. long, cylindrical, somewhat dilated in the upper third, the lobes 1.5 cm. long; throat of corolla densely bearded at and below the insertion of the stamens; filaments very short, strongly curved; anthers oblong, 4 mm. long, reaching within 3 mm. of the base of the corolla-lobes; fruit 18–20 cm. long, the joints about 8 mm. long, 5 mm. broad, dark brown, black-dotted.

Yungas, 1890 (551) = Rusby's 2381, but apparently not the same as Rusby's 2380 and 2382.

Amblyanthera brachyloba Muell. Arg. Linnaea, **30**: 423 (1859–60).

Yungas, 1890 (461) = Rusby's 2585.

LASEGUEA MANDONI Britton, Ms.

Branches slender, red-brown, scabrous; petioles 2–4 or 5 cm. long, the older scabrous like the branches, the younger white-villous; blades 8–12 cm. long, 5–9 cm. broad, broadly oval to rotund-ovate, the base cordate with narrow sinus, the apex very shortly and very abruptly pointed, acute, entire, above dark green, slightly scabrous, below white, densely short-tomentose, principal veins about 7 pairs, ascending, parallel, slightly curved, the lowest pair with several large branches radiating downward; racemes long-peduncled, elongating as the lower flowers fall, dense, the pedicels stout, 1 cm. long, like the rhachis and young peduncles, white-villous; calyx varying from a little less to a little more than 2 cm. long, with scarcely any tube, the linear divisions 2 mm broad, finely tapering, light brown, pubescent within and without, open in the bud; corolla in some racemes a little longer, in others a little shorter than the calyx, deep maroon except the tube, which is colored like the calyx, funnelform, contracted just below the stamens, and slightly just below the lobes, which are 3 mm. long, oblong-oval, obtuse, within bearded just below the lobes; filaments very short, bearded, the anthers 5 or 6 mm. long, not reaching to the base of the corolla-lobes; stigma ovate, narrowly 5-winged, terminating in a 2-cleft subulate appendage; calyx lined by a ring of ligulate glands a little shorter than the disk, the latter of 5 nearly quadrilateral lobes, a little shorter than the ovaries.

Yungas, 1890 (402).

DIPLADENIA sp. probably undescribed. Yungas, 1890 (249).

ASCLEPIADEAE.

Sarcostemma incanum A.DC. Prodr. **8**: 542. Songo, Nov. 1891 (985). Distributed as "Amblystigma."

Gothofreda eriantha (Decne.) Kuntze, Rev. Gen. Pl. 420 (*Oxypetalum erianthum* Decne. in DC. Prodr. **8**: 584. Yungas, 1890 (615) = Morong's 655.

GOTHOFREDA ANDINA sp. n.

Stems erect, 2–4 dm. long, flexuous, simple or sparingly branched below, densely hirsute with divergent hairs; lower leaves reduced, the others 3–4 cm. long, with petioles 5 mm. long, 1.5 cm. broad, oblong-ovate, cordate with a broad sinus, acute, scabrous-hirsute above, hirsute below, the principal veins 3 or 4 pairs; umbels long-peduncled, axillary, solitary, 1.5 cm. in diameter, floral leaves few, narrowly oblong, the pedicels shorter than the flowers, like the peduncles and calyx white-hirsute; calyx-lobes tapering from the base, 3.5 mm. long, glabrous within, the tube very short; disk consisting of numerous papillae; corolla pilose without, glabrous within, the tube hemispherical, angled, the lobes 4 mm. long, triangular-lanceolate; crown divided into 5 oblong-ovate lobes 3 mm. long, 1.5 mm. broad, the upper fourth 2-parted, not appendaged within; hyaline terminal appendages nearly as long as the anther, nearly twice as long as the linear callosities of the pollinia, obovate with rounded apex; stigma-appendages very narrow, extending 3 mm. beyond the stamens; follicles 7 cm. long, 1 cm. broad, lanceolate, the apex long-tapering but obtuse, tomentose, not apparently muricate; body of seed light brown, 3.5 mm long, 2 mm. broad, strongly flattened, the base ovate, rounded, erose, strongly muricate, one face concave, the other convex, its central row of tubercles forming a slender slight keel.

Yungas, 1890 (394a and 425). This species is very near *G. capitata* (Mart. et Zucc.) Kuntze, but so far as I can see all the specimens from Guiana and Bolivia in the Kew herbarium placed under the latter name are *G. andina*.

Asclepias Cochabambensis sp. n.

Pale, glabrous except a slight pubescence upon the top of the stem, peduncles and pedicels; stem stoutish, ascending or erect, 3–4 dm. long (or longer?), pale green with few erect branches or simple, densely leafy; leaves oblong-lanceolate or oblong-oval, the lower very small, the upper 5–6 cm. long, 2–3 cm. broad, on very short broad petioles, the base rounded, or rarely sub-cordate, the apex acute and mucronate, thick, the midrib broad and coarse, the principal veins 8–11 pairs, near the margin bifurcated and interarching; peduncles shorter than the leaves, spreading, umbels 4–6 cm. broad, pedicels about half the length of the peduncle; flowers in the reflexed condition nearly 1.5 cm. long; calyx-lobes strongly reflexed, 3 mm. long, nearly 1.5 mm. broad, ovate, acute; corolla-lobes oblong, obtuse, 7 mm. long, 3 mm. broad, greenish; hoods orange, elliptical-oblong, nearly twice the length of the column, the horns very strongly incurved; wings of the anthers large, thickened, bearing a small blunt auricle at the base, the acuminate apex adnate to the very thin hyaline terminal appendage, whose sub-rotund apex is inflexed; fruit not seen.

Vic. Cochabamba, 1891 (982).

The same collected by Bridges, but the locality not given.

Asclepias Weddellii Fourn. Ann. Sci. Nat. (VI.) **14**: 381. Yungas, 1890 (612).

Metastelma parviflorum (Sw.) R. Br. Mem. Wern. Soc. **1**: 52 (1811). (*Cynanchum* Sw. Fl. Ind. Oc. **1**: 537.) Vic. Cochabamba, 1891 (989) = Pearce's specimen from Pelechuco.

Ditassa lanceolata Decne. in DC. Prodr. **8**: 576. Yungas, 1890 (479).

Morrenia brachystephana Griseb. in Goett. Abhandl. **19**: 205 (1874). Vic. Cochabamba, 1891 (986).

Gonolobus elliptica sp. n.

Roughish-hirsute throughout with spreading hairs; stems slender, rough-fissured, the cork orange without, light brown within; branchlets purple, the internodes some longer, some shorter than leaf with petiole; petioles and blades of each pair slightly unequal, the former 1–1.5 cm. long, the latter 3–6 cm. long, 2–3 cm. broad, oblong to oblong-ovate, only slightly cordate with broad sinus, the apex varying from acutish to rounded or retuse, dark green, strigose both sides, principal veins about 5 pairs; umbels closely sessile, of 5–10 very dark purple flowers; calyx rotate, the lobes purplish green, hirsute, oblong, 3.5 mm. long, nearly 2 mm. broad, obtuse, faintly 5–7-nerved, the disk inconspicuous; corolla rotate, the lobes 4 mm. long, 3 mm. broad, oval, the apex rounded or minutely notched, many-nerved, pilose without, thickish; crown colored like corolla, saucer-shaped with incurved margin, 5-lobed; essential organs forming a disk-shaped mass not projecting above the crown, brown, with stellate purple center; fruit not seen.

Vic. Cochabamba, 1891 (992).

Not closely related to any other species. Distributed as "Ibatia."

LOGANIACEAE.

Buddleia andina Britton, Ms.

A much branched small tree, densely short-tomentose, the ultimate branchlets erect and striate; leaves sessile, on new shoots 4–8 cm. long, 1.5–2.5 cm. broad, on older wood 2–3 cm. long by 5–10 mm. broad, lance-oblong, both ends obtuse, entire, thick but flaccid, above dark green and rugose with deeply impressed veins, below white or yellow with prominent veins, the primary 6–8 pairs; heads on short stout erect peduncles, or mostly sessile in a pair of leafy bracts, globose, dense, in flower 8–12 mm., in fruit 12–20 mm. in diameter; bracts linear, oblanceolate, about the length of the calyx, and, like it, densely hirsute; calyx 5 mm. long, nearly 4 mm. broad, campanulate, 4-angled, lobed one-third of the way to the base, the 4 lobes very thick, ovate, blunt; corolla a little exceeding the calyx, funnelform, the lobes one-third the length of the tube, semicircular with hyaline margins; anthers inserted about the middle of the corolla, very small, obtusely sagittate, the cells mucronate at the apex; pistil 4 mm. long, the ovary turbinate, truncate, pubescent, the style stout, about as long as the ovary, darker, a little broader and compressed above; fruit 4 mm. long, 2.5 mm. broad, oval with rounded apex, the base obtusely 4-angled, 2-sulcate, pubescent; seeds brown, very numerous, 1 mm. long, lance-oblong, flattened and angled.

Vic. La Paz, 10,000 ft., 1889 (85) = Rusby's 2050.

Reputed to be very poisonous.

GENTIANEAE.

Lisianthus calygonus R. & P. Fl. Per. **2**: 14. *pl. 126.* Yungas, 1890 (339)=Rusby's 1227.

Lisianthus ovalis R. & P. Fl. Per. **2**: 13. Yungas, 1890 (520).

Gentiana punicea Wedd. Chlor. And. **2**: 70. Yungas, 1890 (655 and 719).

Gentiana sedifolia H.B.K. 3: 173. *pl. 225.* Vic. Cochabamba, 1891 (939)=Rusby's 674.

Halenia gracilis (H.B.K.) Griseb. Gent. 327. Yungas, 1890 (665) =Rusby's 669 and 670.

POLEMONIACEAE.

Cantua buxifolia Juss.; Lam. Encycl. **1**: 603. Vic. La Paz. 1889 (103).

HYDROPHYLLACEAE.

Phacelia Peruviana (R. & P.) Spreng. Syst. **1**: 584. Vic. La Paz. 10,000 ft. 1890 (169) = Rusby's 1157.

Phacela pinnatifida Griseb.; Wedd. Chlor. And. **2**: 85. Vic. Cochabamba, 1891 (940).

Marilaunidium dichotomum (R. & P.) Kuntze, Rev. Gen. Pl. 434. (*Nama dichotoma* Chois. in DC. Prod. **10**: 182.) Vic. Cochabamba, 1891 (958) = Mandon's 453, and very likely distinct from *M. dichotomum.*

BORAGINEAE.

Cordia discolor C. & S. Linnæa **4**: 482 (1829). Yungas, 1890 (399) = Rusby's 2051.

HELIOTROPIUM (EUHELIOTROPIUM) BRIDGESII sp. n.

Strigose throughout; primary root woody, nearly 1 cm. in diameter, crown stout, knotty, much branched, stems 1–3 or 4 dm. long, prostrate, very slender, the internodes mostly nearly twice as long as the leaf with petiole; petiole nearly half the length of the blade, the latter 7–10 mm. long, 3–5 mm. broad, oval-obovate with acute base and rounded minutely pointed apex; inflorescence terminal, dichotomous; calyx-lobes very unequal, narrowly oblong, foliaceous, blunt, about equalling the corolla-tube, which is nearly as broad as long and densely bearded at the base; corolla-lobes undulately plicate, very broad; anthers very small, linear-oblong, obtuse, less than half the length of corolla-tube; style a little longer than the ovary, nearly as broad, ovoid-conical, blunt, annulus small; nutlets 4, distinct, slightly shorter than the smaller (inner) calyx-lobes.

Vic. Cochabamba, 1891 (950).

Also collected by Bridges.

HELIOTROPIUM (EUHELIOTROPIUM) ABBREVIATUM sp. n.

Coarsely hirsute throughout, stems ascending from a vertical root, stout, coarsely and strongly angled, much branched, the branchlets naked below, above abbreviated, with the leaves crowded to form a sort of involucre for the sessile cymes; lower leaves subpetioled by the narrowed base, 3–6 cm. long, 1–2.5 cm. broad, lanceolate to rhomboid-ovate, mostly inequilateral, obtuse, margin entire but irregular, both sides strigose, the hairs upon the veins underneath very coarse; principal veins 3 or 4 pairs, coarse and broad, strongly ascending; cymes short and much contracted, the flowers nearly concealed in the white hispid indumentum of the peduncle, calyx, etc.; calyx parted nearly to the base, the lobes oblong, obtuse, foliaceous, erect, 1.5 mm. long; corolla slightly exceeding the calyx, the tube inflated, the limb plicate, lobes imbricate; anthers inserted about the middle of the tube, broadly oval, barely acute; ovary very small, twice as broad as the annulus, longer than the style and appendage, the latter much depressed, scarcely distinguishable from the annulus; fruit not seen.

Vic. Cochabamba, 1891 (924).

HELIOTROPIUM (ORTHOSTACHYS) ANDINUM sp. n.

Root strong and woody; stems several, prostrate or ascending, hirsute, leafy, the leaves mostly more than twice the length of the internodes; petioles 2–3 mm. long, blade about 2 cm. long, 5–6 mm. broad, oblong, base subacute, apex acute and apiculate, strigose both sides, especially beneath; cymes terminal, dichotomous, the one-sided racemes about three in number, when through flowering 5–6 cm. long; flowers sessile, 4–5 mm. long; calyx-lobes strigose, one-half the length of the flower, lanceolate, tapering from the base, acute, short-aristate; corolla strigose, the tube ovoid-cylindrical with contracted mouth, the lobes nearly one-fourth the total length, linear-acuminate, acute, anthers inserted a little below the middle of the tube and reaching not quite to the lobes, lanceolate, acuminate-appendaged, 4-celled; style very stout, the 5-lobed annulus slightly below the middle, the terminal portion conical, obtuse, the ovary scarcely twice as large as the annulus; fruit densely strigose, shorter than the calyx-teeth, broader than long, the nutlets apparently separating in pairs, attached near the base to the short broad gynobase, having a short blunt inturned apex.

Vic. Cochabamba, 1891 (929).

HELIOTROPIUM (?) BOLIVIANUM sp. n.

Root rather stout; stems several, sub-erect, stoutish, 1–2 dm. long, light brown, densely hirsute with spreading hairs; internodes one-half to two-thirds the length of the leaves; leaves sessile, 4–5 cm. long, 1–1.5 cm. wide, lanceolate, the inequilateral base narrowed, apex obtuse or acutish, above dark green, scabrous with impressed veins, beneath yellowish with prominent veins, the primary about 5 pairs; cymes terminal, dichotomous; flowers about 7 mm. long, the calyx less than half the length of the corolla; calyx-lobes lanceolate, obtusish; corolla pilose, the tube cylindraceous, 5-angled, the limb broad, rotate-campanulate, plicate, the lobes scarcely any, very slightly imbricated; stamens 5, all perfect and similar, sessile very near the base of the tube, the body oval-elliptical, the angular, blackish acumination as long as the body; ovary small, glabrous, not perceptibly lobed, style stout, the apex depressed-conical, 2-cleft, about as large as the ovary, the annulus about twice the size of the ovary, obscurely sinuate-lobed; fruit apparently only 1-carpelled by abortion and 1-seeded; seed exalbuminous, cotyledons large, plane.

Vic. Cochabamba, 1891 (926). A positive determination of the genus is prevented by the peculiarly reduced fruit, but the style is that of *Heliotropium*. It has the corolla of Euploca, but not its stamens nor style.

Borago officinalis L. Sp. Pl. 137. Vic. La Paz, 10,000 ft., 1889 (38 and 129).

CONVOLVULACEAE.

Ipomoea coccinea L. Sp. Pl. Ed. 2, 228. Yungas, 1890 (490 and 587).

Ipomoea hederacea Jacq. Coll. 1: 124. Yungas, 1890 (534).

Ipomoea Bona-nox L. Sp. Pl. Ed. 2, 228. Yungas, 1890 (589) = Rusby's 1990.

Ipomoea—apparently undescribed, but specimens insufficient for description. La Granga, 1891 (750). Apparently the same as Jameson's 5531 from Ecuador.

Convolvulus laciniatus Desv. in Lam. Encyc. 3: 546. Vic. Cochabamba, 1891 (959) = Rusby's 1851.

Convolvulus Ottonis (Chois.) Meissn. in Mart. Fl. Bras. 7: 311. Vic. Cochabamba, 1891 (990).

Evolvulus incanus Pers. Syn. 1: 228. Vic. Cochabama, 1891 (970).

Evolvulus sericeus Sw. Prod. 55. Vic. Cochabamba, 1891 (951)= Mandon's 1491 and Glaziou's 13,475.

Dichondra argentea Willd. Hort. Ber. 297. Vic. La Paz, 10,000 ft. 1890 (98 and 185) = Rusby's 2008.

Cuscuta Popayanensis H.B.K. Nov. Gen. 3: 123 (?) Vic. La Paz, 10,000 ft., 1889 (115) = Mandon's 1479 and (?) 1480 in Herb. Kew as *C. grandiflora* H.B.K.

SOLANACEAE.

Solanum radicans L. f. Dec. 1: *pl. 10.* Vic. La Paz, 10,000 ft., 1889 (1 and 10) = Rusby's 807.

Solanum nudum H. & B.; Dun. Solan. Syn. Ed. 2, 20. *pl. 107.* Vic. La Paz, 10,000 ft., 1889 (31) = Rusby's 769 and 785.

Solanum lycioides L. Mant. 1: 46. Vic. La Paz, 10,000 ft. 1889 (32) = Rusby's 833 and 835.

Solanum pulverulenum Pers. Syn. 1: 223. Vic. La Paz, 10,000 ft. 1889 (90) = Rusby's 797.

Solanum Mandonis Van Huerck and Muell., Huerck, Obs. Bot. 78. Yungas, 1890 (238) = Rusby's 782.

Solanum callicarpaefolium Kunth et Bouché, Sec. Nov. et Emend. Hort. Bot. Berol. 10. Yungas, 1890 (259) = Rusby's 788, Schomburghk's 150 and Mandon's 423.

Solanum tripartitum Dunal ex. DC. Prod. 13: 1, 72. Yungas, 1890 (538) = Rusby's 808.

Solanum nigrum L. Sp. Pl. 186. Yungas, 1890 (539 and 727) = Rusby's 802.

Solanum sisymbriifolium Lam. Tabl. Encyc. 2: 25. Yungas, 1890 (614) = Rusby's 768.

Solanum incarceratum R. & P. Fl. Per. **2**: 40. *pl. 176. f. a.* Yungas, 1890 (614a and 702) = Rusby's 783 and 793.

Solanum Sprucei V. Huerck et Muell. Arg.; Huerck, Obs. Bot. 67. Yungas, 1890 (630). A little less tomentose than Spruce's 4352, the type.

Solanum Salzmanni Dun. in DC. Prod. **13**: 1, 206. Yungas, 1890 (630a) = Jenman's 4072. Very variable as to spine-characters.

Solanum montanum (Dun.) R. & P. Fl. Per. **2**: 32. *pl. 160. f. 6.* (*Witheringia montana* var. β, Dun. Syn. 2, n. 8.) Yungas, 1890 (740) = Rusby's 795.

SOLANUM URSINUM sp. n.

A stout coarse shrub, aculeate with few scattered solitary prickles, which are short, straight or slightly recurved, laterally compressed with broad base, very sharp and smooth; densely shaggy, with ferruginous stiff divaricate hairs, half as long as the prickles and stellate at their summits; petioles 2–3 cm. long, nearly as long as their supporting branchlets, blades one to several dm. in length, 5–15 cm. broad, obovate, the base inequilateral, rounded or subcordate, apex not seen, very coarsely sinuately lobed or angled, very thick, both sides densely shaggy like the branchlets; cymes mostly peduncled, the peduncles shorter than those of its branches, the pedicels very stout, shorter than the calyx, which is shaggy within and without, its lobes a little longer than the tube, ovate, acute, nearly 1 cm. long, 4–5 mm. broad; corolla purplish blue, shaggy without, divided nearly to the base, oblong, obtuse, 2 cm. or more in length; anthers 9 mm. long, oblong, slightly acuminate but obtuse, the apex apparently slightly recurved and pores looking outward; ovary and lower half of style densely shaggy, style thickened upward, truncate, 12 mm. long exclusive of ovary; fruit globular, 1.5 cm. in diameter (when dry), glabrous, shining, apparently green.

Yungas, 1890 (703). Near *S. pelliceum* Sendtn. but flowers larger, calyx smaller and hairs distinct.

SOLANUM PEARCEI Britton, Ms.

Shrubby; branches slender, light brown, above narrowly winged by the decurrent petioles, and, like the peduncles and pedicels, sparsely clothed with bristly hairs; leaf narrowed gradually into a margined petiole about 1 cm. long, the blade 8–12 cm. long, 3–4 cm. broad, oblong, acute at both ends, the margins sharply revolute, thickish, rigid, above glabrous, beneath sparsely bristly-hairy, midrib and veins very stout and prominent beneath, the primary veins 6 or 7 pairs, strongly upwardly curved toward or into those next above; peduncles 3–4 cm. long, pedicels slender, becoming in fruit 1.5 cm. long, the cymes dichotomous; calyx 7–8 mm. broad, hispid, divided half way to the base or farther, the lobes triangular-ovate, obtuse; corolla dull white (?), glabrous, thick, divided nearly to the base, the lobes oval, obtusish, the tube appendaged with scales projecting between the anther bases; filaments 1 mm. long, the anthers 3 mm. long, 2 mm. broad, somewhat incurved, oval, apex and base rounded, pores elongated, divergent at the base, continued downward into perfect sutures; ovary oval, blackish, 1 mm. long, the style stout, 4 mm. long, the apex recurved; stigma terminal, small; fruiting calyx 7–8 mm. broad, the ovate, obtuse lobes slightly longer than the hemispherical tube; fruit (immature) very strongly reticulate-wrinkled.

Yungas, 1890 (712) = Rusby's 794, though that is a smaller-leaved form. Also collected by Pearce at Unduavi, altitude 12,000 ft., Dec. 1865.

SOLANUM GILIOIDES sp. n.

Annual, stems 6–18 cm. high, slender, bluish below, green above, pubescent; upper leaves sessile, the lower tapering very gradually into a margined petiole, including the latter 2–3 cm. long, 1.5–2 cm. broad, pinnatifid nearly to the midrib into 3 or 4 pairs of lobes which are inequilaterally and irregularly oblanceolate, obtuse, entire, the sinuses about as large and of approximately the same form, sparingly hairy and somewhat scurfy, passing gradually into the floral, which are oblong and sub-entire; racemes peduncled, hairy, the pedicels very slender, 5–7 cm. long; calyx hairy, the tube hemispherical-turbinate, a little shorter than the lance-ovate obtuse lobes which are 2 mm. long; corolla light blue, rotate, strongly reflexed, nearly twice as long as the calyx-lobes; anthers yellow, 2.5 mm. long, straight, broadly oblong, the base appendaged with two short blunt auricles, the pores looking upward and inward; ovary scarcely a mm. long and broad, truncate, the style cylindrical, stoutish, pubescent, the stigma terminal, very small.

Vic. Cochabamba, 1891 (938) = Bridges 400 from Chili and very near *S. pulchellum* Phillippi.

SOLANUM PALLIDUM sp. n.

Very pale grayish-green (herbaceous?); branches slender, flexuous, ascending, leafy, obscurely angled, scurfy-pubescent; petioles 1 cm. long, striate, margined, the blades 5–8 cm. long, 1.5–3 or 4 cm. broad, angularly ovate, more or less inequilateral, the base rounded, but abruptly produced into the margined petiole, apex tapering, sub-acute, toward the base obscurely sinuate-toothed, thin, above minutely stellate-puberulent, more decidedly so beneath, principal veins about 8 pairs, near the margin curving upward to meet a short lower branch from that next above; peduncles 2.5 cm. long, stoutish; cymes 3–5 cm. broad, the pedicels very slender, nearly 1 cm. long, hirsute; calyx 5–7 mm. broad, lobed half way to the base, the lobes triangular, acute, densely hirsute; corolla about three times the length of the calyx, pale blue or purple, thin, puberulent without, lobed half way to the base; anthers yellow, 4 mm. long, oblong, straight, the pores directed inward; style exceeding the anthers by 2 mm., filiform, the lower half pilose and slightly thickened, the stigma capitate; fruit globose, 5 mm. in diameter, glabrous, red.

Vic. La Paz, 10,000 ft., 1889 (64) = Mandon's 406 and Rusby's 779. Near *S. Gayanum*, but has not its large fruit. The fruit is rather that of *S. radicans*. Distributed as "*S. Gayanum*."

SOLANUM INELEGANS sp. n.

A stout, coarsely much branched shrub, densely yellowish sordid-scurfy throughout; branchlets short, stout, spreading, terete; petioles varying from .5–2 cm. long, blades 6–10 cm. long, 3–4 cm. broad, ovate, base rounded, apex more or less acuminate, entire, membranaceous but somewhat rigid, stellate-scurfy both sides, especially beneath; peduncles short and stout, pedicels at flowering, 1–1.5 cm. long, thickened upward; calyx about 12 mm. broad, divided two-thirds to the base, the tube short-hemispherical, the lobes 5 mm. long, 3–3.5 mm. broad, triangular-ovate, acutish, with sinuses acute; corolla in the bud globular, tomentose without, dirty yellow, double the length of the calyx, divided nearly to the base, the lobes ovate, 8 mm. long, 5 mm. broad, obtuse; anthers 5 mm. long, broadly oblong, the dorsum presenting a regular, slight outward arch, the pores looking directly inward, continued downward into perfect sutures; ovary and style densely hirsute, the latter cylindrical, stoutish, 7 mm. long, the stigma terminal, slightly 2-lobed; fruit unknown.

Yungas, 1890 (709 and 715). Near *S. asperum*.

SOLANUM ABUTILIFOLIUM sp. n.

Densely tomentose throughout with long-branched stellate hairs, shrubby; branches ascending, elongated, stout, leafy toward the ends, terete, yellowish brown; petioles stout, ascending, 3–4 cm. long, blades 8–12 cm. long, 4–8 cm. broad, oval-ovate, the base rounded, apex abruptly short-acuminate, entire, deep brownish green above, light grey-green below, thickish, primary veins about 5 pairs, strongly ascending; peduncles about twice the length of their petioles, simple or once forked, the flowers simply racemed, their pedicels stout, about 5 mm. long; calyx-teeth much longer than the tube, triangular-lanceolate, 3 mm. long; corolla densely tomentose without, the inner surface purple, appearing tuberculate in the dried condition, thickish, divided nearly to the base, the lobes strongly 1-nerved and veiny, lanceolate, tapering, acute, 12 mm. long, 4 mm. wide; anthers erect, linear-lanceolate, 8 mm. long, 3 mm. broad, tapering, coriaceous and rugose, the lower half slightly arching outward, the upper half straight, the pores looking outward and upward; ovary very small, densely long-hirsute, the style cylindrical, thickened upward, 4 mm. long; stigma terminal; fruit not seen.

Yungas, 1890 (373). Apparently the same as Gardner's 1787 from Ceara. Near Pearce's Coroico specimen. Near *S. verbascifolium*, but stem and indumentum differ. Distributed as "*S. pycnanthemum*."

SOLANUM VALIDUM sp. n.

Strongly woody, stellate-scurfy; branches erect, flexuose, stout, very leafy; leaves sub-sessile by a cuneate base, 5–8 cm. long, 1.5–2 cm. broad, lanceolate, blunt, finely strigose above, finely stellate-scurfy beneath, the margin irregularly sinuate, midrib coarse, prominent beneath, principal veins about 7 pairs, each connected near the margin with a descending branch from that next above; cymes sessile, 3–5 flowered, the pedicels unequal, stout, thickened upward, in flower 5–9 mm., in fruit 1.5 cm. long; calyx scurfy, the tube turbinate, the lobes linear, obtusish, foliaceous, 8–9 mm. long, 1.5 mm. broad, 4 times the length of the tube; corolla about equalling the calyx, yellowish-white, divided nearly to the base, oval, acutish, 4–5 mm. broad; anthers yellow, 4 mm. long, oblong, straight, the pores looking upward and a little inward; style filiform, one-half longer than the anthers, the stigma terminal, small; fruit spherical, 12 mm. in diameter, red, glabrous, shining.

Vic. Cochabamba, 1891 (972 flower, and 1096 fruit). Very near *S. capsicastrum*, but has larger flowers and different anthers.

SOLANUM STYRACIOIDES sp. n.

Unarmed and except the inflorescence, glabrous; stem woody, apparently reclining or perhaps climbing, flexuous, thick with large pith, becoming hollow, deep purple; petioles slender or stoutish, some of them showing a tendency to twine, 2–5 (or more?) cm. long, blades 10–15 cm. long and 6–10 cm. broad, ovate, the base rounded or abruptly slightly and often unequally produced, in Spruce's specimen some of the lower cordate, the apex blunt, thin and membranaceous, dark-green, drying brownish, coarsely veined, tne primary about 6 pairs; panicle puberulent, terminal, 2–3 dm. long, 1–2 dm. broad, pyramidal, lax, compound, the flowers racemose, the pedicels slender, 5–8 or 10 mm. long; buds broadly ovoid when young, at maturity oblong-elliptical, 15 mm. long, 5–7 mm. broad; calyx (in flower) 5 mm. broad, scarcely 2 mm. long, saucer-shaped, truncate with 5 obscure teeth, brown, puberulent like the pedicels; corolla light bluish-brown or gray-brown, velvety without, thick, divided nearly to the base into lance-linear obtuse lobes; disk inconspicuous; stamens erect, the filaments equal in the bud, but in flowering one elongating to 6 mm. (the others 1 mm.), anthers 7 mm. long, densely granular, papillose, brown with whitish tips, oblong, straight, the pores looking upward and inward, and continued downward into perfect sutures; ovary about equalling the calyx, style nearly 1.5 cm. long, filiform, the stigma small, capitate.

Yungas, 1890 (522). Between Tipuani and Guanai, Dec. 1892 (1662) = Spruce, Tarapoto, No. 4327.

This most peculiar species of *Solanum* inclines, by its habit, appearance of inflorescence and downwardly broadened filaments toward *Cyphomandra*. In its one elongated filament it is the counterpart of the section Nycterium, with one elongated anther. This character, the paniculate inflorescense and densely papillose or warty anther furnish the characters of a new section of the genus *Solanum*, which I call ANDROPEDAS.

CYPHOMANDRA DICHOTOMA sp. n.

Habit unknown, but apparently climbing or reclining, the branches whitish, with small scattered warts and conspicuous horseshoe-shaped leaf scars, the branchlets similar, erect, flexuous, slender, slightly angled, minutely scurfy; petioles slender, but rather broadly margined, 4–6 cm. long, blades 12–20 cm. long, 6–9 cm. broad, ovate to oval, base abruptly acuminate, apex obtuse, entire, thin, minutely stellate-scurfy beneath, nearly glabrous above, principal veins about 12 pairs, nearly straight, parallel, slender, like the midrib impressed above; racemes strictly dichotomous, slender, very loosely flowered, drooping and curling, knotty-jointed at the articulation of the pedicels, which are very slender, thickened upward, 1.5 to 3 cm. long; calyx in flower hemisherical-campanulate, 3 mm. long, 5 mm. broad, very shallowly 5-lobed, the lobes very broad with rounded margin, the sinuses small and acute; corolla puberulent without, rotate-campanulate, 1.5–2 cm. broad, the lobes triangular, acute, 4 mm. long and somewhat broader; anthers 3–5 mm. long, very broad, straight, longitudinally dehiscent, without pores, the connective distinctly thickened, filaments manifest; ovary obtusely conical, slightly longer than broad, 3 mm. long, the style 5 mm. long exclusive of the oblong stigma which is 1 mm. long; fruit globose, soft, 7 mm. in diameter as pressed.

Yungas, 1890 (519). A very distinct species, distributed as "Solanum."

Physalis Peruviana L. Sp. Pl. Ed. 2, 1670. Yungas, 1890 (301) = Rusby's 824.

BASSOVIA STENOLOBA (V. Heurck & Muell.) Britton.

Solanum stenolobum V. Heurck & Muell. Obs. Bot. 69.

Branches slender and weak, very flexuous, apparently reclining, angled, glabrous except near the ends, the leaves divergent or the lower reflexed, the principal 5–10 cm. long, 2–3 cm. broad, inequilateral, oblong-lanceolate, tapering at both ends, sessile, thin and membranaceous, deep green, sparsely and coarsely strigose below, glabrous above, the principal veins 8 or 9 on each side; reduced leaves broadly ovate, acute, inequilateral, 1–2 cm. long; pedicels solitary in the axils, filiform, reflexed, 2–3 cm. long, puberulent, dilated and somewhat 5-angled toward the calyx; flower-material insufficient for dissection; fruiting calyx pubescent, 7 mm. broad, cup-shaped, the 10 linear teeth nearly as long as the tube, borne upon a truncate margin, erect; fruit globose-ovoid, glabrous, apparently red.

Songo, Nov. 1890 (854), = Spruce's 4210, *fide* Britton. Distributed as "Brachistus."

Capsicum frutescens L. Sp. Pl. 189. (cult. form) Vic. La Paz, 10,000 ft., 1890 (200).

ACNISTUS OBLONGIFOLIUS sp. n.

Branches slender, flexuous, knotty at the nodes, blackish, branchlets light brown, puberulent, striate; petioles slender, pubescent, about 1 cm. long, blades 5–8 cm. long, 1.5–2.5 cm. broad, oblong to oblong-lanceolate, the base acuminate, apex obtuse, entire, membranaceous, bright green, glabrous both sides, the principal veins 7–9 pairs, connecting some distance from the margin; flowers fascicled, pedicels slender, 1.5–2 cm. long, pubescent; calyx (in flower) 5 mm. long and broad, hemispherical-campanulate, 5-lobed one-third of the way to the base, the lobes broadly triangular, acuminate, canescent; corolla blue, canescent, about 13 mm. long, campanulate, the lobes 5 mm. long, ovate, acutish, slightly spreading; filaments 12 mm. long, membranaceous-dilated below, filiform above, anthers ovate, obtuse, 2 mm. long; style filiform, 12 mm. long, the stigma small, capitate; fruiting calyx enlarging and partly closing over the depressed-globular fruit, the latter apparently not mature in my specimen.

Vic. Cochabamba, 1891 (993). Also collected by Pearce in

November, 1864, and nearly the same as an Ecuador specimen from Jameson. Distributed as "Poecilochroma."

Dunalia lycioides Miers, Hook. Lond. Journ. Bot. 7: 338 (1848).

Vic. La Paz, 10,000 ft., 1890 (153) = Rusby's 827, 828 and 829.

Poecilochroma punctatum (R. & P.) Miers, Hook. Lond. Journ. Bot. 7: 354 (1848). Yungas, 1890 (725 and 726).

CACABUS PARVIFLORUS sp. n.

Somewhat clammy; stems several from a thick vertical root, ascending, conspicuously jointed, sharply angled, 2–3 dm. long, slender; petioles margined, 5–15 mm. long, blades 2–5 cm. long, 1.5–3 cm. broad, ovate, the base inequilateral and slightly produced, apex blunt or sub-rounded, entire or obscurely sinuate-lobed, principal veins about 4 pairs, midrib and veins broad and coarse, membranaceous, bright green; pedicels axillary, solitary, filiform; flowering calyx campanulate with truncate or slightly intruded base, 13 mm. long, 10 mm. broad, lobed nearly half-way to the base, the lobes triangular, acute, canescent; corolla 13 mm. long, 7 mm. broad, narrowly campanulate; anthers about the length of the filaments, or a little longer, oblong, 3 mm. long; style 11 mm. long; fruiting calyx 3 cm. long, 2 cm. broad, ovoid, the base strongly intruded, the teeth erect, rigid, glabrous, with 10 principal and 10 smaller intermediate ribs, very reticulate-veiny; berry globose-ovoid, glabrous, 1 cm. long.

Vic. Cochabama, 1891 (969). Very near *C. Mexicanus* Wats. Distributed as "Physalis."

Salpichroa diffusum Miers, Hook. Lond. Journ. Bot. 7: 335 (1848).

Vic. La Paz, 10,000 ft. 1889 (50) = Rusby's 830.

Datura Tatula L. Sp. Pl. Ed. 2, 256. Capi, March, 1891 (783).

JUANULLOA MEMBRANACEA sp. n.

Branchlets and peduncles more or less roughened with thin exfoliating scales of cork; petioles 2–3 cm. long, margined, the blades 15–18 cm. long, 6–8 cm. broad, oval to obovate-oval, the base acuminate, the apex abruptly very short-acuminate or rounded, entire, membranaceous but rigid, green, when young extremely thin, above glabrous, below sparsely stellate-flecked, midrib and principal veins flat, margined, the latter about 6 pairs; peduncles 5–10 dm. long, much knotted at the flowering summit; pedicels 5 mm. long, very thick, warty; calyx 2 cm. long, parted to the base, the lobes lance-oblong little if at all acuminate, obtuse, erect; corolla 3.5 cm. long, funnelform, not ventricose, the mouth little if at all contracted, the lobes short and broad, erect (perhaps at length reflexed); filaments inserted into a densely pilose ring near the base, the anthers extending nearly to the base of the corolla-lobes, 7 mm. long, lance-oblong, acuminate; ovary ovoid-conical, style filiform, dilated at the apex, stigma triangular-ovate; fruit ovoid-conical, obtuse, two-thirds as long as the calyx and enclosed by the latter, brown.

Yungus, 1890 (348). Distributed as "Erythrochiton?" in the absence of flowers.

JUANULLOA PEDUNCULATA sp. n.

Branches roughened with broad, thin, separating scales of cork; petioles margined and keeled, 2.5–3.5 cm. long, glabrous; blades 1–2 dm. long, 6–9 cm. broad, obovate, the base obtuse, the apex abruptly short-acuminate and acutish, entire, membranaceous, rigid, glabrous both sides, drying brown, principal veins about 6 pairs; peduncles heteromorphous (always?), the terminal densely scurfy, especially above, the lateral with narrow wings but no scurf, strongly nodose and corky at and below the summit at the insertion of the flowers, 2–3 dm. long; pedicels 5 mm. long, stout, thickened upward and continuous with the calyx, articulated with the peduncle; calyx 1.5–2 cm. long, campanulate, divided nearly to the base, the tube 5-angled, the lobes membranaceous, lanceolate, acuminate, acute, permanently erect, the leathery corolla purple-maroon, 3.5 cm. long, funnelform, above dilated and ventricose, the mouth contracted, the imbricated lobes very short and broad, rounded, erect (or perhaps at length reflexed); filaments inserted into a pilose ring near the base, somewhat compressed, the anthers reaching the base of the corolla lobes, lance-oblong, acuminate, 6 mm. long: disk inconspicuous, ovary conical-ovoid, style filiform, dilated upward, the triangular stigmas standing about the middle of the anthers; fruit brown, partly dry, ovoid. acuminate, 1–1.5 cm. long, nearly 1 cm. broad; seeds imbricated, fixed below the middle of the cuneate face, tetragonal, the truncate base ascending obliquely toward the back, obtuse, straight; embryo bluish, moderately curved; cotyledons plane, the albumen forming a similar but smaller mass, separated, at the other end of the seed.

Songo, Nov. 1891 (919).

Cestrum Parqui L'Her. Stirp. Nov. 73. Vic. La Paz, 10,000 ft 1890 (157) = Rusby's 862.

Cestrum strigillatum R. & P. Fl. Per. **2**: 29. *pl. 156.* Yungas, 1890 (631) = Rusby's 815.

CESTRUM RIGIDUM sp. n.

Branches slender, whitish, branchlets greenish brown, puberulent like the petioles, peduncles and pedicels; petioles 3–5 mm. long, blades 5–8 cm. long, 12–20 mm. broad, lanceolate, the base abruptly acuminate, the apex tapering and acute, deep green, entire or very obscurely sinuately toothed, revolute, glabrous both sides, except the midrib which is warty or papillose underneath, strongly and sharply reticulate below, rigid; flowering branchlets very slender, leafy-bracted, the lowest leaf frequently curling about the supporting branch; flowers sub-solitary, the pedicels proper scarcely 2 mm. long; calyx 3–4 mm. long, 1.5–2 mm. broad, regularly cylindrical, the lobes barely 1 mm. long and broad, triangular, acutish, pubescent; corolla glabrous, 10-nerved, the regularly cylindrical tube 2 cm. long, 1 mm. broad, with hyaline base, below adnate to the short stipe of the ovary; the funnel-shaped throat 5 mm. long, 3 mm. broad at the summit, the lobes 5 mm. long, 2 mm. broad, obtusish; filaments glabrous, except toward the base of the tube, adherent up to the base of the throat, one shorter, the anthers globose, versatile; disk hyaline, cup-shaped, 5-lobed, two-thirds the length of the ovoid light-brown angled ovary; style filiform, the stigma slightly surpassing the anthers, strongly 2-lobed; fruit not seen.

Yungas, 1890 (679). Apparently the same as Bourgeau's 2406 and also one by Jameson from Antioquia.

Its hyaline corolla-base, unequal filaments and 2-lamellate stigma appear to exclude it from this genus, but fruit is lacking.

Nicotiana glauca Grah. Bot. Mag. *pl. 2837*. Vic. La Paz, 10,000 ft. 1889 (11)=Rusby's 813.

Nicotiana undulata R. & P. Fl. Per. **2**: 16. *pl. 30. f. b.* (non Vent.). Vic. La Paz, 10,000 ft. 1890 (194)=Mandon's 447, Pentland (Titicaca) and Ball (Chicla).

Schwenkia Americana H.B.K. Nov. Gen. **2**: 345. *pl. 180.* La Grange, March, 1891 (749). Distributed as "Wahlenbergia."

SCROPHULARINEAE.

FAGELIA BARTSIAEFOLIA (Wedd.).

(*Calceolaria bartsiaefolia* Wedd. Chlor. And. **2**: 134.) Vic. La Paz, 10,000 ft. 1889 (83) 1890 (146)=Rusby's 1055.

Fagelia virgata (R. & P.) Kuntze, Rev. Gen. Pl. 460 (*Calceolaria virgata* R. & P. Fl. Per. **1**: 20. *pl. 31*). Yungas, 1890 (325) = specimens of R. & P.; also Pearce's 127, and Rusby's 1060.

Fagelia chelidonioides (H.B.K.) Kuntze, Rev. Gen. Pl. 459 (*Calceolaria chelidonioides* H.B.K. Nov. Gen. **2**: 378). Yungas, 1890 (720) = Rusby's 1056.

Fagelia lobata (Cav.) Kuntze, Rev. Gen. Pl. 461. (*Calceolaria lobata* Cav. Ic. 5: 26. *pl. 443. f. 1*) Capi, March, 1890 (774)=Mandon's 459 and 461.

FAGELIA BANGII sp. n.

Erect, shrubby, the branches erect, slender, straw-colored, puberulent, above narrowly winged; petioles pubescent, 3–5 mm. long, the base dilated, blade 1–2 cm. long, 6–12 mm. broad, ovate to lanceolate, the base rounded, the apex blunt, serrate-dentate with blunt ciliolate teeth, thin, above strigose but not harsh, below pale, and coarsely and transparently reticulate; peduncles terminal and in the axils of the upper leaves and bracts, erect or spreading, slender, few-flowered, angled, pubescent; flowers bright yellow, the yellowish-green pubescent calyx-lobes ovate, obtuse, 6 mm. long, the large one 5 mm. the others 3 mm. broad; corolla 2 cm. long, 1 cm. broad; filaments broad, shorter than the anther-cells, which are strictly horizontal, each nearly 1.5 mm. long, broad and obtuse; ovary conical, 2 mm. long and broad, puberulent, the style red, glabrous, flattened, 1.5 mm. long, the apex recurved; fruit not seen.

Vic. La Paz, 10,000 ft. 1889 (83a). Also near Cochabamba. Distributed as *C. bicolor*. Near *F. scabra*. Flowers larger, pedicels longer, and toothing and pubescence of leaves different than in *C. adscendens.*

Alonsoa acutifolia R. & P. Syst. Veg. 153. Vic. La Paz, 10,000 ft. 1889 (60)=Rusby's 1084 and 1085.

Leucocarpus ala us G. Don in Sweet Brit. Fl. Gard. 5: *pl. 124.* Yungas, 1890 (521)=Rusby's 2423.

Vandellia diffusa L. Mant. 89. Songo, Nov. 1891 (883)=Rusby's 1775.

Buchnera elongata Sw. Fl. Ind. Occ. 2: 1061. Yungas, 1890 (648)=Rusby's 1363.

Gerardia lanceolata (R. & P.) Benth. Comp. Bot. Mag. 1: 207. Yungas, 1890 (730)=Rusby's 1082.

Gerardia lanceolata var. La Paz, 10,000 ft. 1890 (188).

Castilleja communis Benth. in DC. Prodr. 10: 529. Yungas, 1890 (588)=Mandon's 495 and Rusby's 1097.

Castilleja fissifolia L. f. Suppl. 293. var. *pumila* (Benth.) Wedd. Chlor. And. 2: 119. Yungas, 1890 (711)= Rusby's 1088.

Bartsia inaequalis Benth. in DC. Prod. 10: 547. Yungas, 1890 (668)=Rusby's 1091.

Bartsia laxiflora Benth, in DC. Prodr. **10**: 547. Yungas, 1890 (691)=Rusby's 1092 and 1089.

GESNERACEAE.

Koellikeria argyrostigma (Hook.) Regel, Fl. (1848) 250. Yungas, 1890 (275)=Rusby's 275 and 2658.

SEEMANNIA PURPURASCENS sp. n.

Herbaceous, strigose throughout, the rhizome, stem and under sides of the ternate leaves deep purple, roots fibrous, fine; petioles 5 mm. long, margined, blades 6–12 cm. long, 3–5 cm. broad, the lower as well as the upper smaller, ovate, the base rather abruptly narrowed into the petiole, the apex obtuse or acutish, sparsely serrate, the teeth very small and sharp, the midrib and veins coarse and densely white-villous underneath; pedicels stoutish, 2 cm. long, the flowers horizontal or more or less reflexed; calyx campanulate, the lanceolate long-acuminate lobes 7 mm. long, more than double the length of the hemispherical tube, with darker tips; corolla bright crimson, densely villous, 2.5 cm. long, broad-cylindrical with slightly contracted mouth, straight, the lobes very short; disk annular, fleshy, sinuate; stamens attached near the base of corolla, reaching very nearly to the lobes, the filaments membranaceous-dilated and gibbous at the base, recurved at the apex, the anthers lightly coherent, nearly square in outline, white, with a red nearly square, disk-shaped connective centrally attached and covering about half its dorsal surface; ovary ovoid-conical, compressed, hirsute, about half-adnate; fruit not seen.

Yungas, 1890 (542). Distributed as "Columnea."

GESNERA SULCATA sp. n.

Tuberous rhizome large, stem stout, erect, strongly sulcate, purple, finely strigose, sparingly erect branched; petioles very short and stout, densely hirsute, blades 4–6 cm. long, 3–4 cm. broad, ovate, acutish, crenate, thick, densely strigose above, tomentose and strigose beneath, the veins broad and coarse · fascicles rather many-flowered, the pedicels slender, unequal, 1–3 cm. long, purple, white-hispid; flowers not examined; fruiting calyx bright-purple, white-hispid, short-campanulate, the lobes erect-appressed, rigid, the 2 lower separate, 4–5 mm. long and broad (twice the length of the tube), triangular, acute, the 3 upper short, united; disk of 5 separate glands, the two upper large; capsule broadly conical, 10–12 mm. long, green, finely hispid; style persistent, on the mature fruit 3 cm. long, flattened and twisted; seeds very small, lanceolate, both ends acute, light-brown.

Yungas, 1890 (629)=Mandon's 500; also collected at Pata by Pearce. Species near *G. Lindleyi* Hook.

My specimen consists of one undeveloped leafy stem and the leafless fruiting summit of another, so that my description is necessarily incomplete and perhaps inaccurate as to size of leaves.

ALLOPLECTUS SOLITARIUS sp. n.

Glabrous, the branches coarse but weak, apparently partly decumbent or reclining, coarsely and obtusely 4-angled and sulcate, purplish; leaves 1–2 or 3 dm. long, 5–10 cm. broad, oval, below abruptly acuminate into a long petiole-like base, the apex abruptly short-acuminate, acute, the margin serrate with very small rather distant teeth, the principal veins 7 or 8 pairs, much arched and continued along the margin; flowers solitary in axils from which the leaves have fallen, the pedicels slender, about 1 cm. long, much thickened near the calyx; calyx campanulate, gibbous, nearly 3 cm. long, the tube small, turbinate, the limb membranaceous, strongly veined, purple, unequally lobed, the lobes very broad, ovate, obtuse or acutish, obscurely toothed; two of the disk-glands large, the others more or less reduced; corolla deep purple, 3.5–4 cm. long, the tube cylindrical, nearly straight, the throat not contracted, the mouth slightly oblique, lobes unequal, short, erect-spreading; free portion of the filaments shorter than the anthers, which are broadened at the apex; ovary 6 mm. long, style stout, strongly flattened.

Songo, Nov. 1890 (856).

ALLOPLECTUS, species certainly undescribed.

My specimen is so badly eaten by insects that a description is impossible. Yungas, 1890 (571). Also collected by Holton.

COLUMNEA (SYSTELOSTOMA) BOLIVIANA Britton sp. n.

Minutely strigose the branches thick but weak, apparently decumbent or reclining, obtusely 4-angled and sulcate, light brown, glabrate; petioles about 1 cm. long, stout, strigose, the blades 1 to nearly 2 dm. long, 4–8 cm. broad, obovate, the base acute, the apex short-acuminate and acute, finely serrate, minutely strigose and deep green above, obscurely strigose and flavescent beneath, the midrib strongly strigose; principal veins 8 or 9 pairs, strongly arched and continued along the margin, obscure above; pedicels axillary, solitary, shorter than the petioles; calyx nearly 1.5 cm. long, hirsute within and without, the lobes ovate, obtuse or acutish obsurely dentate, the two lower longer and narrower; corolla densely pilose, 3 cm. long, curved, the base strongly gibbous on the upper side, the limb about equally ventricose on the lower side, the mouth oblique, the lobes equal, about 2 mm. long, 4 mm.

broad, reflexed; united portion of filaments nearly 1 cm. long, free portion 1 cm., the anther-cells broadly oblong, 2 mm. long, parallel, the anthers separate; style thick, curved, much shorter than stamens, the stigma oblique, gibbous, fringed; glands in my specimen destroyed by insects.

Yungas, 1899 (515)=Rusby's 1352 and 2488, but not Rusby's 2487.

COLUMNEA (SYSTELOSTOMA) LATISEPALA sp. n.

Branches thick but weak, light brown, narrowly winged, retrorsely hirsute, densely so above; leaves distinctly unequal, the petioles broad, 1.5–2 cm. long, densely hirsute, like the pedicels and calyx; the blades 8–12 cm. or more long, 3–8 cm. broad, oval to rotund-ovate, the base rounded or contracted, apex abruptly short and acutely pointed, margin with very small distant salient sharp teeth, the upper larger, very thin, deep green and strigose above, beneath pale, strigose and the veins hirsute, midrib and veins broad, the latter 8–10 pairs; pedicels stout, 1.5–2.5 cm. long, divergent or deflexed; calyx hirsute, nearly 4 cm. broad, 3 cm. long, amply gibbous upon the upper side, the lower side declined, the lobes herbaceous, inequilaterally ovate, somewhat acuminate, erect, serrate and ciliate; two of the disk-lobes larger, connate, separate at the apex; the handsome purple corolla 4–5 cm. long, 3–3.5 cm. broad at the mouth, strongly declined, the lobes large and rounded, spreading, the lower lacerate.

Songo, Nov. 1890 (869). A most handsome plant, unlike any other, except an undescribed species collected by Pearce.

COLUMNEA (COLLANDRA) ASCENDENS sp. n.

Strigose-hirsute throughout, branches ascending, thick, obscurely angled, leaves and flowers crowded, erect-spreading; leaves sub-sessile, the minor scarcely discernible, the major 1.5–2 dm. long, 4–6 cm. broad, falcate-oblong, both ends short-acuminate, acute, closely and sharply serrulate, finely strigose both sides, veins prominent beneath, the principal about 10 pairs, elegantly curved and branched; flowers solitary, on very short and thick pedicels, mostly not bracted; calyx hemispherical in outline, 1 cm. long, 13 mm. broad, the lobes ovate, acuminate and acute, serrate, densely hirsute within and without; glands 5, the two broader united, the others longer, all minutely notched at the apex, very thick; corolla purple, hirsute, 3–4 cm. long, 1 cm. broad, straight, the lower side ventricose at and above the middle, the mouth conspicuously contracted, the orifice scarcely oblique, lobes small, erect-spreading; filaments elongated, very slender, pubescent, much contorted below; style 3 mm. long, strongly flattened, twisted.

Songo, Nov. 1890 (853). Near *C. aureonitens* Hook.

BESLERIA MONTANA Britton, sp. n.

Shrubby (?), strigose and bristly-hirsute, the stems or branches ascending, obtusely quadrangular and sulcate, purplish; petioles 3–4 cm. long, broad, the blades 1.5–2 dm. long, 6–8 cm. broad, oval to ovate, base acute or short-acuminate, apex abruptly short-acuminate, minutely spinulose-toothed, sparsely and coarsely strigose both sides; flowers crowded in the axils, the flowers short-pedicelled; calyx (in flower) 1 cm. long and broad, fleshy, purple, coarsely-hirsute, divided half-way to the base, the lobes broad, with foliaceous recurved obtuse or acute tips; disk annular; corolla 1.5 cm. long, cylindraceous, somewhat curved, thick, hirsute, a distinct annulus at the somewhat oblique mouth, the base not appendaged, the very short sub-equal lobes veiny, rounded, reflexed; stamens and pistil destroyed by insects in all my flowers.

Yungas, 1890 (412) = Rusby's 2425.

Fluckigeria Fritschii Rusby, Bull. Torr. Bot. Club, **21**: 488.

BESLERIA FOLIACEA sp. n.

Habit unknown, leaves and flowers crowded; leaves sub-equal, the petiole, inclusive of the narrowed base, 6–8 cm. long, blade proper 1.5–2 dm. long, ovate to oval or even obovate, below abruptly narrowed into a petiole-like base, apex abruptly short-acuminate, acute, crenate-dentate, very thin and herbaceous, strigose both sides and below sparsely pilose, the midrib broad and purple, principal veins 8–10 pairs, very coarsely and slenderly reticulate, purple underneath when young; pedicels slender, 2 cm. long; calyx-lobes 4 cm. long, 7 mm. broad, lance-linear, crenate-dentate, obtuse, very membranaceous, veiny, erect; disk sub-annular, one lobe elongated, keeled and acuminate; corolla 2.5 cm. long, ample, slightly curved, little if at all ventricose, the mouth broad, somewhat oblique, the lobes unequal, very short and broad, spreading, deeper purple than the tube; anthers short, the cells oblong, parallel; fruit perfectly 2-valved; seeds oval-ovate, obtusish at both ends, the funiculus not apparent.

Yungas, 1890 (338.) Distributed as "Alloplectus?"

BESLERIA OVALIFOLIA sp. n.

Glabrous, stems apparently climbing or reclining, branches regularly quadrangular, very deeply sulcate; petioles 12–15 cm. long, thin and broad; blades 1.5–3 dm. long, 1–2 dm. broad, oval, the base rounded, very slightly bordering the apex of petiole, the apex not seen, rather sparse, thin, slightly shining, pale beneath, the midrib broad, slightly sulcate, principal veins 18 or 20 pairs, strongly curved, the salient, spinulose teeth 1 mm. long and half as broad;

peduncles very short, gray-puberulent, dividing into two short racemes, each about 8–10 flowered, the pedicels slender, about 12 mm. long, slightly thickened upward and continuous with the calyx, which is sub-urceolate, enlarging in fruit, its tube 5–6 mm. in diameter, the teeth 5–6 mm. long, triangular, abruptly long-acuminate, the sinuses acute; corolla about 11 mm. long, 7 mm. broad (as pressed) cylindraceous, straight, manifestly ventricose, the mouth contracted, slightly 2-lipped, the teeth very small; filaments inserted near the base, ribbon-shaped with broad base, much contorted, the broadly reniform anthers coherent, white with broad red disk-like connective upon the back; disk annular, the margin sub-entire; ovary depressed-ovoid, slightly ventricose, glabrous, the style stout, cylindrical, 8 mm. long, stigma capitate, dilated, 2-lamellate; capsule 7 mm. broad, depressed-globose, tipped with the style-base; placentae 4, densely seminiferous all over, the seeds rust-brown, oval or oblong, straight, both ends contracted, but obtuse.

Songo, Nov. 1890 (862).

Besleria (*?*). My single flower deformed and eaten.

Yungas, 1890 (544).

BIGNONIACEAE.

Tecoma sambucifolia H.B.K. Nov. Gen. 3: 143. Vic. La Paz, 10,000 ft. 1889 (7).

ACANTHACEAE.

Mendoncia Lindavii sp. n.

Shrubby twiner, the older branches dark brown or blackish, sparsely bristly, conspicuously angled, greatly swollen and knotted at the nodes, the rest of the plant densely ferruginous; petioles stout, 5–8 mm. long (or longer?) the older apparently twining; blades 7–11 cm. long, 3–6 cm. broad, ovate to broadly oval, the base rounded, the apex abruptly and finely acuminate, entire, above papillose-scabrous or strigose, beneath tomentose, membranaceous, coarsely reticulate, the principal veins about 5 pairs; flowers solitary or geminate, the pedicels stout, enlarged upward, strongly angled, about 2 cm. long; mature bud 4 cm. long, 1 to nearly 1.5 cm. broad, very slightly curved, oblong or linear-oblong, the abruptly acuminate apex incurved or circinate, the bracts connate, in flower opening along one side, in fruit partly by the other side also, bearing a conspicuous rib; calyx 5 mm. broad, scarcely 1 mm. long, sinuately 5-lobed, glabrous; corolla red, glabrous, 4.5 cm. long, nearly straight, the light colored tube about half its length, dilated near the base, the upper half moderately ventricose and more than twice as broad, the lobes sub-equal, the lower a little larger, rounded, entire, erect, 4–5 mm. long; anthers sessile, inserted at about the middle of the corolla, 2 of them a little larger, 1.5 cm. long, the base 3 mm. broad, sagittate, the markedly unequal lobes rounded at the ends, nearly glabrous; disk broad and flat, reddish; ovary 3 mm. long, angled, densely pilose; style hispid below, flattened, extending to the base of the corolla lobes, dilated above, the lobes thick and broad, spreading, concave, equal; fruit tomentose, enclosed in the bracts, tipped with the entire persistent style, 2 cm. long, 1 cm. broad, oblong-obovate, inequilateral, strongly compressed, doubly keeled.

Yungas, 1890 (532) Tipuani-Guanai, Dec. 1892 (1707). Distributed as *M. puberula*, but clearly distinct as pointed out by Dr. Lindau. Rusby's 2405 is perhaps distinct, with shorter bracts, longer and more slender curved corolla, and shorter fruit.

Stenandrium dulce (Cav.) Nees in DC. Prodr. **11**: 282 (*Ruellia dulcis* Cav. Ic. **6**: 62. *pl. 585. f. 2*). Vic. Cochabamba, 1891 (967) = Mandon's 299 and Bridges' 326.

Probably an extreme form of the same is (891) Songo, Nov. 1891. Same collected by Tweedie.

HANSTEINIA CRENULATA Britton, Ms.

Herbaceous, glabrous, about a meter high; stems and branches very slender, erect, angled above, the internodes commonly many times shorter than the leaves; petioles slender, 1–4 cm. long, blades 1–2.5 dm. long, 4–10 cm. wide, oval to ovate-oval, base acute to cuneate, apex acuminate, margin variably, mostly obscurely crenate, very thin and membranaceous; panicle terminal, erect, narrow, loose, mostly 1–2 dm. long, 2-bracteolate at the points of branching, the pedicels slender, 5–10 mm. long, 2-bracted above the middle, the bracts small, triangular-subulate; flowers erect, spreading or partly nodding; calyx-tube very short, rotate, its broadly spreading lobes 3 mm. long, tapering regularly from the base, a little more than 1 mm. broad, acute, the sinuses acute; corolla scarlet, 2 cm. long, 5 mm. broad (as pressed), abruptly one-half contracted just above the broad base, dilated at the middle portion, the upper lip shorter, recurved and concave, entire, the lower 3-lobed, the lobes rounded, larger. erect; anthers 3.5 mm. long, scarcely equalling the style.

Yungas, 1890 (641). Songo, Nov. 1891 (875) = Rusby's 1103 and 1818.

Dr. Lindau points out that "Glockeria" is preoccupied in paleontological botany, and unites this genus with *Hansteinia* under the latter name. While we are by no means satisfied that the groups are not generically distinct, yet we follow Dr. Lindau for the present rather than propose a new generic name.

JUSTICIA (DIANTHERA) RUSBYANA Lindau, sp. n. Fruticulosa (?), rami teretes, longitudinaliter sulcati, tomentelli; folia petiolis 10 mm. longis, tomentellis, oblonga, apice acuminata obtusiuscula, basi angustata, usque ad 9×3 cm., margine integro, utrinque (impris subtus ad costas) tomentello-pubescentia, cystolithis vix conspicuis; racemi axillares, breves, pedunculati, tomentelli; bracteae lanceolatae, 4×2 mm., bracteolae 3×1 mm.; calycis lobi 4, 7×1.5 mm., tomentelli; flores extus et intus ad faucem pilosi, tubo 9 mm. longo, apice 4, basi 3 mm. diametro, labio postico erecto, 8×5 mm., dentibus 2, 1 mm. longis, labio antico 10 mm. longo, 9 mm. in medio lato, dentibus 3, medio 2 mm. longo, 3 lato, lateralibus 1.5×2 mm. obtusis; filamenta 2, 7 mm. longa, antheris subsuperpositis, loculis 1 mm. longis, obtusis; pollinis granula typica, 42 μ. longa, 16–23 μ. lata; ovarium 2 mm. longum; disco 1 mm. longo; stylus 13 mm. longus, stigmate subbilobo; capsula ignota.

Affinis *J. laeviligni* (Nees) Lindau, sed pube et foliorum forma longa diversa.

Yungas, 1890 (379).

VERBENACEAE.

Lantana velutina Mart. et Gal. Bull. Acad. Brux. **1**: 325. Yungas, 1890 (585) = Rusby's 922 and 923.

Lantana lilacina Desf. Cat. Hort. Par. Ed. 3, 392.

The larger leaved form. Yungas, 1890 (219) = Rusby's 925.

Lantana Camara L. (?) Corolla-tube much curved, much dilated, the lobes small and crumpled, the anthers too broad. Yungas, 1890 (469).

Lippia scorodonoides H.B.K. Nov. Gen. **2**: 269. Vic. La Paz, 10,-000 ft., 1889 (5) = Rusby's 920.

LIPPIA BOLIVIANA sp. n.

Branches clothed with slender exfoliating strips of bark, brown, terete, the branchlets very numerous and slender, erect, 1.5–2.5 dm. long, purplish, obscurely quadrangular, the internodes 1 to nearly 2 cm. long, very minutely scabrate; leaves thick and rigid, sub-petioled by the narrowed base, 1.5–2.5 cm. long, 3–7 mm. broad, oblanceolate, the base cuneate, apex rounded and retuse, obscurely serrate toward the apex, the teeth blunt, thick and rigid, revolute, beneath purple-reticulate, above rugose and papillose; peduncles axillary, solitary, 4–10 mm. long, very slender, papillose; heads 4 mm. long, 5–6 mm. broad, the scales closely appressed, oval-obovate, strongly concave, acute, ciliate; calyx ovoid, nearly 2 mm. long, densely hispid, 2-fid, the teeth minutely notched; corolla 4 mm. long, whitish, pubescent, funnelform, 4-lobed, the upper lobe deeply cleft, the lower obovate, longer than broad; ovary oval, about as long as the style, together 2 mm. long, the stigma lateral, not so large as in the next; mature fruit not seen.

Vic. Cochabama 1891 (979).

LIPPIA FIMBRIATA sp. n.

Appressed-hairy, branches elongated, ascending, slender, terete, light yellowish-green, the leaves opposite or ternate; petioles about 5 mm. long and nearly as broad, leaves 2.5–5 cm. long, 1.5–3 cm. broad, ovate, the rounded base very abruptly contracted into the petiole, apex obtuse or acutish, coarsely serrate with large appressed teeth, thick and rigid, coarsely strigose both sides, the hairs yellowish; midrib and 2–3 pairs of nerve-like veins very prominent beneath; peduncles axillary, solitary, erect or ascending, naked, 8–10 cm. long, slender; heads about 1 cm. long, 1.5 cm. broad, the flowers little exceeding the closely appressed involucre, its scales similar in shape to the leaves, sessile, entire; calyx globose, 1 mm. long, the margin truncate, beautifully setose-fimbriate; corolla dull white, 5 mm. long exclusive of the lip, the tube puberulent, strongly curved, its lower third contracted, the mouth slightly contracted, its large lobe fan-shaped, 3 mm. broad, 2 mm. long, 3–4 times as large and thinner than the others, the margin slightly erose; stamens reaching to the middle of the tube, much exceeding the style; ovary broadly oblong, light brown, glabrous, about as long as the style, the stigma lateral, half the length of the style, oblong-expanded; fruit globular, crustaceous, entirely enclosed in the calyx, with a contracted, flattened, 2-winged base.

Vic. Cochabamba, 1891 (973). Named in reference to the beautifully fimbriate calyx.

Its calyx and stigma are those of *Lantana*, while in habit, corolla, and especially fruit, it is a perfect *Lippia*.

Valerianodes Cayennense (Vahl) Kuntze, Rev. Gen. Pl. 509 (*Stachytarpheta Cayennensis* Vahl, En. 1: 208.). Yungas, 1890 (208).

Verbena microphylla H.B.K. Nov. Gen. 2: 272. Vic. La Paz, 10,000 ft. 1890 (161 and 161a) = Mandon's 525.

Verbena hispida R. & P. Fl. Per. 1: 22. *pl.* 34. *f. a.* Vic. La Paz, 10,000 ft. 1889 (8).

Verbena littoralis H.B.K. Nov. Gen. **2**: 276. Vic. La Paz, 10,000 ft. 1890 (204) = Rusby's 89 and 90.

Verbena Bonariensis L. Sp. Pl. Ed. 2, 28. Vic. La Paz, 10,000 ft. 1889 (136).

Ægiphila arborescens (Aubl.) Vahl, Ecl. **1**: p. 15. Yungas, 1890 (584) = Rusby's 2458.

ÆGIPHILA SETIFORMIS sp. n.

Branches much elongated, slender, ascending, greenish, obscurely 4-angled, minutely puberulent, the younger parts pubescent, internodes 5–6 cm. long; petioles 4–10 mm. long, thick, the blades 10–12 cm. long, 3–5 cm. broad, ovate to lance-ovate, the base rounded and faintly inequilateral, the apex tapering or somewhat abruptly acuminate, entire, strigose on the veins, almost imperceptibly so elsewhere, shining, especially underneath, membranaceous, rigid, sharply veined, the principal veins about 8 pairs, highly curved, produced and connecting along the margin; panicle sessile or sub-sessile, at first hemispherical, becoming ovoid-pyramidal with dense rounded summit, the lower branches becoming distant and peduncled, the flowers nearly sessile; bracts lance-linear, not conspicuous; calyx 4 mm. long, 3 mm. broad, hispid, divided to the middle, the tube turbinate, the 4 lobes erect, equal, ovate, acute; corolla-tube 6 mm. long, cylindrical, equal, straight, the limb 7 mm. broad, the 4 lobes obovate with rounded apex; filaments about as long as the anthers; ovary 1 mm. long and nearly as broad, 4-lobed and 4-grooved, on a short thick base, the style 1.5 cm. long; fruit light brown, slightly shining, ovoid with umbilicate apex and base, 6 mm. long, 5 mm. broad, the lower two-thirds closely invested by the calyx.

Songo, Nov. 1890 (878a). Near *Æ. cuspidata*.

Clerodendron fragrans Vent. Jard. Malm. *pl. 70* (1803–1805). Vic. Cochabamba, 1891 (975).

LABIATAE.

MARSYPIANTHES CHAMAEDRYS (Vahl) (*Clinopodium Chamaedrys* Vahl, Symb. **3**: 77.—*Marsypianthes hyptoides* Mart. ex Benth. Lab. 64). Yungas, 1890 (654).

Mesosphaerum arboreum (Benth.) Kuntze, Rev. Gen. Pl. 526. (*Hyptis arborea* Benth. in DC. Prodr. **12**: 132); without flowers and deformed. Songo, Nov. 1891 (836).

Mesosphaerum eriocephalum (Benth.) Kuntze, Rev. Gen. Pl. 526 (*Hyptis eriocephala* Benth. in DC. Prodr. **12**: 124). Vic. Cochabamba, 1891 (976) = Rusby's 1404.

Mesosphaerum odoratum (Benth.) Kuntze, Rev. Gen. Pl. 526. (*Hyptis odorata* Benth. Lab. 81). Yungas, 1890(270a) = Rusby's 1417.

MESOSPHAERUM YUNGASENSE Britton, sp. n.

Herbaceous, ferruginous-tomentellate; stems strongly but not acutely quadrangular, deeply sulcate, purple, erect, widely branching; petioles about one-third as long as the blades, the latter 3–5 cm. long, 1.5–3 cm. broad, broadly ovate, the base broadly cuneate, apex obtuse or obtusish, coarsely serrate with blunt teeth, rigid, above rugose and scabrous, below ferruginous-tomentellate; panicles 3–4 dm. long, 2–3 dm. broad, pyramidal, very open, the branches distant; heads 5 mm. in diameter, nearly sessile, few-flowered, their supporting branchlets spiciform, cylindrical and obtuse, the lower heads distant, the lanceolate bracts half as long as the heads; bractlets of the head obovate, obtusish, about 3 mm. long, like the calyx densely setose-hispid; calyx (in young fruit) as long as the bractlets, narrowly campanulate, the 5 nearly equal subulate teeth half as long as the tube; corolla one-half longer than its calyx, 2-lipped, the upper lip about equally 3-lobed, the lower saccate, larger, obscurely dentate; apex of style recurved.

Yungas, 1890 (622) = Rusby's 1410.

Mentha aquatica L. Sp. Pl. 576. Vic. La Paz, 10,000 ft., 1889 (137).

Bystropogon canus Benth. Lab. 326. Vic. La Paz, 10,000 ft. 1889 (48) = Rusby's 1406. Mr. Bang's No. 575 from Yungas, 1890, is, perhaps, of the same species, though the flowers are smaller and floral leaves are different, as also the toothing of the leaves.

Hedeoma Mandoniana Wedd. Chlor. And. **2**: 148. Capi, March, 1891 (785) = Rusby's 1497.

Alguelagum conferium (Benth.) Kuntze, Rev. Gen. Pl. 512. (*Sphacele conferta* Benth. Pl. Hartw. 244.) Yungas, 1890 (689).

Alguelagum parviflorum (Benth.) Kuntze, Rev. Gen. Pl. 512. (*Sphacele parviflora* Benth. in DC. Prodr. **12**: 256.) Yungas, 1890 (686).

Alguelagum tenuiflorum (Benth.) Kuntze, Rev. Gen. Pl. 512. (*Sphacele tenuiflora* Benth. in DC. Prodr. **12**: 257.) Vic. La Paz, 10,000 ft. 1890 (167) = Rusby's 1407 and 1411.

Salvia tiliaefolia Vahl, Symb. **3**: 7. Yungas, 1890 (310).

SALVIA BANGII sp. n.

Shrubby, much branched, the branches ascending, slightly canescent, sharply 4-angled; leaves on the older parts smaller, rugose and rigid; petioles of the others slender, 5–10 mm.

long, the blades 4–6 cm. long, 1–2.5 cm. broad, lanceolate, the base broadest, rounded or sub-truncate to very abruptly cuneate, apex somewhat abrupt, but acutish, from coarsely to finely crenate-serrate, papillose or strigose above, puberulent beneath, green, membranaceous, the veins slender and inconspicuous (except as above stated), the principal 5 or 6 pairs; peduncles solitary, terminal, unbranched, 3–4 cm. long; verticils few and rather distant, about 6–8-flowered; pedicels very short, spreading; flowering calyx 6–7 mm. long, about half as broad, in fruit slightly enlarged, sharply nerved, the nerves bluish; corolla apparently light blue or whitish, exceeding the calyx by about 1 cm., widely ringent, the lower lip about one-half longer than the upper; my specimens too badly damaged to permit of dissection.

Vic. Cochabamba, 1891 (980). Also collected by Bridges.

SALVIA RUSBYI Britton, sp. n.

Weak and slender, minutely puberulent above, widely branching, the branches brownish; petioles 2–4 cm. long very slender, mostly deflexed, the under side ribbed; blades 8–11 cm. long, 4–6 cm. broad, ovate, in the type inequilaterally and rhomboidally ovate, the base rounded to sub-cordate and slightly unequal, apex abruptly acuminate and acute, rather sharply serrate, glabrous both sides, finely reticulate, pale beneath, the midrib toward the base dilated and ridged on the under side, the principal veins 5–6 pairs, 3 pairs starting from near the base, membranaceous and very thin; raceme terminal, peduncled, weak, simple, the flowers approximate, the pedicels 4–5 mm. long, erect, dilated upwards; calyx puberulent, very strongly ribbed, 12 mm. long, 4 mm. broad (as pressed), lipped nearly half way to the base, the erect or even slightly converging teeth strongly acuminate and pungent; corolla scarlet, pubescent, exceeding the calyx 4–4.5 mm., the tube slenderly funnelform, slightly curved and very slightly ventricose, the rather broad lips 5 and 8 mm. long respectively; stamens exceeding the longer lip 5–8 mm., the anthers about 3 mm. long; style exceeding the anthers 5–7 mm., one division 4 mm. the other 2.5 mm. long.

The type is Rusby's No. 2414, from which this description is taken.

Yungas, 1890 (422). Differs from the type in its rounded ovate more acuminate smaller leaves and smaller flowers, but clearly of this species.

Salvia sp.

Vic. La Paz, 10,000 ft., 1889 (37 in part, with small thick rigid leaves and small flowers) = Rusby's 2439.

Salvia sp.

Vic. La Paz, 10,000 ft., 1889 (37 in part, with lanceolate elongated thin flaccid leaves and large flowers) = Rusby's 1496.

Whether this group of scarlet *Salvias* of the La Paz region, represented also by Mandon's 710, and specimens by Pearce and Bridges, forms a single polymorphous species, or a number of distinct ones, I am not as yet prepared to decide. Under the impression that the former view was correct, Dr. Britton has proposed a name dedicated to Bridges, the first collector. The same view was taken by myself until the moment of preparing these notes for press, but it now appears probable that at least two species are represented. Which of these represents Bridges' collection I cannot now determine, and the point must go over for further comparison.

Perilomia ocymoides H.B.K. Nov. Gen. **2**: 328. Yungas, 1890 (358).

PLANTAGINEAE.

Plantago major L. Sp. Pl. 112. Vic. La Paz, 10,000 ft., 1889 (12) = Mandon's 536 in part, and Rusby's 668; 1890 (156) = Mandon's 737.

Plantago Virginica L. Sp. Pl. 113. (?) Vic. La Paz, 10,000 ft., 1889 (87).

Plantago sericea R. & P. Fl. Per. **1**: 51. *pl. 79. f. b.* Vic. La Paz, 10,000 ft., 1889 (94).

Plantago lanceolata L. Sp. Pl. 113. Vic. La Paz, 10,000 ft., 1889 (125).

NYCTAGINEAE.

Mirabilis Jalapa L. Sp. Pl. 177. Yungas, 1891 (480).

Oxybaphus micranthus Choisy in DC. Prodr. **13**: 2, 432. Vic. La Paz, 1889 (36).

Wedelia incarnata (L.) Kuntze, Rev. Gen. Pl. 534. (*Allionia incarnata* L.). Vic. Cochabamba, 1891 (928).

Boerhaavia viscosa Lag. & Rod. Anal. Cienc. Nat. 4: 256, n. 12 (1801). Vic. Cochabamba, 1891 (957) = Spruce's 4509, Mandon's 1008 and apparently Hayes' 732.

Collignonia parviflora (H.B.K.) Choisy in DC. Prodr. **13**: 2, 439. Yungas, 1890 (699 and 710).

ILLECEBRACEAE.

Pentacaena ramosissima (Weinm.) H. & A. in Hook. Bot. Misc. **3**: 338 (1833). Vic. La Paz, 10,000 ft., 1889 (93).

Herniaria setigera Gillies in Hook. Bot. Misc, **3**: 337 (1833). Yungas, 1890 (524).

AMARANTHACEAE.

Amaranthus chlorostachys Willd. Amarant. 34. *pl. 10. f. 19.* Yungas, 1890 (231) = Mandon's 1018 and Spruce's "Peru bor." in Herb. Kew.

Amaranthus muricatus Gillies ex Moq. in DC. Prodr. **13**: 2, 276. Vic. Cochabamba, 1891 (952) = Miers', Buenos Ayres 1410.

Amaranthus retroflexus L. Sp. Pl. 991. Yungas, 1890 (732) = Miers', Buenos Ayres 1404. Also (?) Vic. La Paz, 1889 (97).

Achyranthes aspera L. Sp. Pl. 204, var. Yungas, 1890 (505).

Guilleminia densa (Willd.) Mcq. in DC. Prodr. **13**: 2, 338 (*Illecebrum densum* Willd.; R. & S. Syst. Veg. **4**: 517 = *G. illecebroides* H.B.K. Nov. Gen. **6**: 42. *pl. 518*). Vic. La Paz, 10,000 ft., 1889 (22).

Telanthera Mexicana (Sch. Bip.) Moq. in DC. Prodr. **13**: 2, 372. Yungas, 1890 (682) = Mandon's 1015, Linden's 72, Vera Cruz and Matthews 2058, Peru.

Alternanthera repens (L.) Steud. Nom. Ed. 2, 1, 65 (*A. Achyrantha* R. Br. Prod. Fl. Nov. Holl. **1**: 417). Vic. Cochabamba, 1891 (963).

ALTERNANTHERA BOLIVIANA sp. n. (954).

Stems prostrate, creeping widely, slender, much branched, matted, reddish, compressed, coarsely sulcate, glabrous or sparsely pilose about the joints and ends; leaves conspicuously unequal, 5–12 mm. long, 4–8 mm. broad, oval to spatulate-oval, base abruptly narrowed, then tapering into a short petiole, apex blunt, or some with an acutish point, entire or obscurely sinuate, thickish, beneath minutely papillose or granular, the veins obscure; heads closely sessile, globose-obovoid, moderately compact, 7–10 mm. long, the apex rounded; bracts broadly oval, concave, 2.5 mm. long, obscurely lacerate; bractlets of equal length, laterally compressed, keeled, acute, one side narrower; outer perianth segments 4 mm. long, broadly oval, the apex rounded, strongly 3 or 5-ribbed, the inner equal in length, narrower, otherwise similar, folded; stamen-tube shorter than the ovary, bearing 5 oblong appendages between the filaments, and only about one-fourth the length of the latter; fertile filaments 3, the anthers reaching about to the middle of the perianth, about double the length of the brown strongly compressed ovary, which is nearly twice as broad as long, shortly stipitate and with a large capitate sessile stigma; fruit two-thirds as long as the perianth, slightly emarginate.

Vic. Cochabamba, 1891 (954). Near *A. paronychioides* St. Hil.

Gomphrena glabrata (Mart.) Moq. in DC. Prodr. **13**: 2, 388. Yungas, 1890 (255).

Gomphrena Gardneri Moq. in DC. Prodr. **13**: 2, 404 (?). Apparently a young state of Gardner's 2293. Vic. Cochabamba, 1891 (932).

Gomphrena decumbens Jacq. Hort. Schoenb. *pl. 482* (?). Vic. Cochabamba, 1891 (933). The same as specimens collected by Pearce, Bridges and Simcaya, and Glaziou's 11,425.

Gomphrena acaulis Remy, Ann. Sci. Nat. (3) **6**: 350 (1846). Talca Chugiaguilla, April, 1891 (812) = Mandon's 1017; also a specimen by Pearce, but not that of Bridges with deep brown calyx.

Iresine celosioides L. Sp. Pl. Ed. 2, 1456. Yungas, 1890 (228, 477 and 643).

CHENOPODIACEAE.

Chenopodium foetidum Schrad. in Mag. Ges. Naturf. Fr. Berl. **2**: 79 (1808). Talca Chugiaguilla, Apr. 1891 (799). Vic. Cochabamba, 1891 (1004).

Chenopodium Quinoa Willd. Sp. **1**: 1301. Vic. La Paz. 1889 (61).

Chenopodium murale L. Sp. Pl. 219. (?). Vic. La Paz. 1890 (199).

Chenopodium ambrosioides L. Sp. Pl. 219. Vic. La Paz, 1889 (3). Yungas, 1890 (281).

Chenopodium Chilense Schrad. Ind. Sem. Hort. Gott. 2 (1832). Vic. La Paz, 1889 (52).

Atriplex cristata Willd. Sp. **4**: 959 (1805). H.B.K. (1817). Vic. La Paz, 1889 (84).

ATRIPLEX RUSBYI Britton sp. n.

Odor resinous; thinly and compactly scurfy, the branches numerous, erect, elongated, slender, flexuous, terete, whitish, the internodes about two-thirds as long as the leaves; petioles very stout, 2–4 mm. broad; blades 10–25 mm. long, 12–25 mm. broad, irregularly triangular, the base varying from shortly produced to truncate or sub-cordate, the apex blunt, margin irregularly and angularly several-toothed, very thick, 3-nerved from near the base, mostly with a second strong pair of veins above the middle; spikes sessile, simple or branched, blackish, interrupted, the glomerules globular, sessile, 3–4 mm. in diameter; staminate flowers with perianth segments 5, less than 1 mm. long, orbicular-spatulate, strongly concave, thick, black-mottled without; fertile stamens 5, at length exserted and pistil not perceptible; pistillate flowers and fruit not seen.

Vic. La Paz, 10,000 ft., 1889 (181) = Rusby's 1529.

PHYTOLACCACEAE.

Rivina laevis L. Mant. 3. Yungas, 1890 (574).

VILLAMILLA RACEMOSA Britton, n. sp.

More or less bristly hairy throughout, very dark; petioles broad, 2–3 cm. long, blades 8–15 cm. long, 3–6 cm. broad, oblong-ovate, obscurely crenulate, thin, much recticulate with very dark veins, the upper surface glabrate, the base more or less narrowed but obtuse, apex acuminate or acute; racemes peduncled, elongated, tapering and acute, becoming loosely flowered; pedicels solitary, subulate-bracted from the rhachis, only 5–7 mm. long, divaricate; bud oblong, perianth blackish (as dried) 4 mm. long, striate, mostly reflexed in anthesis; stamens 8 or 12 (mostly 8), the filaments longer than the pistil.

Yungas, 1890 (414) = Rusby's 743. According to Dr. Britton, not the same as a specimen collected by Pearce at the same locality.

Petiveria alliacea L. Sp. Pl. 342. Yungas, 1890 (506).

Phytolacca icosandra L. Sp. Pl. Ed. 2, 631. Yungas, 1890 (486).

POLYGONACEAE.

Polygonum lacerum H.B.K. Nov. Gen. **2**: 179 (?). Vic. La Paz, 10,000 ft., 1889 (130).

Rumex crispus L. Sp. Pl. 335. Vic. La Paz, 1889 (51).

Rumex conglomeratus Murray, Prodr. Fl. Gott. 52. Vic. Cochabamba, 1891 (955).

SARCOGONUM FRUTICULOSUM (Walp.). (*Polygonum fruticulosum* Walp. Nov. Act. Ac. Leopold, **19** [1843]: Supp. 1, 407. *Muehlenbeckia rupestris* Wedd., Ann. Sci. Nat. [III.] **13** [1849]: 256.) Vic. La Paz, 1889 (132).

Sarcogonum vulcanicum (Endl). *Muehlenbeckia vulcanica* Endl. Gen. Suppl. 4: 51. Vic. Cochabamba, 1891 (41).

Uvifera polystachya (Wedd.) Kuntze, Rev. Gen. Pl. 562. Yungas, 1890 (299).

PIPERACEAE.

(By Dr. Casimir de Candolle.)

Piper Bangii C. DC. Bull. Torr. Bot. Club, **19**: 254. Yungas, 1890 (380).

Piper angustifolium R. & P. Fl. Per. **1**: 38. "Matico," U. S. P. Yungas, 1890 (215).

Piper Lechlerianum C. DC. Prodr. **16**: 2, 269. Yungas, 1890 (345).

Piper Bolivianum C. DC. Prodr. **16**: 2, 280. Yungas, 1890 (540).

Peperomia trinervis R. & P. Fl. Per. **1**: 32. *t. 50. f. b.* Yungas, 1890 (331).

Peperomia nudicaulis C. DC. Bull. Torr. Bot. Club, **19**: 48. Yungas, 1890 (331, a).

Peperomia Hilariana Miq. Syst. 89. Yungas, 1890 (224).

Peperomia Brittonii C. DC. Bull. Torr. Bot. Club, **19**: 254. Yungas, 1890 (329).

Peperomia fragrans C. DC. Seem. Jour. Bot. 1866: 140. Yungas, 1890 (330).

Peperomia Bangii C. DC. Bull. Torr. Bot. Club, **19**: 49. Yungas, 1890 (330, a).

CHLORANTHACEAE.

Tafallaea glabrata (H. B. K.) (*Hedyosmum glabratum* H. B. K. Nov. Gen. 7: 165). Yungas, 1890 (388).

MONIMIACEAE.

Siparuna limoniodora (R. & P.) DC. Prodr. **16**: 2, 646. Yungas, 1890 (352).

Siparuna nigra sp. n.

Glabrous except the upper leaf-surfaces, the branchlets blackish, slender, spreading, terete, little flattened at the joints, the internodes many times shorter than the leaves; petioles about half the length of the internodes, divaricate or reflexed; the blades 8–12 cm. long, 3–5 cm. broad, the base cuneate, the apex abruptly acuminate, acutish or obtuse, minutely spinulose-toothed, the teeth cartilaginous, drying blackish, above very minutely strigose, thin but somewhat rigid, the primary veins 6–7 pairs; cymes sessile or peduncled, solitary or geminate, few-flowered, reflexed, the pedicels 1–2 mm. long, in fruit becoming 2 cm. long, fleshy, thickened upward; calyx black, 4 mm. broad, the tube turbinate, 2 mm. long, fleshy, the limb 5-lobed, the lobes short and rounded; disk in the staminate flowers closed over the stamens, the flat surface centrally perforated, the stamens numerous, imbricated in about 4 series, broadly dilated, the anther sub-sessile, pistil none; pistillate flowers very much smaller, central in the cymule; fruit black, fleshy, globose-pyriform, 1.5 cm. broad (as pressed and dried) at maturity.

Songo, Nov. 1890 (844), in flower and Mapiri, July–Aug. 1892 (1523) in fruit = Fendler's 2358 (second collection) from Tovar, Venezuela.

LAURINEAE.*

Nectandra globosa (Aubl.) Mez, Laur. Am. 415. (*Laurus globosa* Aubl. Pl. Gui. 1: 364.) Yungas, 1890 (488 and 688).

Persea scoparia Mez, Arb. Bot. Gart. Breslau, 115. Yungas, 1890 (501).

Persea coerulea (R. & P.) Mez, Jahrb. k. Bot. Gart. 5: 171. Yungas, 1890 (300.) Songo, Nov. 1890 (833).

LORANTHACEAE.

Loranthus concinnus Mart. in Schult. Syst. 7: 170. (*Struthanthus concinnus* Mart. Flora, 1830: 1, 104.) Yungas, 1890 (213).

Loranthus eugenioides H.B.K. Nov. Gen. 3: 435. Vic. La Paz, 10,000 ft., 1889 (6).

Loranthus verticillatus R. & P. Fl. Per. 3: 47. Vic. La Paz, 1889 (139) = Mandon's 1469 and Pearce's from Orubamba, Jan. 1867.

Loranthus punctatus R. & P. Fl. Per. 3: 47. *t. 277. f. a.* Yungas, 1890 (705).

LORANTHUS FLEXILIS sp. n.

Glabrous, somewhat glaucous, pale, the branches much elongated, slender, variously curved, finely many-striate, scarcely broader at the nodes; petioles broad, about 1 cm. long, the blades, in flowering stage 2–3 cm. long, 1–2 cm. broad, in fruiting stage 3–5 cm. long, 2–3 cm. broad, oval-elliptical to obovate, base

* Kindly determined by Dr. Carl Mez.

rounded to acute; apex rounded to very slightly pointed, entire, thick and coriaceous, spreading or reflexed; spikes very loose and interrupted, short-peduncled, rarely equalling or exceeding their leaves; flowers sub-sessile, solitary or 2 or 3 together; buds pyriform, 5-angled; flower yellowish, 3 mm. long; calyx 1 mm. long, 1.5 mm. broad, the dark tube hemispherical, the light-colored limb spreading, sinuate; corolla 5-parted to the base, the segments 3 mm. long, 1 mm. broad, oblanceolate, the apex rounded, plane or slightly concave, thick; filaments very short and broad, inserted about the middle of the corolla-lobes, the anther short, nearly as broad as the corolla-lobe, immovable, the apex oblique, the thickened connective projecting above; style 2 mm. long, stout, thickened at the middle portion, the stigma oblique; drupe blue, fig-shaped, 1 cm. long, 6 mm. broad, on a fleshy, clavate pedicel half its length.

Yungas, 1890 (468) in flower, and between Tipuani and Guanai, Dec., 1892, in fruit (1659). Near *L. orbicularis*. Nearly Jenman's 1035 and 4410.

Phoradendron coriaceum Mart.; Eichl. Fl. Bras. 5: 2, 121. Yungas, 1890 (363).

Phoradendron Mandoni Eichl. Fl. Bras. 5: 2, 124. Yungas, 1890 (657) = Rusby 1387.

PHORADENDRON BRITTONIANUM sp. n.

Very fleshy, glabrous, stems elongated, curving, branchlets sharply quadrangular, at the nodes compressed, moderately broadened (about one-half broader) and narrowly winged; petioles very stout, 5–7 mm. long, the blades 5–7 cm. long, 3.5–5 cm. broad, oval, the base very abruptly narrowed, the apex rounded, entire, reddish-brown, very thick, the primary veins 2 or 3 pairs, obscure; spikes 3–5 in each axil, at the base 2–several pairs of empty bracts, the mature joints nearly 1 cm. long, and, including the flowers about as broad, the rhachis blackish, the bracts greenish, triangular-ovate, connate, nearly equalling the perianth, which is 3-parted, well immersed, 3 mm. broad when expanded, ruby-red, translucent, much thickened, the lobes triangular with rounded apex, 2 mm. broad, 1.5 mm. long; ovary entirely immersed, the circular stigma not elevated above the surface; staminate flowers and fruit not seen.

Yungas, 1890 (632).

SANTALACEAE.

Quinchamalium majus Brogn. Voy. Coquille, *t. 51. f. a.* Capi, Mar. 1891 (761).

EUPHORBIACEAE.

Euphorbia hypericifolia L. Sp. Pl. 454 (?) Vic. La Paz, 10,000 ft., 1889 (2).

Euphorbia Peplus L. Sp. Pl. 456. Vic. La Paz, 10,000 ft., 1889 (46).

Euphorbia geniculata Orteg Hort. Matr. Dec. 18. Yungas, 1890 (232) = Rusby 891 and 892.

Euphorbia pilulifera L. Sp. Pl. 454. Yungas, 1890, (591).

Euphorbia (*Stachidium*?) specimen in fruit, not matched at Kew, but diagnosis cannot be made out.

Yungas, 1890 (619).

EUPHORBIA (CROSSADENIA) CYMBIFORMIS sp. n.

Shrubby, glabrous, the branches very numerous, erect, elongated, slender, glaucous, terete, the leaves (except the upper bracteose ones) alternate, imperfectly present in my specimens, apparently sessile, broadly ovate and 3–5-nerved, reddish like the bracts, which are distinct, but in the dried specimen appearing as though connate, the pair forming a boat-shaped involucre, triangular-ovate, acute, entire, thickish, glaucous, the lower 2 cm. long, 1.5 cm. broad: peduncles solitary, 1 mm. long, stout, the involucre 4 mm. long, 3 mm. broad, urceolate, 5-lobed nearly half-way to the base, the lobes hyaline, rounded, fimbriate; glands 4, exceeding the lobes, their broad stalks about equalling the latter, reddish, the upper surface oblique, concave, posteriorly with 2 short blunt lobes; filaments at length about equalling the involucre and the stipe of the ovary; ovary 6–costate, 3 of the ribs produced; fruit deeply 3-lobed, 4 mm. long and slightly broader, light brown, minutely granular; seed 2.5 mm. long, 1.5 mm. broad, tetragonal, 2 faces concave, 2 convex and bluntly ridged, greenish-gray, strongly muricate and granular.

Talca Chugiaguilla, Apr. 1890 (794).

Euphorbia (sp. n.?) near *E. zygophylloides* Boiss. Vic. Cochabamba, 1890 (930).

Phyllanthus lathyroides H. B. K. Nov. Gen. **2**: 110. Yungas, 1890. (335).

HIERONYMA RETICULATA (Pl.) Britton (*Antidesma reticulata* Pl.) Yungas, 1890. (383)=Matthews', Peru, 1562.

Jatropha Curcas L. Sp. Pl. 1006. Yungas, 1890 (626)=Rusby's 889.

Croton glandulosus L. Syst. Ed. 10, 1275, var. Yungas, 1890 (471).

Croton Boliviensis Muell. Arg. Linnaea, 34: 91 (1865–'66). Vic. Cochabamba, 1891 (971). Same collected by Bridges.

CROTON (EUCROTON) BANGII sp. n.

Suffrutescent, much branched from the base; stems ascending, slender, 3–5 dm. high, terete, scurfy, yellowish-white; petioles 3–5 mm. long, blades 2–3.5 cm. long, 1–2 cm. broad, oblong to obovate, the base slightly narrowed, apex rounded, entire, above dark green and lepidote, below densely silvery-scurfy, thick, rigid, involute in drying, principal veins about 10 pairs, straight; racemes in the upper axils on peduncles about 5 mm. long, becoming loose and about 3 cm. long, the rhachis angled by the decurrent pedicels; staminate flowers smaller than the pistillate, the sepals broader; petals white, delicate, nearly as long as the sepals, oblanceolate, acute; disk small, inconspicuous; stamens 15, about equalling the petals; pistillate flowers: pedicels very short, erect or recurved, calyx urceolate-campanulate, 3 mm. long, 2 mm. broad, parted two-thirds to the base, the lobes oblong-lanceolate, acute; disk cup-shaped, shallow, thick, shallowly 5-lobed, bearing 5 very small projecting globose green shining glands in the sinuses; petals none; ovary densely scurfy, about half as long as the calyx, the 3 styles 2-cleft nearly to the base, exceeding the calyx, stout, stellate-scurfy, at the base diverging, the stigmas connivent and circinate, brown; seeds oblong, brown, glabrous, shining.

Unduavi, March, 1891 (745).

CROTON (EUTROPIA) PILULIFERUM sp. n.

A tall shrub, the branchlets short and stoutish, widely divergent, densely rusty-lepidote and sparsely pilose, striate; petioles angled, extremely variable in length, reaching to 6 cm. or more; stipules ovate, 5 mm. long, blades 8–15 cm. long, 5–11 cm. broad, ovate-cordate, the sinus slight, abruptly short-acuminate, the margin more or less sinuate, above scabrous, below white (when young yellow) stellate-scurfy, the principal veins about 8 pairs, 2 or 3 pairs radiating from near the base, connected by parallel wavy secondary ones, slender, but prominent below; basal glands small, inconspicuous; racemes terminal, solitary, 10–15 cm. long, the peduncles 3–4 cm. long, angled, the flowers mostly geminate, on pedicels 3–4 mm. long, the buds globose, 2 mm. in diameter; staminate flowers: the calyx 5-parted nearly to the base, the segments nearly 3 mm. long, 2 mm. broad, ovate, obtuse, equal; petals exceeding the calyx by 1 mm., oblong-elliptical, the margin tomentose, strongly recurved; stamens 20 or more, about equalling the petals, toward the base pilose like the receptacle; disk flat, irregularly lobed, small. Pistillate flowers: the calyx more deeply parted, the segments 4 mm. long, oval, acute, ribbed, the margins strongly revolute; petals (?); disk annular, obscurely lobed, bearing subulate pilose glands in the sinuses; ovary long and densely stellate-hairy, the styles bifid to below the middle.

Yungas, 1890 (375). Near *C. celtidifolius* Baill.

Croton pungens Jacq. Ic. Pl. Rar. **3**: 19. *t. 622* (?) Yungas, 1890 (278).

Acalypha macrostachya Jacq. Hort. Schoenb. **2**: 63. *t. 245* (?) Yungas, 1890 (217).

Acalypha diversifolia Jacq. Hort. Schoenb. **2**: 63. *t. 244*. Yungas, 1890 (377).

ACALYPHA HIBISCIFOLIA Britton, sp. n.

Fruticose, finely tomentose, leafy, the branches erect or ascending, angular, glabrate; stipules 1 cm. long, 2.5 mm. broad, tapering from the base, acute; petioles 3–6 cm. long, channelled above; blade 2–2.5 dm. long, 4–6 cm. broad, ovate, the base slightly cordate, the apex abruptly or gradually acuminate, serrate-dentate, the teeth small and numerous, mostly short and broad with a minute point, membranaceous, strigose-pubescent above, the veins underneath narrow but prominent, much reticulated; spike (but one seen) terminal, sessile, 7 cm. long, 1 cm. broad, pistillate, loosely flowered at the base, the scales light-brown, membranaceous, the body inversely triangular, 3 mm. long and broad, bearing about 3 stout prominent dark brown ciliate ribs, which are extended into tapering acute fimbriate awns mostly longer than the body; flowers not examined; capsules glabrous, sub-globular, 2–2.5 mm. long; seed 1.5 mm. long, 1 mm. broad, ovoid, slightly compressed, light brown with a dark broadly circular plane caruncle.

Yungas, 1890 (242) = Rusby's 1275, the type.

ACALYPHA CAPILLARIS sp. n.

Tall shrub, the branches slender, ascending, elongated, reddish-gray, terete, minutely puberulent; petioles 2–6 cm. long, slender, the stipules subulate, attenuate, erect, rigid, 6 mm. long, the blades 10–15 cm. long, 3–7 cm. broad, the base rounded, the apex long-acuminate, sharply serrate, glabrous both sides, scrobiculate and pilose in the axils underneath, much reticulate with dark veins, the primary about 8 pairs, thin and membranaceous; staminate spikes filiform, elongated, the persistent bracts dark, thick, rigid, pilose, triangular, acuminate, equalling the flowers; glomerules about 4-flowered, the flowers dark-brown, very small, the stamens 8, the pedicels at length elongated, pilose; pistillate spikes terminal, solitary, simple, not more than 1 cm. broad; bracts very broad, enclosing a single flower, ribbed, the ribs terminating in long unequal barbellate awns, the longest 7–8 mm. long; calyx small, about equalling the pilose ovary; styles as long as the bracts, or nearly so, scantily fimbriate, unequal; fruit not seen.

Yungas, 1890 (676.) Collected also by Pearce at Santa Cruz, Feb. 1865. Near *A. diversifolia* Jacq.

Alchornea triplinervia Muell. Arg. in DC. Prodr. **15**: 2, 909. Yungas, 1890 (210).

Ricinus communis L. Sp. Pl., 1007. Unduavi, Mar. 1891 (742).

Mabea angustifolia Benth. in Hook. Journ. Bot. 1854, 365, var. LONGIFOLIA Britton, Ms.

In all respects smaller than the type, the leaves 4–10 cm. long, exclusive of the petiole, 5–10 mm. broad, the base sub-rounded, the apex contracted and long-attenuate, very acute.

Yungas, 1890 (507).

Maprounea Guianensis Aubl. Pl. Gui. **2**: 895. *t. 342*. Songo, Nov. 1891 (831).

URTICACEAE.

Urtica flabellata H.B.K. Nov. Gen. **2**: 40. Vic. La Paz, 1889 (127).

Urtica subincisa Benth. Pl. Hartw. 293. Talca Chugiaguilla, Apr. 1890 (803).

Urera sinuata Wedd. Ann. Sci. Nat. (III.) **18**: 201. Yungas, 1890 (369).

Urera alceaefolia Gaud. Freyc. Voy. Bot. 497 (1826). (*U. aestuans* Steud. Nom. Ed. 2, **2**: 737, but as *nomen nudum*.) Yungas, 1890 (420).

Pilea dauciodora Wedd. Ann. Sci. Nat. (III.) **17**: 223. Yungas, 1890 (687).

Pilea anomala Wedd. Ann. Sci. Nat. (III.) **17**: 217. Songo, Nov. 1890 (894) = Mandon's 1104.

Boehmeria caudata Sw. Prod. Veg. Ind. Occ. 34. Yungas, 1890 (445).

Boehmeria near *B. Pavonii* Wedd. Ann. Sci. Nat. (IV.) **1**: 202. Yungas, 1890 (328) = Spruce, Tarapota, 3962. Clearly distinct from *B. Pavonii*, but better material required for description.

Phenăx ballotaefolius (Kunth) Wedd. Ann. Sci. Nat. (IV.) **1**: 192. Yungas, 1890 (475).

PHENAX PALLIDA sp. n.

Slender shrub, the branchlets elongated, spreading, slender, terete, purple, striate, above clothed with divergent soft white hairs; petioles stout, 5–10 mm. long, blades 5–10 cm. long, 2–3 cm. broad, oblong, the base acute, the apex acuminate, flabellately tri-costate, penni-veined so as to connect the ribs, sharply serrate, thickish and rigid, above finely strigose, dark green, beneath very pale, hispid-hairy; glomerules closely sessile, solitary in the axils and clothing the leafless branchlets, 4–5 mm. in diameter, brown; bracts broadly ovate, about as long as the staminate flowers, hyaline, 3-nerved; staminate flowers forming a globose bud, anthers 4, rudimentary pistil little larger than an anther, the stigma nearly as large as the ovary; pistillate flower very short-stalked, 1.5 mm. long, light brown, shining, narrowly margined, the subulate style and stigma about as long as the ovary.

Yungas, 1890 (341).

CERATOPHYLLEAE.

Ceratophyllum demersum L. Sp. Pl. 992. Talca Chugiaguilla, Apr. 1890 (800).

GNETACEAE.

Ephedra Americana Willd. Sp. 4: 860. Vic. La Paz, 10,000 ft. 1889 (9).

HYDROCHARIDEAE.

Elodea Chilensis Casp. Abhandl. Berl. Acad. 1857: 47. Lake Titicaca, 1890 (165).

ORCHIDEAE.

(Communicated by Mr. R. A. Rolfe.*)

PLEUROTHALLIS YUNGASENSIS Rolfe n. sp.

Stems slender, terete, about a foot high. Leaf oblong-lanceolate, acuminate, with subcordate base, 6–8 in. long, 1¼–1¾ in. broad. Flowers fascicled from a little above the base of the leaf; pedicels slender, 2–2½ in. long. Dorsal sepal ovate, acute, 7–9 lin. long, 4–5 lin. broad; lateral sepals connate, elliptical-oblong, acute, 9–12 lin. long, 6–8 lin. broad. Petals subulate-lanceolate, acute, base subcordate, 3½ lin. long, 1 lin. broad. Lip reniform-

*As this communication is accepted in the form submitted by Mr. Rolfe, the same rules of nomenclature do not apply as those which determine the names elsewhere.
H. H. R.

cordate, obtuse or apiculate, denticulate, tricarinate, 2 lin. broad. Column short.

Yungas 1890 (459).

A species belonging to the section Macrophyllae fasciculatae, and allied to *P. ruberrima* Lindl., a native of New Granada and Venezuela, but readily distinguished by the more distinctly cordate lip and the shorter and broader dorsal sepal.

PLEUROTHALLIS DENSIFOLIA Rolfe n. sp.

Leaves oblanceolate-linear or subspatulate, obtuse, base attenuate into the short petiole, 1¼–1½ in. long, 1½–2 lin. broad. Scapes slender, 3½–4 in. long, 6–8-flowered; pedicels slender, 4–6 lin. long. Bracts triangular, acute, with funnel-shaped base, ¼ lin. long. Dorsal sepal ovate-lanceolate, acuminate, concave at the base, 3 lin. long; lateral ones connate, similar in shape, but rather longer. Petals obovate-oblong, obtuse, membranaceous, 1 lin. long. Lip entire, oblong, obtuse, tricarinate, 1¼ lin. long. Column broadly winged, rather shorter than the petals.

Yungas, 1890 (216).

A species belonging to the section Apodae caespitosae, and allied to *P. picta* Lindl., a native of British Guiana, but different in its rather narrower leaves, longer tails to the sepals, and larger petals, which are not spatulate.

PLEUROTHALLIS SCABRIDULA Rolfe n. sp.

Stems erect, slender, scabrid, leafy, 1½–2 in. long, the sheaths with free ovate scabrid-ciliate spreading limb. Leaves elliptical-oblong, obtuse, 2½–4 lin. long, 1–2 lin. broad. Racemes slender, 1–1½ in. long, 5–8-flowered. Bracts minute. Pedicels slender, 3 lin. long. Dorsal sepal oblong-lanceolate, caudate, acuminate, 2¼ lin. long; lateral sepals linear-caudate, 3 lin. long. Petals lanceolate-linear, acute, ½ lin. long. Lip linear-oblong, ½ lin. long. Column nearly equalling petals.

Songo (907).

A species belonging to the section Caulescentes, and allied to *P. diptera* Lindl., but less than half the size and more than twice as slender.

STELIS BANGII Rolfe n. sp.

Stems 1½–2½ in. long, clothed with two or three long tubular sheaths. Leaves linear-oblong, subobtuse, base attenuate, 2½–4 in. long, 5–9 lin. broad. Spikes solitary, 5–9 in. long. Bracts distichous, conduplicate, ovate, acuminate, 3–5 lin. long. Pedicels 1½–2 lin. long. Perianth 3 lin. in diameter, lobes short, very broadly ovate, 7-nerved. Petals reniform-ovate, very obtuse, ¾ lin. in diameter. Lip like petals, but slightly smaller.

Yungas, 1890 (458).

Allied to *S. triplicata* Lindl. of the section Distichae, but readily distinguished by its narrower leaves and narrower and more acuminate bracts.

Stelis euspatha Reichb. f. in Bonplandia, 3: 225? Lindl. Fol. Orch. Stelis, 3.

Yungas, 1890 (653).

The buds of this specimen are very young, but so far as I can make out it belongs to this species, which was based on a Bolivian plant collected by Bridges.

STELIS BRITTONIANA Rolfe n. sp.

Stems 3 in. long. Leaves linear-oblong, obtuse, 2–4 in. long, 5–7 lin. broad. Spikes one or two from the leaf axil, 3–5 in. long. Bracts broadly ovate, acute, 1 lin. long. Pedicels a little longer than bracts. Perianth 3 lin. in diameter, lobes elliptical-oblong, obtuse, 3-nerved. Petals broadly oblong, truncate, ¼ lin. long. Lip similar to petals, but very obscurely 3-lobed.

Yungas, 1890 (739).

A species obviously allied to the Venezuelan *S. lutea* Lindl., though the spikes are frequently more than one from each leaf-axil. The fact is Lindley's groups Monostachyae and Polystachyae cannot be retained, not being constant, even for the same species. The present plant may be distinguished from *S. lutea* by its narrower sepals and different bracts.

STELIS RUSBYI Rolfe n. sp.

Stems 1½–3 in. long. Leaves oblong or linear-oblong, obtuse, 2–4 in. long, 5–11 lin. broad. Spike solitary, 4–6 in. long. Bracts ovate-lanceolate, acuminate, 3–4 lin. long. Pedicels 1½ lin. long. Dorsal sepal ovate, subacute, 5-nerved, 3 lin. long, 2 lin. broad; lateral ones connate into a broadly ovate 9-nerved body, 2½ lin. long, 2 lin. broad, apex minutely bidentate. Petals very broadly ovate, obtuse, 3-nerved, 13 lin. long. Lip similar but rather smaller, with thicker nerves, and somewhat auricled at the sides.

Yungas, 1890 (332) = Rusby's 2758.

A member of the section Dialissa, allied to the Peruvian *S. truncata* Lindl., which, however, is distinctly scandent, and has differently shaped petals and lip.

Liparis elata Lindl. Bot. Reg. 14: *pl. 1175.*
Yungas, 1890 (608).

Liparis elliptica Reichb. f. in Walp. Ann. 6: 218.
Yungas, 1890 (656).

Microstylis fastigiata Reichb. f. Yungas, 1890 (456 and 590.)
Also collected at Cochabamba, 1891.

Bletia Wageneri Reichb. f. Bonplandia, 2: 22 (1854). Yungas, 1890 (455).

ELLEANTHUS YUNGASENSIS Rolfe n. sp.

Stems 1 foot or more high. Leaves ovate-lanceolate, acuminate, 3½–7½ in. long, ¾–1½ in. broad. Spikes oblong, 3½ in. long. Bracts elliptical-oblong, subacute, 6–8 lin. long. Sepals lanceolate-oblong, acute, 4–4½ lin. long, 1½ lin. broad. Petals lanceolate-linear, acute, 4 lin. long, ¾ lin. broad. Lip suborbicular, retuse, 4 lin. long by nearly as broad, with one prominent rounded callus 1 lin. broad in the basal cavity. Column clavate, 3 lin. long.

Yungas, 1890 (658).

A species belonging to the section Calelyna, and allied to *E. conifer* Reichb. f., a native of Peru, of which, however, the callus is described as triangular, and the plant evidently different in other respects.

Epidendrum Ibaguense H.B.K. Nov. Gen. 1: 352. Yungas, 1890 (243).

Epidendrum syringothyrsus Reichb. f. ex Hook. f. Bot. Mag. *pl. 6145.* Yungas, 1890 (633).

Epidendrum paniculatum R. & P. Syst. Veg. 243. Yungas, 1890 (635).

Epidendrum oreonastes Reichb. f. Xenia Orch. 3: 22. Capi, March, 1890 (763).

Epidendrum brachycladium Lindl. Fol. Orch. Epid. 60. Vic. Cochabamba, 1891 (743).

Epidendrum lanipes Lindl. Fol. Orch. Epid. 91. Yungas, 1890 (452).

EPIDENDRUM YUNGASENSE Rolfe n. sp.

Stems terete, erect, 1–1¼ ft. high. Leaves oblong-lanceolate, acute, 1½–3½ in. long, ¼–¾ in. broad. Panicles lax, with about one side branch, 2–2½ in. long, with two or three lanceolate sheaths at the base. Bracts linear-lanceolate, acuminate, 1–1½ lin. long. Pedicels slender, 4–5 lin. long. Sepals oblanceolate, acute, reflexed, strongly 3-nerved, 3 lin. long, ¾ lin. broad. Petals filiform, very slightly thickened at the apex, 3 lin. long. Lip adnate to column, 3 lin. broad, three-lobed; lateral lobes broadly rounded, falcately acute, minutely denticulate; front lobe deeply bipartite, with linear obtuse lobes. Column 1¾ lin. long.

Yungas, 1890 (572).

A member of the section Spathium, and apparently most allied to the Peruvian *E. parviflorum* Ruiz & Pavon, but a stouter plant with shorter and broader leaves, shorter bracts and other differences.

GOVENIA BOLIVIENSIS Rolfe n. sp.

Leaves elliptical or elliptical-lanceolate, subobtuse, 11 in. long, 3¼–4½ in. broad; petioles 9–10 in. long. Scape 14 in. high, few-flowered. Bracts ovate-oblong, subobtuse, 3–4 lin. long. Pedicels 5 lin. long. Dorsal sepal broadly oblanceolate, acute, 7 lin. long; lateral ones falcate-oblong, subacute, 4 lin. long. Petals obovate-oblong, somewhat oblique, acute, 4 lin. long, 2½ lin. broad. Lip ovate, acute, submembranaceous, with three slender obtuse keels, 3 lin. long, nearly 2 lin. broad. Column clavate, 2½ lin. long.

Yungas, 1890 (609).

Allied to the Peruvian *G. tingens*, Poepp. & Endl., but the lip scarcely half the size, in which respect it approaches *G. Gardneri* Hook., though the lip is not nearly so membranaceous.

Zygopetalum intermedium Lodd. var. *Peruvianum* Rolfe, in Lindenia, 9: 71. *pl. 418.* Yungas, 1890 (453).

XYLOBIUM VARICOSUM (Reichb. f.) Rolfe. (*Maxillaria varicosa* Reichb. f.). Yungas, 1890 (573).

Lycaste macrophylla Lindl. Yungas, 1890 (454).

MAXILLARIA NERVOSA Rolfe n. sp.

Rhizome creeping, clothed with broadly ovate obtuse striate somewhat imbricating sheaths. Pseudobulbs ½–¾ in. distant, oblong, subcompressed, 2-leaved. Leaves linear-oblong, emarginate, 1¼–2 in. long, 2–3 lin. broad. Peduncles 1½–1¾ in. long, clothed with about six or eight somewhat imbricating bract-like sheaths. Bracts oblong-lanceolate. acute, conduplicate-concave, striate, 5 lin. long. Sepals oblong-lanceolate, acute, 5–6 lin. long, closely striate-nerved and subcoriaceous. Petals linear-lanceolate, acute or acuminate, in texture like the sepals, 4 lin.

long. Lip obscurely 3-lobed, 3 lin. long; lateral lobes erect, obtusely rounded, front lobe reflexed, lanceolate, acute, crest linear, fleshy, equalling lateral lobes. Column clavate, 2½ lin. long.

Yungas, 1890 (457). Alzo Brazil, near Rio Janeiro, Glaziou, n. 11612, 20513; Prov. Minas, Glaziou, n. 20512; Organ Mountains, Miers.

Near *M. acuminata* Lindl., but a far smaller plant in every respect. I fail to identify this well marked species with any published description, though being also a Brazilian species I expected to find a name for it.

Camaridium longibracteatum Lindl. Pl. Hartw. 154. Yungas, 1890 (478).

CAMARIDIUM BOLIVIENSE Rolfe n. sp.

Stems erect, somewhat elongated, leafy. Pseudobulbs 1–1½ in. distant, lanceolate-oblong, ¾–1 in. long, apex 2-leaved, base about 4 to 6-leaved. Leaves erect, linear, obtuse, unequally bidentate, 2–3½ in. long, 1–1½ lin. broad, their bases broader, sheathing and imbricating. Flowers axillary, solitary, peduncles but little exserted from sheaths. Bract lanceolate, acute, 5–6 lin. long. Sepals oblong, acute, 5 lin. long. Petals linear-oblong, 5 lin. long. Lip linear-oblong, acute, entire, with a rather obscure oblong callus in the centre. Column clavate, 3 lin. long.

Yungas, 1890 (636).

Allied to *C. arbuscula* Lindl. and *C. Lawrenceanum* Rolfe, and about intermediate between them in habit.

DICHAEA HAMATA Rolfe n. sp.

Stems erect, somewhat branched below, 5–7 in. long, leafy. Leaves distichous, lanceolate-linear, acute, somewhat recurved, ¾–1 in. long. Flowers axillary, slightly exserted from leaf-sheaths. Bracts ovate, acuminate, 2 lin. long. Sepals ovate-oblong, acute, 2 lin. long. Petals rather smaller than sepals, but otherwise similar. Lip as long as petals, basal half cuneate, apical half as broad as the lip's length, apex broadly rounded and apiculate, obscurely denticulate, and terminating behind on either side in a sagittate appendage; crest absent, but base of lip rather fleshy. Column very short. Fruit 2–2½ lin. long, setose-echinate.

Yungas, 1890 (602).

Allied to *D. graminifolia* Lindl. The lip is very curious, being somewhat hooked on either side and anchor-shaped.

Ornithidium giganteum Lindl. Capi, Mar. 1890 (764).

Odontoglossum rigidum Lindl. Vic. Cochabamba, 1891 (744).

Oncidium Rusbyi Rolfe n. sp.

Leaves linear-lanceolate, acute, 15 in. or more long. Panicle much elongated, branches 2–5 in. long, flexuose. Bracts broadly triangular-ovate, subobtuse, conduplicate, 2½ lin. long. Pedicels 8–11 lin. long. Sepals unguiculate, acuminate, undulate; dorsal one 3½–4 lin. long, with ovate-oblong limb; laterals 5–5½ lin. spreading, with linear-oblong limb, unguis united for a short distance at the base. Petals unguiculate, 3–3½ lin. long, limb ovate-oblong, acuminate, undulate. Lip entire, 3½ lin. long by nearly as broad; broadly trulliform-ovate, sides somewhat reflexed, apex suddenly attenuated, triangular, recurved; crest large, 5-lobed, the three terminal lobes subequal. Column 1½ lin. long, stout, apex somewhat reflexed; wings short, broadly rounded.

Yungas, 1890 (460).

A species belonging to the group Microchila cimicifera, and allied to *O. Trulla* Reichb. f., though different from every other in the shape of the bracts.

Brassia thyrsodes Reichb. f. Gard. Chron. 1868: 842 (*ex descr.*)
Yungas, 1890 (607).

Sobralia violacea Lindl. Yungas, 1890 (391 and 576).

Altensteinia Weddelliana Reichb. f. Xen. Orch. 3: 19. Talca Chugiaguilla, Apr. 1890 (819).

Altensteinia boliviensis Rolfe n. sp.

Leaves lanceolate, acute or subacute, 6–10 in. long, 1¼–1½ in. broad. Scapes 10–18 in. long. Spikes 4–5 in. long, dense. Bracts ovate or ovate-lanceolate, acute, 4–6 lin. long. Sepals lanceolate-oblong, obtuse, 3 lin. long. Petals linear, obtuse, 3 lin. long. Lip elliptical, obtuse, the margin fimbriate in numerous short appendages, 4 lin. long. Column 2½ lin. long.

Yungas, 1890 (820).

Allied to *A. fimbriata* H. B. et K., but a less vigorous plant, with distinctly smaller flowers.

Spiranthes Bangii Rolfe n. sp.

Roots fascicled, stout. Leaves cauline, lanceolate, acute, 4–6 in. long, ¾–1 in. broad, gradually reduced upwards into the bracts. Scapes 1¼–2½ ft. long, spikes 4–9 in. long. Bracts lanceolate or ovate-lanceolate, acuminate, 5–10 lin. long. Dorsal sepal oblong-lanceolate, subobtuse, concave, pubescent, 3½ lin. long; lateral ones lanceolate, subacute, 3½ lin. long. Petals lanceolate, subobtuse, equalling the dorsal sepal, with which they form a cucullate hood. Lip somewhat recurved, lanceolate-oblong, obtuse, crispo-undulate, its base united to the sides of the column and somewhat saccate, 3½ lin. long; disc somewhat verrucose-reticulate. Column 1½ lin. long.

Songo, 1890 (920).

Allied to *S. plantaginea* Lindl.

SPIRANTHES YUNGASENSIS Rolfe n. sp.

Roots fascicled. Leaves cauline, oblong-lanceolate, acute, 3 in. long, 8–10 lin. broad, gradually reduced upwards into the bracts. Scapes pubescent, 1¼ ft. long, spikes 3 in. long. Bracts linear-lanceolate, acuminate, 8–10 lin. long. Sepals pubescent, dorsal one oblong-lanceolate, subacute, 5 lin. long; lateral ones lanceolate-acuminate, 5 lin. long. Petals lanceolate, acute, the inner margin appressed to the dorsal sepal, and thus forming a cucullate hood. Lip somewhat recurved, oblong, obtuse, somewhat undulate, 4½ lin. long, margins united to column, base adnate to ovary, saccate. Column 3½ lin. long.

Yungas, 1890 (451).

Closely allied to *S. hirta* Lindl.

Habenaria hexaptera Lindl. Gen. & Sp. Orch. 316. Yungas (582).

Habenaria maculosa Lindl. Gen. & Sp. Orch. 399. Vic. Cochabamba (1239).

SCITAMINEAE.

Costus spicatus (Jacq.) Swartz, Prod. Veg. Ind. Occ. 11: (*Alpinia spicata* Jacq. Select. Stirp. Amer. Hist. *pl. 1*). Songo, Nov. 1890 (912).

Stromanthe spectabilis Lem. Jard. Fleur. 4: *pl. 401*. Yungas 1890 (513).

STROMANTHE AUGUSTIFOLIA sp. n.

Roots densely long white-hairy; culm slender, angled and finely many-striate, scurfy-tomentose on one side, especially below the bluish nodes; sheaths of the lower leaves 4 dm. long, broad and sheathing below, gradually narrowed above and becoming separate and terete, finely and sharply many-ribbed, above sparsely pilose and scurfy, the blades elongated, in the dry much involute condition only about 5–10 mm. broad, glabrous, light-green, finely and beautifully transverse-striate, the straw-colored mid-rib strong and prominent; peduncles very slender, erect or erect-spreading, the lower reaching 5 dm. in length; bracts indigo-blue at the base, exceeding their branches, acute; rhachis and branches strongly hollowed on the side next the flower, with nodose axils; outer bractlets indigo-blue, at least when young, 1.5–3 cm. long, 3–5 mm. broad in the folded condition, very finely many-nerved, acute or obtuse, when opened 1–1.5 cm. broad, oval, the inner colorless, hyaline and successively smaller; bud 6–7 mm. long; flowers very short-pedicelled, the brown ovary 1 mm. long, turbinate, truncate, strongly tuberculate, the tubercles in 10 rows; sepals similar to the inner scales, 7 mm. long, 4.5 mm. broad, oval, elliptical; petals purple-blue, 6 mm. long, 2–5 mm. broad; lip 5 mm. broad, triangular-obovate, irregularly about 5-lobed, one lobe yellow, antheroid, the inner face at one edge appendaged with a thick gland; anther oval-oblong, 1 mm. long, its filament posteriorly appendaged near the summit with two membranaceous oblong lobes; stigma thickened, cupulate, oblique, its style much flattened.

Songo, Nov. 1891 (874).

Heliconia hirsuta L. f., var. *cannoidea* (Richard) Baker, Annals of Botany, 7: 197. Yungas, 1890 (411).

BROMELIACEAE.*

Pitcairnia consimilis Baker, Journ. Bot. **19**: 269 (1881). Vic. La Paz, 10,000 ft. 1890 (152)=Rusby's 2847.

Pitcairnia (*Puyopsis*) sp. near *P. coerulea* Benth. Songo, Nov. 1890 (892).

Pitcairnia (*Phlomostachys*) sp. near *P. Funkiana* Regel. Yungas, 1890 (592).

Tillandsia usneoides L. Sp. Pl. 287. Vic. La Paz, 10,000 ft. 1889 (107).

Tillandsia propinqua Gay, Fl. Chile, **6**: 15. Vic. La Paz, 10,000 ft. 1889 (123).

Tillandsia sphaerocephala Baker, Journ. Bot. **26**: 141 (1888). Vic. La Paz, 10,000 ft. 1889 (159).

TILLANDSIA (PLATYSTACHYS) BOLIVIENSIS Baker sp. n.

Foliis dense rosulatis, e basi ovata lineari-acuminatis, dorso dense albido-lepidotis, pedunculo brevi, spica simpli oblonga, bracteis floralibus ovato-navicularibus glabris, calyce bractea paulo breviori sepalis lanceolatis glabris dorso convexis.

Folia 6–8 poll. longa, bractea 12–15 lin. longa. Vic. La Paz, 10,000 ft. 1890 (159a). Near *T. canescens* Sw. and *T. achyrostachys* E. Morren.

* Kindly determined by Mr. J. G. Baker.

IRIDEAE.

Sisyrinchium iridifolium H.B.K. Nov. Gen. 1: 324. Yungas, 1890 (623). Vic. Cochabamba, 1891 (999)? = Rusby's 695.

Sisyrinchium alatum Hook. Ic. Pl. *pl. 219.* Yungas, 1890 (623a).

AMARYLLIDEAE.*

ZEPHYRANTHES XIPHOPETALA Baker sp. n.

Bulb globose, 1¼–1½ in. diam.; outer tunics brown, membranous; leaves not seen, probably not developed at the same time as the flowers; peduncle ½–1 foot, bearing a single subsessile erect flower; spathe white, membranous, 1-valved, under an inch long; perianth erect, infundibuliform, bright yellow, 1½–2 in. long; tube ⅓ in. long, cylindrical below the dilated apex; segments lanceolate, ⅙ in. broad at the middle, narrowed gradually to an acute apex; stamens about half as long as the perianth-lobes; anthers curling up spirally; style deeply trifid, overtopping the anthers.

Vic. Cochabamba, 1891 (890).

The only other species known with a sessile flower and trifid style is *Z. verecunda* Herb. in Bot. Mag. *pl. 2583* = *Z. sessilis* Herb., a Mexican species with white flowers.

Elisena ringens (R. & P.) Herb. Amaryll. 201 (?) (*Pancratium ringens* R. & P. Fl. Per. 3: 53. *pl. 283.*) Songo, Nov. 1890 (918). Specimens too incomplete for positive determination.

Bomarea multiflora (L.) Mirbel, Hist. Nat. Pl. 9: 72 (1804). Yungas, 1890 (593, 723 and 724).

Bomarea edulis (Tussac) Herb. Amaryll. 111. Yungas, 1890 (593a) = Rusby's 568.

Bomarea acutifolia (Link & Otto) Herb. Amaryll. 112. Yungas, 1890 (593b) = Rusby's 599.

Bomarea Herbertiana Baker, Handb. Amaryll. 155 (*B. formosissima* Herb. et Benth., not [R. & P.] Griseb.) Yungas, 1890, (724b).

LILIACEAE.

Asphodelus fistulosus L. Sp. Pl. 309. Vic. La Paz, 10,000 ft., 1889 (133).

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* Kindly determined by Mr. J. G. Baker.

Nothoscordum andicolum Kunth, Enum. : 463. Vic. La Paz, 10,000 ft., 1889 (187).

COMMELINACEAE.

Commelina gracilis R. & P. Fl. Per. **1**: 44. *pl. 72. f. a.* Yungas, 1890 (463).

Commelina elliptica H.B.K. Nov. Gen. **1**: 259 (*C. variabilis* Schlecht.) Capi, Mar. 1890 (782) = Mandon's 1241 and Rusby's 848.

Dichorisandra Aubletiana Schult. f. Syst. **7**: 1181. Yungas, 1890 (509).

Tinantia fugax Scheidw. Allgem. Gart. **7**: 365 (1839). Yungas, 1890 (289 and 733).

Tradescantia multiflora Sw. Prod. Veg. Ind. Occ. 57. Yungas, 1890 (603) = Rusby's 1369.

JUNCACEAE.

Juncus andicolus Hook. Ic. Pl. *pl. 714.* Vic. La Paz, 10,000 ft. 1889 (89).

Juncus brunneus Buchen. in Bremen Abh. **6**: 403 (1879). Vic. La Paz, 10,000 ft. 1889 (73).

Juncus Chamissonis Kunth, Enum. **3**: 348. Vic. La Paz, 10,000 ft. 1889 (116) = Rusby's 181.

PALMAE.*

Geonoma baculifera Kunth, Enum. **3**: 233. Songo, Nov. 1891 (877).

AROIDEAE.

Caladium sp., apparently undescribed, but material insufficient. Songo, Nov. 1890 (920).

Xanthosoma roseum Schott, Oest. Bot. Zeitsch. 1858: 178.

CYPERACEAE.†

Cyperus Meyenianus Kunth, Enum. **2**: 49. Yungas, 1890 (263).

Cyperus flavomariscus Griseb. Pl. Lorentz. 264 (in reprint paged 217). Yungas, 1890 (410).

Cyperus ferax Rich. Act. Soc. Hist. Nat. Par. **1**: 106 (1792). Yungas, 1890 (529).

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* Determined by Mr. Charles Wright.

† Species marked by an asterisk determined by Mr. C. B. Clarke.

Cyperus Luzulae Rottb.; Willd. Sp. Pl. **1**: 276. Yungas, 1890 (531).

Cyperus Martianus* Schrad.; Nees in Mart. Fl. Bras. **2: 32. Yungas, 1890 (528).

Cyperus laevigatus* L. Mant. **2: 176 (*C. reptans* Boeck. fide Clark). Vic. La Paz, 1890 (186).

Cyperus phaeocephalus* Griseb. Goett. Abh. **19: 264. Vic. La Paz, 10,000 ft. 1889 (95 and 95a) = Spruce's 5904.

Cyperus seslerioides* H.B.K. Nov. Gen. **1: 209. Vic. Cochabamba, 1891 (995).

Kyllingia odorata* Vahl, Enum. **2: 382. Yungas, 1890 (581).

Eleocharis albibracteata* Nees et Meyen; Kunth, Enum. **2: 143. Vic. La Paz, 10,000 ft. 1889 (71a).

Eleocharis montana* Roem. & Sch. Syst. **2: 153. Vic. La Paz, 1890 (144). Vic. Cochabamba, 1891 (996).

Dichromena nervosa Vahl, Enum. **2**: 241. Yungas, 1890 (251) = Rusby's 109.

Fimbristylis laxa Vahl, Enum. **2**: 292. Yungas, 1890 (530) = Rusby's 71.

Stenophyllus capillaris (L.) Britton, Bull. Torr. Bot. Club, **21**: 30. Yungas, 1890 (306).

STENOPHYLLUS SPHAEROLEPIS (Boeck.) Britton. (*Scirpus sphaerolepis* Boeck.) Yungas, 1890 (432).

Scirpus asper* Presl, Rel. Haenk. **1: 194. Capi, Mar. 1890 (765).

Scirpus cernuus* Vahl, Enum. **2: 245. Vic. La Paz, 10,000 ft. 1889 (71).

Scirpus Americanus Pers. Syn. **1**: 68. Vic. Cochabamba, 1891 (997).

Rynchospora glauca* Vahl, Enum. **2: 233. Yungas, 1890 (433).

Rynchospora globosa (H.B.K.) R. & S. Syst. **2**: 89. Vic. Cochabamba, 1891 (873).

**Pleurostachys Urvillei* Brongn. Duperr. Voy. Bot. 173. *pl. 31.* Vic. Cochabamba, 1891 (871).

Scleria pleostachya Kunth, Enum. **2**: 355. Yungas, 1890 (203).

Scleria bracteata Cav. Ic. **5**: 34. *pl. 457.* Yungas, 1890 (262).

Carex festiva Dewey, Am. Journ. Sci. **19**: 246 (1835). Vic. La Paz, 10,000 ft., 1889 (62).

GRAMINEAE.

(Report expected from Mr. F. L. Scribner.)

MARSILEACEAE.

Azolla Caroliniana Willd. Talca Chugiaguilla, Apr. 1890 (790).
Azolla filiculoides Lam. Vic. Cochabamba, 1891 (983).

SELAGINELLACEAE.

Selaginella Poeppigiana Spreng. Yungas, 1890 (577) = Rusby's 452.
Selaginella Moritziana Spreng. (?) Yungas, 1890 (440).
Selaginella mnioides A. Br. Songo, 1890 (909) = Rusby's 460.

LYCOPODIACEAE.

(Communicated by Mrs. E. G. Britton.)

Lycopodium complanatum L, Yungas, 1890 (395).
Lycopodium cernuum L. Yungas, 1890 (396) = Rusby's 447.
Lycopodium tenuifolium L. Yungas, 1890 (637) = Rusby's 449.
Lycopodium reflexum Lam. Yungas, 1890 (638).
Lycopodium clavatum L. Yungas, 1890 (320).

FILICES.

(Communicated by Mrs. E. G. Britton.)

Gleichenia pubescens H.B.K. Yungas, 1890 (303).
Cyathea Schansin Mart. Yungas, 1890 (562).
Alsophila pubescens Baker. Yungas, 1890 (563) = Spruce's 4712.
Alsophila pruinata Kaulf. Yungas, 1890 (484).
Woodsia mollis J. Sm. Yungas, 1890 (302).
Woodsia Peruviana Hook. Songo, 1890 (878) = Rusby's 338.
Hymenophyllum ciliatum Sw. Yungas, 1890 (436 and 349 p. p.) = Rusby's 135. Songo, Nov. 1890 (904).
Hymenophyllum protrusum Hook. Yungas, 1890 (349b) = Rusby's 186.
Hymenophyllum crispum H.B.K. Songo, Nov. 1890 (900) = Spruce's 4693.
Hymenophyllum axillare Sw. Songo, Nov. 1890 (902) = Pearce's 243, Lechler's 2250, Spruce's 5420, and Couthoy's 65 from Quintensian Andes, 1853.

Hymenophyllum polyanthos Sw. Songo, Nov. 1890 (897 and 903) = Rusby's 183 and (?) Spruce's 4696.

Hymenophyllum tenerrimum V. D. B. Songo, Nov. 1890 (with 899) = Spruce's 4702.

Hymenophyllum microcarpum Desv. Yungas, 1890 (555) = Rusby's 137.

Trichomanes crinitum Sw. Songo, Nov. 1890 (906), ex. descr.

Trichomanes crispum L. Songo, Nov. 1890 (898) = Rusby's 184.

Trichomanes rigidum Sw. Songo, Nov. 1890 (899).

Trichomanes reptans Sw. Yungas, 1890 (with 555).

Trichomanes radicans Sw. Yungas, 1880 (555).

Lindsaya stricta Dry. (?) Songo, Nov. 1890 (905), ex. descr.

Adiantum decorum Moore. Vic. La Paz, 10,000 ft. 1889 (112).

Adiantum Aethiopicum L. Yungas, 1890 (559).

Adiantum cuneatum L. f. Yungas, 1890 (211).

Cheilanthes pilosa Goldm. Yungas, 1890 (564).

Pellaea ternifolia Fee. Vic. La Paz, 10,000 ft. 1889 (91). Talca Chugiaguilla Apr. 1890 (817).

Pteris pedata L. Yungas, 1890 (212)=Rusby's 112.

Lomaria Boryana Willd. Yungas, 1890 (663).

Blechnum asplenioides Sw. Yungas, 1890 (435)=Rusby's 315.

Asplenium fragrans var. *foeniculaceum* Kaulf. Yungas, 1890 (662)=Rusby's 392.

Nephrolepis exaltata Schott. Yungas, 1890 (291)=Rusby's 411.

Polypodium aureum L. Yungas, 1890 (362).

Polypodium aureum L., var. *areolatum* Eaton. Yungas, 1890 (378).

Polypodium glaucophyllum Kunze. Yungas, 1890 (437).

Polypodium serrulatum Mett. Yungas, 1890 (561). Songo, Nov. 1890 (907 a)=Rusby's 368 and 369.

Polypodium suspensum L. Yungas, 1890 (483)=Rusby's 375.

Polypodium cultratum Willd. Yungas, 1890 (556).

Polypodium subsessile Baker. Yungas, 1890 (557)=Rusby's 379.

Polypodium Plumula H.B.K. Songo, Nov. 1890 (901)=Rusby's 366 and 367.

Polypodium piloselloides L. Yungas, 1890 (734).

Polypodium rigescens Bory. Songo, Nov. 1890 (901 c)=Spruce's 5279.

Polypodium taeniosum Willd (*P. angustifolium* Sw.) Vic. La Paz, 10,000 ft., 1889 (140).

Polypodium apiculatum Kunze. Songo, Nov. 1890 (901b).

Notholaena sinuata Kaulf. Talca Chugiaguilla, Apr. 1890 (786).

Notholaena ferruginea Hook. Yungas (205). Talca Chugiaguilla, (787). La Granga (752) = Rusby's 332, 333, 335 and 336.

Monogramme graminoides Baker, Syn. Fil. 375. Songo, Nov. 1890 (907b).

Gymnogramme calomelanos Kaulf. Yungas, 1890 (244).

Gymnogramme angustifrons Baker. Yungas, 1890 (693).

Gymnogramme tartarea Desv. Yungas, 1890 (305).

Gymnogramme retrofracta Hook. & Grev. Yungas, 1890 (661) = Rusby's 128.

Meniscium serratum Cav. Yungas, 1890 (554) = Rusby's 412.

Vittaria stipitata Kunze. Yungas, 1890 (353) = Rusby's 340.

Acrostichum cuspidatum Willd. Yungas, 1890 (434a).

Acrostichum latifolium Sw. Yungas, 1890 (434).

ACROSTICUM MOOREI E. G. Britton sp. n.

Rhizomes slender, purple, sparsely beset with brown scales and fibrillose radicles; sterile fronds 3–5 inches long, pinnately divided almost to the midvein into 18–20 slender bifurcating segments; stipes 2–3 inches long, grooved and sparingly beset with lower scales; fertile fronds on longer stipes, 3–4 inches long, blade short, less than 1 inch long by ¼ inch broad, crenately lobed with 6 or 8 shallow sinuses on each side.

Yungas, 1890 (558).

Belonging to the section Polybotrya H.B.K., differing from its nearest ally, *A. bifurcatum*, in having the fertile frond almost entire, not pinnately parted, and the rhizome more slender and creeping, less tufted in habit.

Collected also by W. Lechler, near Sachapata, on trunks of trees, and distributed as No. 2609, Plantae Peruvianae. Seen at Kew in Thomas Moore's fern herbarium, labelled "*Indeterm.* Mett. n. sp.?"

Anemia tomentosa Sw. Yungas, 1890 (304) = Rusby's 118.

Anemia tomentosa var. *fulva* H.B.K. Yungas, 1890 (438).

Anemia tomentosa var. (?). Yungas 1890 (439).

Lygodium venustum Sw. Yungas, 1890 (560) = Rusby's 144.

MUSCI.

(Communicated by Mr. Charles Wright.)

Sphagnum acutifolium Ehrh. Yungas, 1890 (481 and 569).

Pogonatum tortile Swz. Songo, Nov. 1891 (908).
Polytrichum juniperinum Hedw. Yungas, 1890 (280).
Bryum Beyrichianum C. Müll (?). Yungas, 1890 (566).
Phyllogonium viscosum Mitt. Yungas, 1890 (565).
Thuidium delicatulum Lindberg. Yungas, 1890 (482).

HEPATICAE.

(Communicated by Mr. Charles Wright.)

Frullania atrata Nees. Yungas, 1890 (567).
Radula Xalapensis Nees et Mart. (?) Yungas, 1890 (511a).
Isotachis Sp. Yungas, 1890 (713, a).
Micropterygium vulgare Nees. Songo, Nov. 1890 (908a).
Marchantia polymorpha L. Songo, Nov. 1890 (910).
Reboulia hemispherica Raddi. Yungas, 1890 (605).

LICHENES.

(Communicated by Dr. J. W. Eckfeldt.)

Baeomyces imbricatus Hook. Yungas, 1890 (713).
Cladonia rangiferina (L.) Hoff. Vic. La Laz, 10,000 ft. 1889 (20, a).
Cladonia ceratophylla Eschw. (Sterile.) Yungas, 1890 (568).
Cladonia peltata Spreng. (Sterile.) Yungas, 1890 (570). (Kindly determined by Dr. H. Mueller.)
Peltigera canina Hoffm. Yungas, 1890 (296.)
Theloschistes chrysophthalmus (L.) Norm. Vic. La Paz, 10,000 ft. 1889 (135, a).
Usnea barbata (L.) Fr. Vic. La Paz, 10,000 ft. 1889 (135.
Stereocaulon virgatum Nyl. Vic. La Paz. 10,000 ft. 1890 (225).

FUNGI.

(Communicated by Mr. Charles Wright.)

Stereum caperatum Berk. Yungas, 1890 (295).

ALGAE.

(Communicated by Mr. Charles Wright.)

Rhizoclonium sp. (other Algae are also intermixed). Vic. La Paz, 10,000 ft. 1890 (164).
{ *Enteromorpha intestinalis* Link.
{ *Rhizoclonium* sp. Vic. La Paz, 10,000 ft. 1890 (166).

MEMOIRS

OF THE

TORREY BOTANICAL CLUB.

VOL. IV. NO: 4.

ARACHIS HYPOGAEA L.

BY ANNA STOCKTON PETTIT.

PLATES 83–85.

ISSUED JUNE 5, 1895.

MEMOIRS

OF THE

TORREY BOTANICAL CLUB.

Vol. IV. No. 4.

Arachis hypogaea L.*

By Anna Stockton Pettit.

(Plates 83–85.)

* Submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, in the University Faculty of Pure Science, Columbia College.

History.

The study of this plant was undertaken for the purpose of discovering, if possible, some additional facts concerning its habit of ripening fruit under ground. Other species of the Leguminosae are known to share this peculiarity with *Arachis*. Among the best known of these are *Vicia amphicarpa* and *Trifolium subterraneum*. *Vicia amphicarpa* bears two kinds of flowers and accordingly two forms of fruit, only one of which is developed under ground. The flower which gives rise to this fruit is formed and always remains underground. The other form of flower and fruit is developed normally, so that in this case the peculiarity of the plant lies as much in its underground flower as in its underground fruit, as the latter seems to be a natural sequence of the former.

Trifolium subterraneum bears but one kind of flowers. These are developed in heads. After flowering, the peduncle bearing the head sinks to the ground and, continuing to lengthen, pushes the head under the soil. The seeds will ripen above ground, and, according to Belli, if the heads are prevented from going into the earth, the seeds germinate easily if the integument is broken; otherwise the germination takes place with difficulty.

Differing essentially from both of these, *Arachis hypogaea* has but one form of flower which is sessile and remains so. It is a growth from the base of the ovary itself which is prolonged until the ovary is pushed into the ground. This growth is technically known as a gynophore. Ovaries which are hindered by any circumstance from reaching the ground do not produce fruit.

Seven species of *Arachis* are now recognized. These are: *A. pusilla*, *A. prostrata*, *A. villosa*, *A. glabrata*, *A. marginata*, *A. tuberosa* and *Arachis hypogaea*, all perennial with the exceptions of *A. hypogaea* and *A. pusilla*. Of these species six are found only in Brazil. The remaining one, *Arachis hypogaea* is cultivated at the present time throughout the warmer regions of the globe.

Little is known with certainty concerning the earlier history of *Arachis*. The fact that all but one of its species are confined to Brazil would seem an indication that it is a native of that country, and in fact De Candolle ascribes its origin to that place. Other authors think it to be a native of Africa, as its importance there as food is so great and its cultivation so general. Still others hold the opinion that it has a Japanese or Chinese origin. Opposing this opinion are the facts that no allusion is made to this plant in the older literature of those countries and that the fruit is not produced there in any great quantities.

Sloan, writing in the latter part of the sixteenth century, speaks of it as having been carried to the West Indies from Guinea in slave ships as food for the slaves, and says it was taken to Guinea from Peru. Oviedo, writing in 1547, describes *Arachis* under the name Mani and states that it is very common in the gardens of the West Indies. From the name Mani is derived the name which the plant now bears in Cuba, Mandubi or Mandobi. Jean de Lery, in 1578, writing a history of travel in Brazil, speaks of *Arachis* as Manobi. The author of the Noticia do Brasil (1589) speaks of the plant under the name Amandao (large Mandel). Rumph described the plant, giving it the name Chamaebalanus Japonicus. Parkinson, writing about 1648, described the American *Arachis* and called it Arachis hypogais Americanus.

It is estimated that the yearly production of peanuts in this country is about 4,000,000 bushels and that this constitutes about one-sixth of the production of the entire world. This amount is contributed almost entirely by Virginia, Georgia, Tennessee and North Carolina, Virginia ranking first in its production. Notwithstanding this large amount supplied to our market and the high nutritient value of the seed, the peanut is nowhere used in the United States as an article of food—as it is used in other countries. Some effort has been made, however, to show how valuable it would prove if so utilized. In Germany experiments have been made with reference to adopting it as an article of diet for the army; and it is said to be already in use there as a dietetic treatment for diabetes.

The following analysis is taken from statistics furnished by German authorities and will serve to show what valuable properties it posesses as a food constituent:

Water, . .	7.85	Fibre, . .	4.29
Ash, . . .	2.77	Fat, . . .	49.20
Protein, . .	29.47	Nitrogen,	4.67

The oil of this fruit is used as a substitute for olive oil, which it much resembles, and to which it is even sometimes preferred. It is also used as a lubricant and in the manufacturing of toilet soap.

Notwithstanding the fact that the fruit of *Arachis* formed so important an article of commerce and that, on account of its utilitarian value, it was so widely cultivated, it has been correctly described only in comparatively recent times.

Piso, writing in 1658, says only of the flower that it is small and yellow, and states that the fruit originates on the root-fibres. The later botanists up to the year 1805 all described the structure of the flower erroneously. The long stem-like calyx was assumed to be a flower stalk even by those botanists who had access to the living plants. In 1805 Poiteau published the first correct description of the structure of the flower. Robert Brown afterward confirmed Poiteau's description in the appendix to Tuckey's Narration of an Expedition to the Zaire, in 1816. Notwithstanding the work of Poiteau, Bentham as late as 1839 writes of *Arachis* as a plant with dimorphous flowers. One form, with calyx and corolla, which are always sterile, the fertile flowers having "neither calyx, corolla nor stamens, but from between two bracteolae, similar to those which are found at the base of the sterile flowers proceeds a stiff rigid stipe or torus, which is speedily reflexed and elongated, and is terminated by what appears to the naked eye a short point. Examined under a glass this point discloses at its extremity a truncated, somewhat concave and dilated stigma."

Hugh M. Neisler, acting upon the supposition that Bentham's statements were correct, made some observations upon the fructification of *Arachis* which convinced him that, in his own words, "The flowers of *Arachis* are all petal-bearing and all fertile." (Silliman's Am. Journal of Science and Art, 2d series, **19**: 1855). Bentham remained unconvinced and published a reply in Hooker's Journal of Botany and Kew Garden Miscellany, 7: 1855. It is difficult to understand how Bentham could have persisted in his mistake, as he did, in the face of so much evidence.

It requires no very expert examination of the plant to be convinced that what he mistook for a cleistogamic flower is the naked ovary after the flower parts have fallen away; and that what he describes as the sessile stigma of the barren ovary is the scar left by the deciduous style.

As to the affinities of *Arachis* no satisfactory conclusion is yet attained. Linnaeus placed it next to *Cicer;* Persoon, nearer *Anthyllis;* Jussieu, between *Ononis* and *Anthyllis.* De Candolle, classifying it according to the character of its embryo, place it among his *Geoffroyae,* but at the same time recognizing how little it conforms in other respects to these plants, suggested its forming together with *Voandzeia* a distinct tribe. Robert Brown says that *Arachis* and *Cercis* possess straight embryos in common with the Caesalpinieae and Mimoseae and in which respect they differ from all of the Papilionaceae. Bentham, adhering to his opinion that *Arachis* possessed dimorphous flowers, points out a resemblance to *Stylosanthes,* but finds an important difference from the group Hedysareae, of which *Stylosanthes* is a member, in the unarticulated legume. He finds *Arachis* not at all similar to *Voandzeia.* Pending a harmonizing of these conflicting opinions *Arachis* is usually accepted among the Papilionaceae.

General Description of the Plant.

Arachis hypogaea is a low annual plant, with one upright flowerless branch surrounded by decumbent spreading branches, upon which the flowers are borne. The stem is cylindrical and smooth, at the base becoming angular and slightly hairy above. The leaves are alternate and pinnate with two pairs of nearly sessile leaflets, the inferior pair of which are nearly elliptical and the superior pair are cuneate and noticeably larger. The leaflets are furnished with pulvini which comprise the entire stalklet (about 1 mm. in length). The primary petiole is also furnished with a pulvinus and with two adnate stipules which partly clasp the stem. The straight tap root gives off numerous lateral roots.

Nearly all of the roots examined bore quantities of the small tuber-like swellings which are a much discussed characteristic of the roots of the Leguminosae. These occur indifferently on the main and lateral roots.

The flowers develop in the axils of the leaves. They are sessile, but with a long calyx, which may easily be mistaken for a peduncle. This calyx varies from 3 to 14 mm. in length, is cylindrical, two-lipped, hairy and with two bracts at its base. The upper lip is two-toothed. The corolla is papilionaceous and yellow. The stamens are monadelphous and inserted in the calyx. They are ten in number and of two kinds, one with long two-celled anthers dehiscing laterally, and one with nearly spherical one-celled anthers.

The ovary is superior, small, conical and one-celled. The style is inserted a little to one side of the apex of the ovary. It is long, cylindrical, exceedingly slender, hairy for a short distance along one side from the stigma, and is terminated by a flat stigmatic surface. After fertilization the gynophore begins its growth. The flower parts fall off; sometimes the style may be seen as a brown hair-like appendage to the ovary after the flower falls. More frequently it is thrown off with the flower. The ovary becomes tipped with a hardened and brown point. The gynophore curves so that it points towards the earth. The growth of the gynophore continues until the ovary has penetrated the earth for some distance. The ovary then begins to swell to form the pod. The part of the gynophore under ground thickens and develops hairs from its epidermal cells which are in every way similar to root hairs.

The fruit develops only under ground. It is a one-celled pod bearing from one to three, or according to Kurtz, sometimes as many as seven seeds. The number is usually two. The pod is indehiscent. The seeds have a purplish brown membrane and no albumen. The embryo is straight. The large, fleshy cotyledons are furnished with pulvini and are exceedingly rich in oil.

General Observations on the Plants Studied.

The following study was made with plants raised during two successive summers in Englewood, N. J.; Lawrence, L. I., and in Potsdam and Buffalo, N. Y. In New Jersey and on Long Island the plants thrived and produced fruit. The seeds planted in richer soil in northern New York produced healthy looking, well-grown plants with flowers but no fruit developed. The plants grow best in a dry sandy soil, and a warm, at least temperate, climate. Under favorable conditions of weather fruit was obtained from seeds planted in Lawrence within two months. From two to three months is usually required. Plants of a crop raised in Lawrence when pulled up during the early part of October were found to bear a quantity of tubers on their roots. On other plants of the same crop examined in November no tubers were found.

In the nyctotropic movement of the leaves, which has already been described by Darwin in his "Power of Movement in Plants," the main petiole sinks downward; the leaflets twist downward and backward so that the lower surfaces of each pair are applied to each other. In this position they form a little packet shutting around the petiole, with the superior pair closed over the inferior and the tips pointing upward. The leaves vary their positions on the stem during the day in such a way as to keep their upper surfaces inclined toward the sun. When a leaf was separated from the stem so that the water supply was cut off while evaporation was going on it was discovered that the loss of water made itself apparent first in the upper half of the pulvinus of the leaflets.

When cut at night or at four p. m. the movement was quicker, probably because the water in the cells of the upper half of the pulvini had already begun to lessen in quantity. The leaves of some stems cut in the morning slept after about one-half hour; others slept at once. The leaves of stems cut on a hot day slept more quickly than those cut on a cool day; those cut at about four in the afternoon more quickly than those cut in the morning.

As the growth of the gynophore is solely for the purpose of pushing the ovary into the soil, its length is determined entirely by the distance of the flower from the ground. The gynophores in the axils of the lower leaves are much shorter than those above, as they reach the ground sooner; for the same reason the gynophores on the more decumbent branches are shorter than those on the more erect. Gynophores bearing fruit have been seen as short as five millimeters; they vary from that length to fifteen or sixteen centimeters, according to their position on the branch and the position of the branch in relation to the ground. That the only condition regulating the length of the gynophore is the distance of the ovary from the ground, was illustrated by the following fact:

One of the plants in a row was entirely removed, together with a portion of the earth about the roots, leaving a hole somewhat more than a foot in depth. A gynophore of a neighboring plant had grown down to the ground at this place and already attained a maximum length. As the ground around it was taken away, it was found after several days still growing down into the darkness and seeking the soil.

The angle which the gynophore forms with the stem is determined by the position of the stem. Accordingly it varies from a right to an acute angle, as the stem runs parallel with the ground or is inclined to an upright position.

The hairs are formed as soon as the gynophore reaches the soil, as all of the underground portion is thickened and bears hairs.

The growth of the gynophore under ground before the fruit begins to form also varies considerably. In a case where three gynophores developed from one axil, the underground portion of the oldest was 24 mm. long, the next 30 mm. and the next 55 mm. This represents the usual relation.

Flowers have been observed on the subterranean portion of the stem. These were perfect and, with the exception of being etiolated, similar in all respects to those above ground. They without doubt produce fruit, as gynophores were also observed which had developed entirely under the ground. This fact, together with the one that the parts of the flower fall off almost as soon as they open, gives evidence that the flower is close fertilized. In the course of its growth the gynophore grows as nearly perpendicularly as possible, apparently obeying the same law as the main root.

When the fruit begins to develop, the growth of the gynophore ceases. The first intimation that the fruit is about to form is a very slight swelling in the lower part of the ovary. As it develops, growth takes place more rapidly on one side than the other, so that the fruit is turned to one side with its length parallel to the surface of the ground. The lower seed, that is the seed next to the base of the ovary, grows to some size before the other begins its growth. (There are seldom more than two.)

Seeds were also kept germinating in the laboratory in sawdust during the two years of study. It was observed that after the root had grown about from one to two mm. in length, the epidermis would break in a circular line around its entire circumference. This happened invariably. This line marks the limit between the root and hypocotyl, as is shown by the change in the bundles at this point from radial to collateral. As the primary root grows it soon develops rootlets which appear in four regular longitudinal rows at an equal distance from each other. Neither the rootlets nor main root bear root hairs. Their surface is roughened and of a yellowish color, both appearances being due to tissue which scales off, the cast-off tissue being decidedly yellow. The etiolated hypocotyl is thick and fleshy and often much curved in its efforts to extricate the cotyledons from the shell. It frequently narrows down to a thinner portion near the cotyledons which is green. This thickening of the etiolated portion of the hypocotyl is of special interest for the following reason: Experiments have shown that the rule for stems growing in darkness is an abnormal growth in length and generally at the expense of the other two dimensions. In this instance the rule is reversed, and a similar case has been recorded by Kraus where the etiolated portion of the hypocotyl of a plant of *Lupinus Termis* was more than twice as thick as a normal hypocotyl. The shoot which develops from the plumule becomes the central upright stem of the plant.

Anatomy and Development of the Gynophore.

Longitudinal sections were made through young flower buds, at a stage before the formation of the egg in the embryo-sac, or at least, before its fertilization. The bud at this stage is almost microscopically small. The ovary may be described as sessile, though there are a few layers of cells between its cavity and the place of insertion of the succeeding organs, the stamens. The basal or lower part of its cavity is nearly rectangular in shape; the ovules are attached to the parietal placenta by short stems. The bundles passing through the base of the ovary, or that part which may be considered the stem, number from 11 to 13. They extend through to the tip of the ovary, branching more or less in their course.

They consist of ducts with closely wound spiral markings, accompanied by very delicate elongated cells in which individual characteristics cannot be determined. There is also a certain cluster of cells lying near each bundle on the side toward the centre of the organ. They are so near the bundle as to suggest some functional relation with it. These cells are large, prismatic in shape and filled with an orange colored substance; they correspond to those occurring frequently in the Leguminosae, which are known as tannin cells.

After the egg is formed and fertilized the rudimentary stem begins to elongate and develop into the gynophore. The development of the young embryo was not studied, but the ovary itself remains nearly in the condition now described until the gynophore completes its growth. This may be seen from the fact that it does not increase perceptibly in size, but its extreme tip elongates slightly and is sharpened to an almost hair-like point. While the anatomy of the gynophore corresponds to that of the stem of any herbaceous dicotyledon, its manner of development resembles that of ordinary roots, as there are no lateral appendages and consequently no internodes.

The cluster of meristematic or dividing cells which give rise to it consists of those lying just below the ovary. For convenience in description we may divide this cluster into three parts: first, those cells which give rise to the central cylinder and which lie immediately below the cavity of the ovary; second, those producing the bundle cylinder, and lastly, those outside both of these, which form the rind tissue, or the hollow cylinder outside the bundles.

The first class consists of several layers numbering from ten to twelve cells in diameter. The first division occurs in the second layer under the cavity, anticlinal walls being formed, but with no great regularity. Soon afterwards the cells lying about the circumference of the upper layer begin to divide, forming new walls in such a manner as to change the rectangular shape of the lower portion of the cavity, that is, the angles or corners become filled with cells and the whole cavity assumes the oval form which it has at maturity. From this time on the several layers below the ovary divide rapidly by the formation of anticlinal walls; the cells so derived constitute the pith.

It will be understood from the nature of the case that the second part of the meristematic cluster, or that giving rise to the bundle cylinder, consists of the elements of the bundles already present. These bundles form an almost unbroken ring around the cavity of the ovary and have already been described as extending through it to its extreme tip. It is easy to determine what part of the bundles is in a formative or meristematic condition by the immature appearance of the ducts and the extremely thin walls of all the other cells. Owing to the irregularity in the order of division of the cells forming the central cylinder it is not possible to say definitely that the meristem of the bundle coincides in depth with that giving rise to the central cylinder. It is, however, highly probable that such is the case.

The third part of the meristematic cluster, or that lying outside the bundle ring, is so irregular in its division that no definite limits can be fixed. It is easier to distinguish the new walls here than in the tissues of the bundles. They appear to arise with no order. It can only be said that the cells of the zone lying next the meristem of the central cylinder are capable of growth and division, and that they form new cells rapidly enough to keep pace with the growth within.

Anatomy of the Mature Gynophore.

Two distinct parts may be recognized in the completed gynophore: that above ground with a smooth even surface, and that below, whose surface bears the hairs. The surface of the aerial portion is flecked with numerous lenticels which open lengthwise. The epidermal cells of the aerial portion show, on a cross section, a nearly oval lumen with a longer tangential diameter. A long section shows the length of the cells to be about three times their tangential diameter. All the walls are slightly thickened. These cells are interrupted by occasional stomata occurring about three to a square millimetre.

The rind, or that part of the ground-tissue extending between the epidermal layer and the bundle-cylinder, is about eight cells in depth. These cells are thin walled, of a nearly circular appearance, seen in a cross section, and with frequent intercellular spaces. In a long section their length is seen to correspond with the epidermal cells.

About half way between the epidermis and the bundle-cylinder a row of cells of peculiar character occurs. They appear to have a much longer tangential than radial diameter. But on examining them carefully they are seen to be completely plasmolytic, the radial walls lying in folds, which gives the appearance spoken of above. This row of cells was constant in the sections of the aerial portion of the gynophores examined. This circumstance is extremely puzzling, as no explanation can be offered for the phenomenon of plasmolysis in cells so situated.

The bundles are arranged in a circle according to the type of dicotyledonous stems. Through the greater part of the length of the gynophore they are constantly thirteen in number, but at either end, that is near the fruit or near the stem, they vary from this, numbering sometimes more and sometimes fewer. The circle of bundles with the tissue between them may be described as a hollow cylinder enclosing the pith. The individual bundle is covered toward the periphery by a partial sheath which extends laterally no further than the bast. This sheath is composed of one layer of cells which are smaller than the cells of the parenchyma of the rind and nearly isodiametric, and their anticlinal walls are frequently oblique.

The outline of the bundle itself, as seen on a cross section, is oval with the smaller part toward the centre. The outer part of the bundle is occupied by a heavy cluster of bast cells, which is convex toward the rind and slightly concave on its inner side. The remaining elements of the phloem were not distinctly made out. The cambium consists of three or four layers of cells in depth, with nothing to distinguish it from cambium of ordinary collateral bundles.

The elements of the xylem are arranged according to the normal type. Following these elements radially from the cambium, first are found one or two reticulated ducts; after these come from one to several with annular markings; after these and next to the pith are one or two marked spirally. All of these ducts are very small in diameter; no porous ones were found. The libriform tissue is not well developed, the walls being hardly thicker than those of the surrounding parenchyma. Surrounding the reticulated ducts are small wood-parenchymatic cells.

It has already been said that the bundles are collateral and open. This statement requires some modification, as in the older portion of the organ the cambium of the bundles is no longer evident, its place being taken by differentiated phloem elements.

There is also an indication of the formation of a cambium ring. Such a ring never really occurs even in the oldest portion of the organ; but the bundles continue to develop both phloem and xylem elements until the ordinary method by which herbaceous stems accommodate themselves to this growth is no longer sufficient. This method, namely, the dilatation of the cells lying near the bundles, is beautifully illustrated here by the extreme size of the cells between the bundles. In the early stage of their development they are no larger than the cells of pith or rind, but as they become older they increase rapidly in both tangential and radial diameter.

This process, however, appears insufficient to keep pace with the growing cambium, and they now become meristematic, forming new walls which are at first tangential; later, radial walls are formed. In this manner arise clusters or bands of relatively small cells, extending from bundle to bundle. While these small cells appear like the ordinary meristematic tissue of stems whose cambium ring is formed after the bundles appear, they do not continue meristematic; at least, in the organs studied there was little evidence that these small cells produced lasting tissue of any kind, and none whatever of the formation of phloem and xylem elements. One or two other variations from the common type of dicotyledonous stems may be mentioned. For example, near the base of the organ, that is, near the point of its attachment to the stem, the cells described as dividing to form the small cells are like those of the pith, as shown by the markings of their walls. They lie also in such a position as to indicate their connection with the pith rather than the rind cells. Owing to this, the bands which they form appear to connect the xylem parts of the bundles rather than the cambium layer.

At the other extremity, or near the growing region, this is not so evident, though the beginning of the division of these cells was found in a section one centimeter from the fruit.

Near the inner extremity of each bundle is a group of cells which have been referred to above as resembling the tannin cells of the family Leguminosae. There are usually several of these in a cluster, so arranged as to form a semicircle in the transverse section, whose concave side is toward the bundle. In the long section they lie in continuous rows. They correspond in size and shape to the larger pith cells, and are conspicuous on account of their deep brownish-yellow color.

The pith is composed of cells which appear circular in a cross section, and in a long section are seen to be somewhat elongated like the other cells of the ground system. The cells composing the outer edge of the pith are of about the same diameter as those of the rind tissue, but they increase in size as the centre is approached. They are provided with numerous pores on the radial and periclinal walls; these are linear or slit-like, and are arranged with their long diameters running obliquely from right to left. On the anticlinal walls, instead of pores, markings very similar to those of reticulated ducts occur.

The anatomy of the subterranean part of the gynophore differs from that above ground in the following respects: (1st) Most of the epidermal cells grow out into long hairs. (2nd) A growth in thickness occurs by a process similar to that of periderm formation, by which the diameter of the subterranean part is considerably increased. (3rd) By the absence of plasmolytic cells in the rind described above.

Nearly all of the epidermal cells develop long thin-walled one-celled hairs. These average about .8 mm. in length and are from .002 to .02 mm. in the other two dimensions. They are slightly enlarged at the base, roundly obtuse at the end and filled with granular contents. No stomata were discovered in the underground portion, but their place was supplied by numerous lenticels.

The examination of a number of sections through this underground portion showed a row of phellogen cells extending around the stem, interrupted more or less in its regularity by frequent lenticels. Over that part of the surface where no lenticels occur three layers of cells had originated from the phellogen layer. By taking sections through a gynophore which has only begun to develop hairs, it is seen that this phellogen layer is the first layer of cells under the epidermis. The order of its development was not definitely determined, though there were indications that the first division was centrifugal and the two following centripetal. The diameter of the organ was thus increased by several layers of cells, as well as by the outward growth of the numerous lenticels. This latter fact also accounts for the unevenness of the surface of the subterranean portion. The cells derived from the phellogen retained the characteristic form and appearance of periderm. On testing for suberin, however, they were found to be entirely free from it, even in the older portions, when the hairs were beginning to die and separate from the cells below.

The cambium of the bundles throughout this portion was generally in an active condition, though it is not possible to state the exact portion of the organ where they lose their meristematic nature and change into phloem elements.

Experiments with the Hairs of the Gynophore.

Repeated experiments were made with plants bearing young gynophores which had not yet reached the ground when the plants were pulled up. Some were placed in a moist chamber and kept in the light; others were kept in darkness. In every case a narrow zone of hairs appeared in the course of about a week. This zone averaged three millimeters in length; its distance from the tip varied. On gynophores of stems kept in moist chambers in the light it was about eight millimeters; on those rolled in newspaper and kept but slightly moistened the zone of hairs was about one millimeter from the tip.

Schwarz states of his experiment with *Pisum sativum* that the hairs arising on the roots of plants raised in damp sawdust appeared between eight and thirteen millimeters from the tip, while those appearing on a plant of the same kind raised in dry earth, which offered more resistance than the sawdust, appeared from three to four millimeters from the tip.

In comparing the growth of gynophore hairs with that of root hairs it must be remembered that the growing point of the gynophore corresponding to the punctum vegetationis of the root lies just below the ovary which occupies the extreme tip of this organ. The ovary, however, is almost microscopically small and remains so during the growth of the gynophore. To illustrate the extremely small space occupied by it, the hairs which were not more than one millimeter from the tips of the gynophores as mentioned above were still below the growing point under the ovary. While this difference in the position of the growing point exists between root and gynophore, the difference which it makes in estimating the relative distances of the hairs from the tips is practically nothing.

The resemblance between these hairs and those of roots was further tested by repeated experiments in pulling young gynophores carefully from the soil. The minute portions of earth clung to the hairs and refused to be separated from them in the same manner as in the case of root hairs. In several instances these hairs were tested for acids and were found to respond readily to the litmus paper test.

Still another experiment was made which furnishes strong evidence that one function of the gynophore hairs corresponds to the chief function of those of the root. A large, well developed, thriftily growing plant was cut in such a manner as to separate the whole root system from the stems, but the latter were still connected with the ground by numerous well grown gynophores. The result was that the plant so treated after two weeks still presented nothing to a superficial inspection to distinguish it from others in its vicinity whose roots were left intact. Closer examination showed that some branches were dead; but the majority were putting out new leaves which appeared quite as strong and healthy as any of those on similar plants in the vicinity which were supported by roots. Unfortunately these experiments were begun late in the season, and the appearance of the frost prevented their continuance.

It is hoped that in a future and more prolonged study of this plant, numerous and varied experiments of this nature will furnish additional proof of the conclusion reached above, namely, that the principal function of the gynophore hair is to furnish a supply of food material for the use of the developing fruit. It is hardly necessary to add here that if the secondary function of the root hair is to hold that part of the root on which it grows firmly, and so to facilitate the penetration of its tip into the soil, the same function must also be ascribed to the hairs of the gynophore, as the conditions are the same in both cases.

Observations on the Root.

On the germination of the first seeds planted for study it was noticed that there was a rupture of the epidermal cells, extending around the circumference of the root at the line where it joined the hypocotyl. The layer of cells so broken curved backward from the place laid bare, showing that it had been subject to a positive tension exerted by the underlying layers, which was strong enough finally to produce the rupture. The portion of the root so exposed grew rapidly and turned a slightly yellow. It was thought at first that this peculiar conduct might de due to the abnormal circumstances under which the seeds germinated, as they were planted in a box of moist sawdust in the laboratory. To test this, seeds were planted under all available differences of condition; some in greenhouses under glass, in sawdust; others in the same place, but in moist earth. Seeds were planted in the open air in various localities referred to at the beginning of this article, but always with the same result. As soon as the seed began to germinate, the break in the epidermis appeared. A study of the development of the young embryo was then undertaken with the following results: The embryo in the seed was found to have a normally developed primary root. The disposition of its meristems corresponds to that ascribed to the roots of the Leguminosae. After germination the dermatogen ceases to develop new cells, while the other meristems continue to divide, the outer layers of the periblem tissue taking the place of an epidermis. As growth continues it appears that the outer layers do not keep pace with the inner, and cells of the surface are continually peeling off in rows or single layers many cells in length.

A cross section of a young root shows the outer layers of cells separating from the inner tissue and from each other by large intercellular spaces, and individual cells may be seen entirely isolated. In this view the peripheral three or four layers of the tissue of the cortex appear as an irregular zone, several cells deep, composed of cells which resemble the rest of the rind cells in shape, but which are much smaller.

These cells are thin walled like the remaining rind parenchyma, and are distinctly cutinized around their whole circumference. Thin sections as well as masses were placed in concentrated sulphuric acid. It was found that the walls of an outer portion, composed of these cells described, turned brownish yellow and remained intact, while the rest of the tissues of the parenchyma disappeared in a few hours. This cutinized portion was from two to three cells deep. The walls of the outer cells were entirely cutinized, while those of the cells next below these were cutinized on the side toward the circumference only.

The lateral roots show the same peculiar lack of epidermal tissue and, of course, no hairs appear. In other respects their anatomy resembles that of the ordinary dicotyledonous root. As they increase in age their outer surface is supplied with a regular periderm, and it is only in the early stages of growth that this peculiar habit may be observed.

Biological Considerations.

As the plant is only found under cultivation, at the present day, it is impossible to estimate in what degree its habits may have been influenced by its artificial surroundings. If, however, the changes induced by cultivation are generally in the direction of the inherent tendencies of the plant, emphasizing rather than changing such tendencies, the fact of cultivation would not enter largely into the question of the biology of *Arachis*.

The question of the course of the downward direction of growth of the gynophore has been answered by Charles Darwin, in his work on "The Movements of Plants." He says that while apheliotropism may act in some slight measure, geotropism is unquestionably the exciting cause of the downward movement. He gives as proof of this the fact that gynophores grew straight down when the light in the greenhouses entered from one side as well as from above. His conclusions were corroborated by the experiments with the gynophore hairs already described, as they served at the same time to exhibit the geotropism of the downward movement. The light came to these plants through one window at the side. When the tips of the gynophores were pointing downward, the position of the stems was so changed as to reverse the direction of the tips, causing them to point directly upward. In a very short time a curve was formed in the growing portion of the gynophore, just below the apex, bringing the tip again to its former position, that is pointing directly downward. There were also some slight indications of a tendency of these organs to curve away from the light.

Darwin also refers to the means by which the organ is enabled to force its tip into the ground and make its way through it. The sharp, smooth point of the gynophore, he says, would probably enable it to penetrate the ground by mere force of growth, but its action is aided by a circumnutating movement. In evidence of this, he gives the result of a number of observations where circumnutation plainly took place.

By the study of its anatomy several other interesting facts have been obtained. First, the arrangement of the vascular tissues is such as to point clearly to its adaptation to the movement of the organ. The bundles, as before stated, run singly throughout its whole length. Furthermore, they lie close together and are characterized by heavy bast strands. The bast serves to strengthen the gynophore while pushing its way into the soil; at the same time pliability is given by means of the separate bundles which allow a freedom of motion not possible when there is a continuous ring.

Another and much stronger feature is unquestionably that of the hairs which form near the tip of this organ whenever and wherever it reaches the ground and has projected its tip into it for a slight distance. By this means the part of the organ already grown is held firmly, while the growth near the apex forces the tip further and further into the soil.

In conclusion, it remains to be considered how much the facts ascertained in this study contribute to the solution of the question undertaken.

The fact that so many of the Leguminosae seek the ground in order to develop their fruit and that such different methods are employed in the accomplishment of this result must be regarded as having some important significance.

Tschirsch in an article on the root tubers of the Leguminosae, in the Berichte der Deutschen Bot. Ges. 1887, states that one group of nitrogenous compounds produced by the Leguminosae can be formed only in darkness and suggests this as a reason for the subterranean fruit of so many species of this order. This explanation does not answer the question satisfactorily, as *Trifolium subterraneum* plainly seeks to place its fruit under ground, and yet may both ripen and germinate it above ground. Beyond this the statement that some nitrates can only be formed in darkness does not meet with the concurrence of all authorities. It has also been suggested that the subterranean development of fruit is to enable it to avoid the danger of being eaten by grazing animals. These are the only reasons which have been offered in explanation of this phenomenon.

In reviewing the results obtained in this study, three facts stand prominently forth: namely, the absence of hairs on the root, the presence of hairs on the gynophore which may perform the chief function of root hairs, and lastly, the increased size of the subterranean part of the gynophore caused by a growth similar to that producing periderm.

While these facts alone are by no means sufficient to account for the underground development of the fruit they may at least furnish some evidence as to what is accomplished by this process. That the plant is able to take up water from the soil by means of the gynophore hairs was shown in the experiment where the roots were severed from the stem. The most puzzling feature in the anatomy of the gynophore is that of periderm formation in the portion under ground. In the large number of gynophores examined this was a constant feature of the subterranean portion, and it was never found in the part above, except as it may be considered represented by the lenticels.

As the walls of the new cells are never suberized it may be suggested that one possible reason for their formation is to increase the number of cells near the surface, where the water from the soil comes in through the hairs. Their small size, however, seems to refute this idea, and even were it admitted as a reason it would not account for the increase of cells occurring only below ground.

Why do they not increase during the entire length of the organ, and thus present a normal condition agreeing with the typical stem? Whatever may be the answer to this question, the increase in the number of cells *does* furnish an additional reservoir of some considerable size for the water flowing in from the hairs.

In regard to the roots it is a well-known fact that the few Angiosperms that are known to be without root hairs are either plants which grow from bulbs and, therefore, do not require much nourishment from the soil, or water plants whose epidermis takes the place of root hairs, or epiphytes which also have no use for these organs. *Arachis* differs from all of these, not only in its need of food from the soil, but in the fact that it lacks both root hairs and a normal epidermal covering on those portions of the root where the hairs should develop. This latter fact points to the possibility that through this it has lost the power to produce hairs, which at one time belonged to its ancestors.

If this be true, the purpose of the gynophore cannot be simply to secure more nourishment than can be supplied by the roots, for they have *lost the habit* of forming hairs, showing that no great demand for food supply has been made upon them. If the plant does not require more nourishment from the soil than might be supplied by root hairs and yet forms such hairs on the gynophore instead of the root, we are forced to the conviction that for some reason it is advantageous to it to take its supply of food from the gynophore rather than the root. What reason can there be but one which has for a motive the welfare of the seed?

It has already been suggested that the plant needs to secure its seeds against the danger of being eaten by grazing animals. If this were in fact the purpose it may be seen how the conditions discovered facilitate its accomplishment. The fruit is not developed until some time after the gynophore has reached the ground. The entire growth after the flower is formed is very rapid. If the fruit were first formed before a growth which pushed it under ground took place the chances for its safety would be much lessened. The fleshy cotyledons are both nutritious and pleasant to the taste and the seed is a favorite with many animals. The foliage of the plant is itself rich in nutritient properties and it is known to enrich the soil when used as a fertilizing agent.

If this were destroyed before the seeds were formed even after the ovaries were buried in the earth, the fruit could not perfect its growth unless provision were made whereby it could obtain and assimilate nourishment without the assistance of the leaves. Light is not necessary to the formation of proteids, and there is no reason to suppose that they may not be formed in an organ without leaves, if the necessary carbohydrates and nitrates are furnished.

The pith and other parenchymatic cells of the gynophore are stored with starch, and nitrates are obtained through the hairs. Therefore it is possible that if a growing seed were suddenly cut off from its normal supply of food by the destruction of the foliage, it would still be able to obtain a sufficient quantity to ripen it from the supplies in the gynophore.

The results so far obtained can only be taken as indications in favor of the second of the two hypotheses before mentioned. It is believed that actual proof, either for or against this hypotheses, may be obtained by a series of physiological experiments.

It is the intention of the writer of this paper to undertake such a series of experiments in the immediate future, believing that the results already obtained are such as to warrant the effort to carry the subject to a more satisfactory conclusion.

Explanation of Plates.

(PLATE 83.)

Fig. A. Portion of longitudinal section through the ovary of a young bud, showing cells bordering the lower side of the cavity of the ovary.

B. Diagramatic drawing of the same section; x–y corresponds with x–y in A.

C. Portion of longitudinal section through the ovary of the flower showing the beginning of the gynophore growth. The rectangular appearance of the cavity of the ovary has already disappeared. (Compare with A.)

D. Portion of a longitudinal section through the ovary after the falling off of the calyx. Next stage to C. Corresponds to A. N. of C.

E. Portion of cross-section through the aerial part of a mature gynophore; a, a row of plasmolytic cells.

F. Ovary with style still attached.

(PLATE 84.)

A and B. Portions of cross-sections through the underground part of a gynophore, showing first division of phellogen layer at a. In A is seen the beginning of hairs at b, c and d.

C. Portion of cross-section of subterranean part of gynophore, showing at a the dilatation and division of cells of ground tissue lying between the bundles.

D. Portion of cross-section of the root, showing the zone of cells about the circumference, marked sec. in fig. E; a is a cell which has entirely separated and a portion of its length is seen.

E. Diagramatic drawing of a segment of a cross-section of the root. The wood, zone is shown at x.

(PLATE 85.)

A. Showing hairs coming on a gynophore of a stem placed under a bell jar. After this gynophore was pointed downward the position of the stem was reversed so that the tip of the gynophore pointed upward. It is shown in the figure as it appeared when again pointing downward. The zone of hairs is seen at a.

B. A segment of a cross-section of gynophore, showing the hairs.

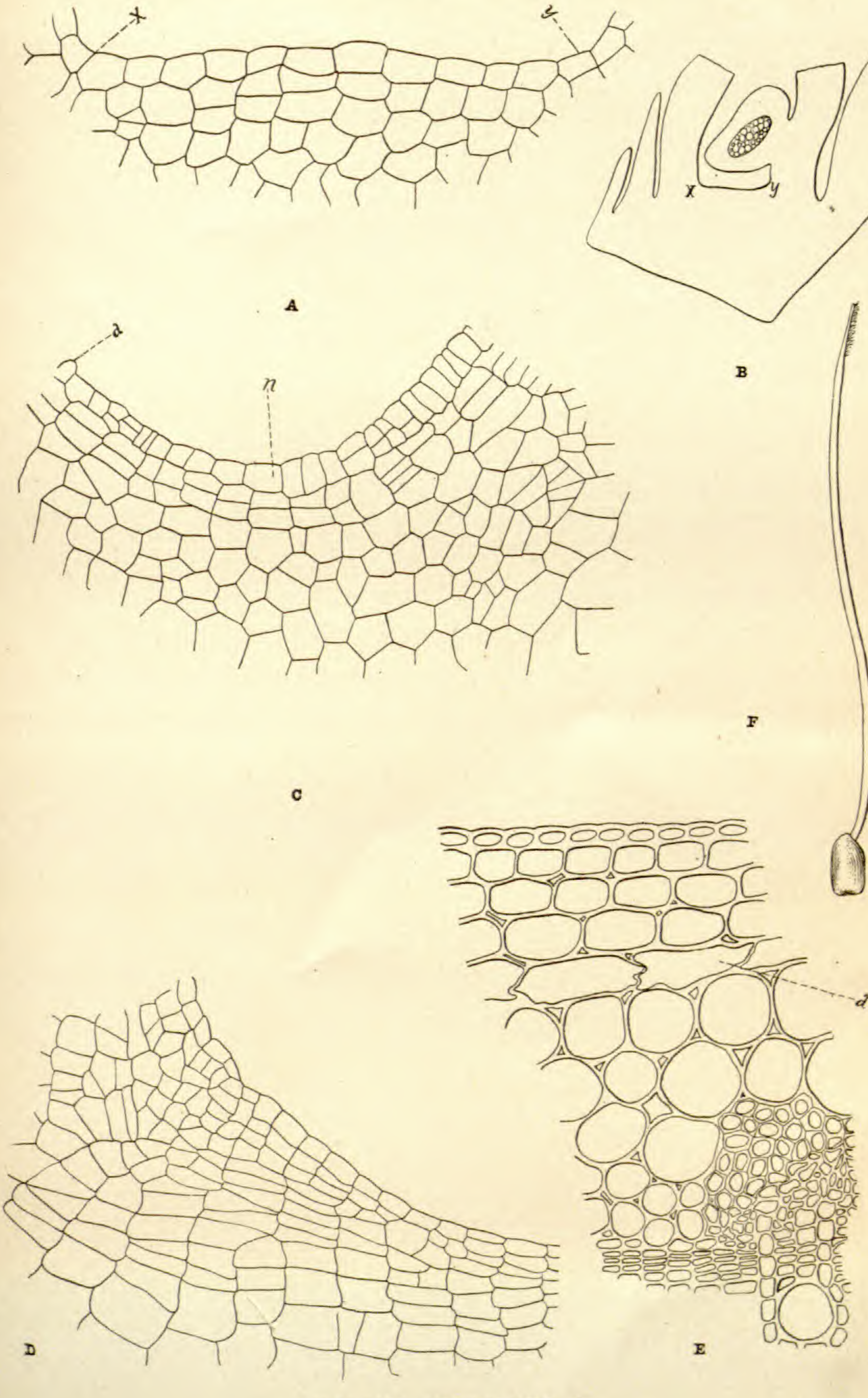
C. Diagramatic drawing of a cross-section of the older part of a gynophore showing the proportion of bast in the bundle. Shaded portions represent bast.

D. A germinated seed showing at a the line of rupture of the epidermis of the root.

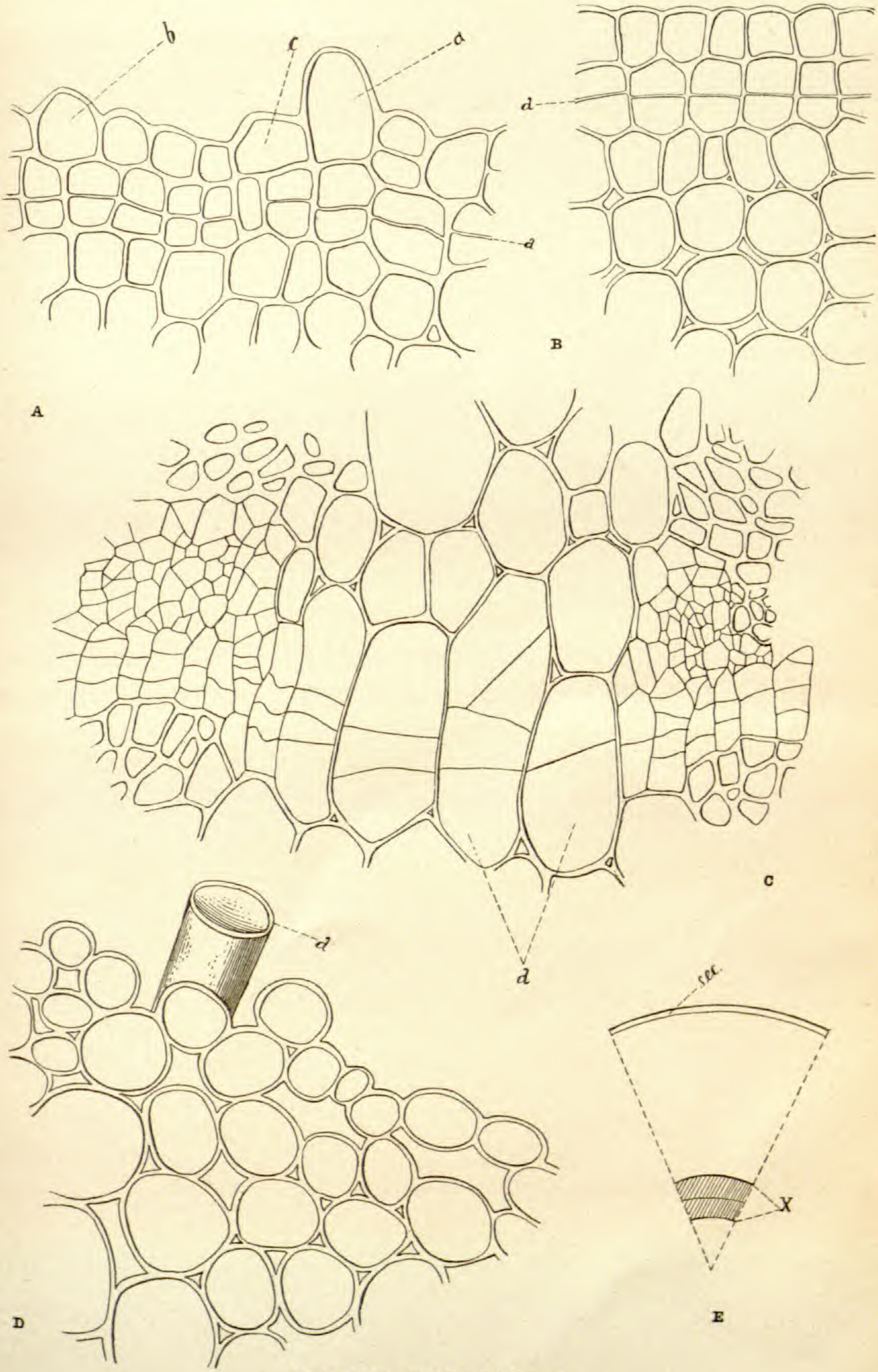
E. A gynophore with fruit just beginning to form. a—aerial part. b—subterranean part.

F. Gynophores bearing developing fruit.

G. A young gynophore which produced hairs while it was wrapped in a damp newspaper. a—zone of hairs.



ARACHIS HYPOGAEA L.



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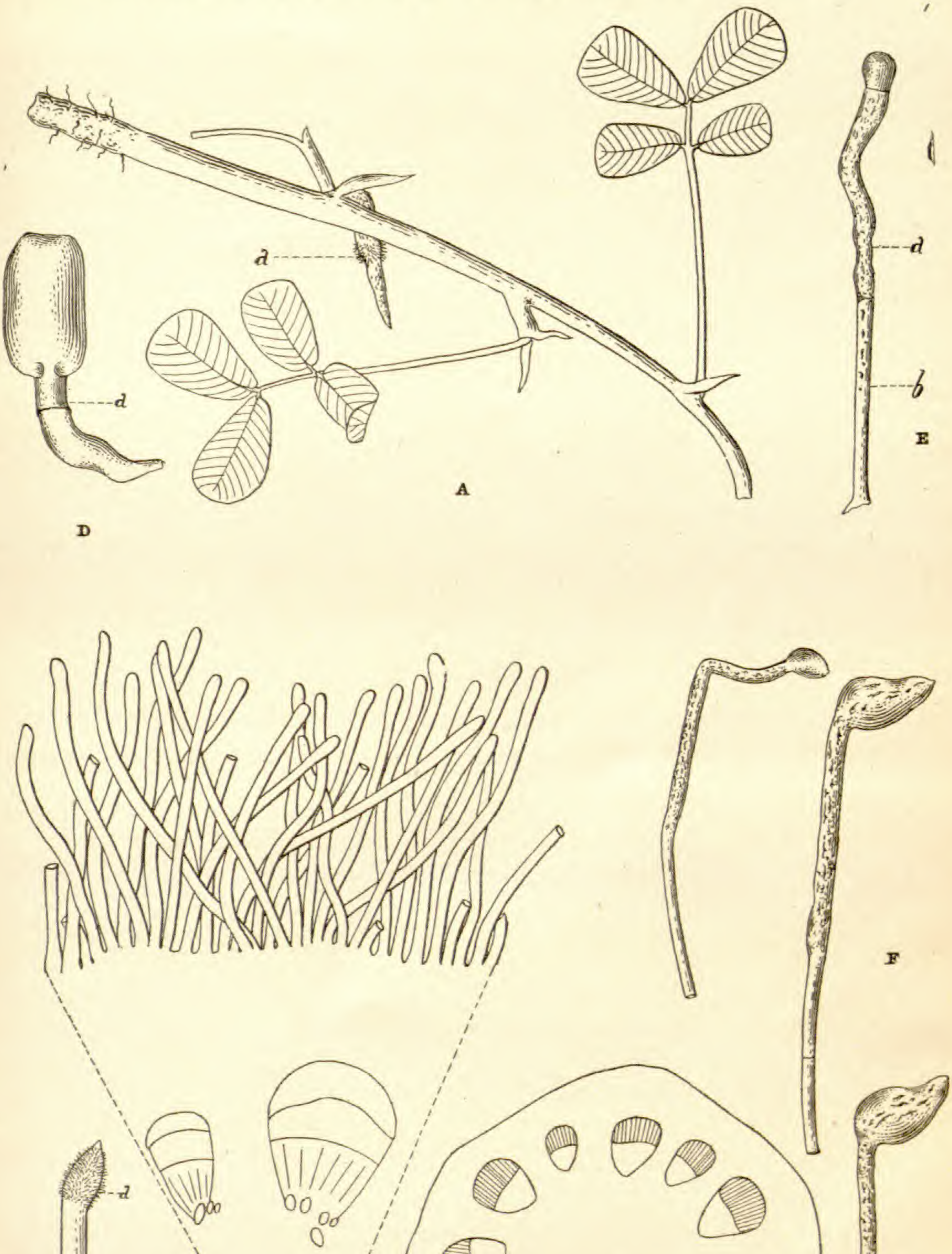

ARACHIS HYPOGAEA L.

MEMOIRS

OF THE

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ISSUED SEPTEMBER 15, 1896

PRICE, - - - 75 CENTS.

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The North American Species of Physalis and related Genera.

BY PER AXEL RYDBERG.

A revision of the genus *Physalis* is without doubt much needed. Any one who has tried, by means of our manuals, to identify the species growing in any part of the country, has failed more or less completely. Especially is this the case in the South and in the prairie states west of the Mississippi. The reason is not that the descriptions are so badly drawn, but that only about one-half of the actual number of species has, as a rule, been recognized. So, for instance, the State of Missouri has not less than 11 species, and Florida 13, while Gray's Synoptical Flora contains only 5 and 7 which are recorded as growing in those States respectively. And yet that work contains the best treatment of our native species. Even Nebraska was supposed to contain only two species and one variety. In 1891, when determining a collection made in the western part of that State for the United States Department of Agriculture, I came to the conclusion that the State had at least six good species. The plants were also determined afterwards by Mr. J. M. Holzinger. I was, however, satisfied neither with his determination nor with my own, and began from that time to study the genus, whenever I had any opportunity.

In 1894 I was called to Washington to prepare for publication the reports of two summers' field work done for the Department of Agriculture, and then had occasion to study the National Herbarium. I found, however, that the arrangement and determination of the specimens was not satisfactory. I also visited both Columbia College and Harvard University, but the condition at neither place was much better. The trouble seemed to be that too many different forms were put together under the same name. I returned to the University of Nebraska with the determination to try to revise the genus if possible.

Through the negotiations of Dr. Chas. E. Bessey I secured the loan of nearly every collection of value in this country, both public and private. I hereby extend my thanks to professors and curators of the following institutions, whose collections I have used: United States Department of Agriculture, Missouri Botanical Garden (including the Engelmann and Bernhardi collections), Columbia College (including the Torrey and Meisner collections), Cornell University, University of Minnesota, University of Tennessee, University of Indiana, California Academy of Sciences, Philadelphia Academy of Sciences, Agricultural College of Iowa (including the Parry and Pammel collections), Agricultural College of Michigan, Oberlin College, Ind., Franklin and Marshall College, Lancaster, Pa., and the University of Wyoming,* and also to the following persons who kindly loaned me their private collections: Prof. E. L. Greene, Dr. J. M. Coulter, Prof. F. D. Kelsey, Dr. A. W. Chapman, Messrs. J. Donnell Smith, Walter Deane, Cambridge, Mass., B. S. Parish, San Bernardino, Cal., E. L. Suksdorf, White Salmon, Wash., Rev. A. B. Langlois, St. Martinsville, La.; Rev. L. H. Lighthipe, Woodbridge, N. J., and Miss Frances Wilson, Rocky Hill, Ct. Owing to certain rules passed by the Trustees of the Gray Herbarium, I could not secure the loan of the collection of *Physalis* at Harvard, but Dr. B. L. Robinson kindly sent all type specimens asked for, and last fall I had occasion to spend two days in the Gray Herbarium, when I saw the whole collection. For this privilege, as well as for the use of the botanical library there I am very grateful, as also for the privilege of looking over the herbarium of the College of Pharmacy, New York City. I also wish to extend my thanks to Dr. Chas. E. Bessey and Dr. N. L. Britton for valuable suggestions and help in my work.

The only collection in this country which I wished to see and

* Of course, I also had access to the herbaria of the University of Nebraska and of the Botanical Survey of the same State.

have not been able to examine is Elliott's herbarium at Charleston, S. C. It is a pity that this valuable collection should be at a place and in such condition that it is made nearly inaccessible to the botanical world.

At the suggestion of Dr. J. M. Coulter, I have extended the original plan by including in the monograph, the related genera *Margaranthus*, *Chamaesaracha* and *Oryctes*. The material used for the study of these genera has been more limited, consisting only of the collections of United States Department of Agriculture, Missouri Botanical Garden, Columbia College, College of Pharmacy, and Prof. E. L. Greene.

The revision includes not only the native and introduced species growing in the United States and Canada, but also a few Mexican ones, collected in the northern part of the border States, Lower California, Sonora, Chihuahua and Coahuila. They may at any time be expected to appear within our country. These species are: *Margaranthus tenuis*, *Physalis subulata*, *P. leptophylla*, *P. hastata* and *P. microphysa*.

Although most of the herbarium work on *Physalis* and also a part of the bibliographical work was done at the University of Nebraska, the most important part of the latter, the collation of the notes, the final arrangement and the preparation of the manuscript has been done at Columbia College, whose botanical library furnishes much better facilities. The whole work on *Margaranthus*, *Chamaesaracha* and *Oryctes*, has also been done at Columbia.

To give a list of all the books referred to, would be useless, as most of them are given in the bibliography under each species. The only monographs of real value in existence are those of Nees von Esenbeck, in Linnaea, Vol. VI, 1831; of Dunal, in De Candolle's Prodromus, Vol. XIII, part 1, 1852; and of Asa Gray, in the Proceedings of the American Academy of Arts and Sciences, Vol. X, 1875, and in his Synoptical Flora, Vol. II, part 1, 1878. All these, however, are defective and incomplete. Many new species and forms have been discovered since the time of their publication, especially in the West and in Florida. More material has accumulated, which has made it possible to separate out as good species, forms that were imperfectly known to Dr. Gray, as, for instance, *Physalis lanceifolia* Nees, *P. Carpenteri* Riddell, *P. arenicola* Kearney, *P. macrophysa* Rydberg, *P. versicolor* Rydberg and *P. ciliosa* and *Chamaesaracha crenata*, to be described below.

The limitation of the species here recognized, differs also from that of Dr. Gray. If he had treated *Physalis* as he did *Aster*, he would have had several more species and would not have united into one such as were rightly kept apart by Dunal. In a genus where the species are as closely related as they are in *Physalis* it is not easy to define the limits, especially as intermediate forms in most cases are found. I must confess that I am far from satisfied with my own treatment of *P. Philadelphica* and *P. heterophylla*. I suspect that each consists of more than one species, but I have been unable to find constant characters that would support a distinction.

In preparing a monograph of these genera,* I have naturally to consider the nomenclature of the species. I knew that it was not in the very best condition, but never imagined that it was in such chaos as I really found it. The following will show the most important cases where changes in the commonly accepted names are necessary. A practically full synonomy will be found under each species, but I feel that something needs to be said in the way of explanation. The changes mentioned are necessary not merely because the author has tried to follow the Rochester and Madison rules. They would have been just as necessary under any accepted rule except one, viz: "Use whatever name you please." Most of the the errors are wrong identifications of species or misapplication of names. The changes here proposed are not hastily made, as I have compared all the species with the original descriptions and drawings and also with the type specimens when possible. I have had access to all types preserved in American herbaria, except one, viz: that of *P. lanceolata* Ell.,† but that name cannot stand as there is an older and accepted *P. lanceolata* Michx.‡ I have seen the original descriptions of all species and varieties, at least in reprint or in manuscript copies, and also that of nearly every synonym.

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* The larger part of the following discussion, although under a different title, was read before the Botanical Seminar of the University of Nebraska, May 27, 1895.

† Ell. Bot. S. C. & Ga. 1: 278. 1817.

‡ Michx. Fl. Bor. Am. 1: 149. 1803.

In the first edition of Linnaeus' Species Plantarum, there are nine species of *Physalis* described, of which six are accredited to America. Of these six two are frutescent and are now referred to the genus *Withania*. Hence there remain only four American species which were known to Linnaeus in 1753, viz.: *P. viscosa*, *P. angulata*, *P. pubescens* and *P. pruinosa*. Besides these, *P. Alkekengi* has escaped from cultivation in a few places.

*Physalis Alkekengi** has been well understood from its first publication, and can scarc ly be confounded with any of our native species. The whitish, more plainly 5-lobed corolla distinguishes it from all of them.

Physalis viscosa L.† is without any doubt the plant that now appears under that name in our manuals. The name *viscosa* refers to the viscid berry. Unfortunately there are several other species that have viscid fruit and the choice of name did not happen to be a good one. Thinking the name referred to the viscid pubescence, most of the earlier American authors, as Pursh, Eaton, Darlington, Beck, Torrey and at first also Gray, applied it to another perennial species, *Physalis heterophylla* Nees,‡ *P Virginiana* Gray,§ not Mill.‖ Roth applied it to *P. Barbadensis*, and *P. viscosa* Jacq. is either *P. Virginiana* Mill. or *P. heterophylla* Nees. This may partly account for the many synonyms under *P. viscosa* L. Gmelin called it *P. nutans* and Walter *P. tomentosa*,¶ which was changed to *P. Walteri* by Nuttall,** as there were already two species which had been described under this name, viz: *P. tomentosa* Medicus†† and *P. tomentosa* Thunberg.‡‡

The remaining Linnaean species of 1753 are not as well understood. The diagnosis in each case is very vague and incomplete, and agrees as well or as badly with any of our annual species, and nobody can be sure that the name belongs to the species to which

* L. Sp. Pl. 183. 1753.

† L. Sp. Pl. 183. 1753.

‡ Linnaea, 6: 463. 1831.

§ Gray, Syn. Fl. 2: pt. 1, 235. 1878.

‖ Mill. Gard. Dict. Ed. 8: no. 4. 1768.

¶ Walt. Fl. Car. 99. 1788.

** Journ. Acad. Phil. 7: 112. 1834.

†† Act. Acad. Theod. Palat. 4: 184. 1780.

‡‡ Thunb. Prod. Pl. Cap. 37. 1794.

it is commonly applied. As to *P. angulata* L.,* there has been some doubt as to whether it is is the same as *P. angulata* of our manuals or *P. obscura* Michx.† Nees von Esenbeck‡ cited the latter as a synonym of *P. angulata* and for the plant that now goes under that name, he proposed the name *P. Linkiana*,§ as the only available synonym, *P. dubia* Link,|| was antedated by *P. dubia* Gmelin.¶ One of the synonyms cited under *P. angulata* both by Linnaeus and Nees is "Alkekengi indicum glabrum chenopodiifolio. Dill. Elth. p. 13, *t. 12, f. 12*;" which figure gives a fair representation of the plant now known as *P. angulata Linkiana* (Nees) Gray.** Furthermore, the leaves of that plant resemble those of *Chenopodium viride*, a statement that can scarcely be made with reference to *P. obscura* Michx. In my opinion *P. Linkiana* Nees is the true *P. angulata*. Dunal, in De Candolle's Prodromus,†† corrects Nees, stating that *P. obscura* Michx. is not a synonym of *P. angulata* L., but makes a mistake when he refers the former to his own species *P. hirsuta*,‡‡ that is to *P. pubescens* L. He retains *P. angulata* and *P. Linkiana* as two distinct species, while Gray makes the latter a variety of the former. Hemsley, in Biologia Centrali Americana, regards *P. Linkiana* as a synonym of *P. angulata*.

Physalis pubescens L.§§ and *Physalis pruinosa* L.|||| are included in one species by Nees and Gray, although the former recognizes *pruinosa* as a variety. There are, however, two distinct species in the United States which might claim the name *P. pubescens*, one diffuse, with small thin ovate leaves, which are sub-entire at least at the base; the other more or less erect, with large thicker leaves, which are coarsely sinuate-dentate and somewhat resemble those of *P. heterophylla* Nees. The former I take as *P. pubescens* L., the

* L. Sp. Pl. 183, 1753.

† Michx. Fl. Bor. Am. 1: 149. 1803.

‡ Linnæa, 6: 474. 1831.

§ Linnæa, 6: 471. 1831.

|| Link, Enum. Hort. Berol. 1: 181. 1821.

¶ See foot note, Linnaea, 6: 471. 1831.

** Proc. Am. Acad. 10: 64. 1874.

†† DC. Prod. 13: pt. 1, 449. 1852.

‡‡ DC. Prod. 13: pt. 1, 445. 1852.

§§ L. Sp. Pl. 183. 1753.

|||| L. Sp. Pl. 184. 1753.

latter as *P. pruinosa.* The whitish pubescence often found on the latter looks at a distance somewhat like mealiness, which, perhaps made Linnaeus give it the characters "divaricationibus farinaceo-germinantibus." It sometimes has yellow anthers, which is given as a character by Linnaeus. The view taken here is practically that held by Nees,* although I think that *P. pruinosa* deserves specific rank. Dunal, as far as I can judge, confuses the two, as his description of *P. pubescens* fits rather that of *P. pubescens* β. Nees, † which, according to Nees, is the same as *P. pruinosa* L. Yet he cites under it as a synonym *P. pubescens* α Nees (*P. pubescens* L.). He describes a species under the name *P. hirsuta*,‡ and as varieties of this he places *P. pubescens* β. Nees, (*P. pruinosa* L.), and *P. Barbadensis* Jacq.,§ but his description corresponds with that of *P. pubescens* α. Nees. It is evident that Dunal has confused *P. pubescens* L. and *P. hirsuta* Mart. & Gal.,‖ a Mexican species not found at all within the United States. The characters by which it differs from *P. pubescens* are given in Walp. Rep. **6**: 574, viz., the long setaceously acuminate calyx-lobes.

What makes me think still more that *P. hirsuta* Dunal is the true *P. pubescens* L. is that it is the species dispersed throughout the warmer regions of the world, while *P. pubescens* Dunal is, as far as I know, restricted to North America. The locality given by Linnaeus for *P. pubescens* is "India utraque," and for *P. pruinosa,* "America."

Another species found within the United States and often confused with the two preceding is one recently collected in Missouri, Kansas, etc. It differs in the shorter calyx lobes. Dr. Britton has named it *P. minima* L, and regards it as introduced. Very likely the identification is right, or rather it is the plant that has been known by this name. At least it is nearly related to it. The description of *P. minima* L., however,¶ does not fit it at all. The characters given, "Physalis ramosissima pedunculis fructiferis folio longioribus," could only be applied to one American

* Linnaea, **6**: 467–8. 1831.

† Linnaea, **6**: 467. 1831.

‡ DC. Prod. **13**: pt. 1; 445. 1852.

§ Jacq. Misc. **2**: 259. 1781.

‖ Mart. & Gall. in Bull. Brux. **12**: Part 1. 132. 1845.

¶ L. Sp. Pl. 183. 1753.

annual species, viz., *P. Greenei* Vasey & Rose* (*P. pedunculata* Greene†, not Mart. & Gal.‡). It is impossible that Linnaeus had this rare plant from Lower California, which therefore can not be *P. minima.* The Linnaean species was from India. Both the locality and the characters given above make it impossible that our plant is *P. minima,* unless a serious error is made in the original description.

Nees suggests that the statement that the pedicels of the fruiting calyx are longer than the leaves may be a typographical error, and perhaps meant longer than the petioles of the leaves. In Miller's Dictionary§ *P. minima* is thus characterized. But even then our species does not agree with the description, as the pedicels are generally much shorter than the petioles. If *P. minima* of Linnaeus and that of Miller are the same, the name *P. minima* does not belong to our species, as *P. minima* of Miller is a smooth plant and generally regarded as the same as *P. Indica* Lam.‖ The first synonym cited by Linnaeus under *P. minima* is "Solanum vesicarium indicum minimum Herm. Lugb. 569, pl. 571." This according to Nees, is also glabrous and is by him included in *P. Indica.* Dunal in DC. Prodr. makes it the type of a new species, *P. Hermanni.*¶ Probably it is only a form of *P. Indica* Lam., but is the one that has the right to be called *P. minima* L., unless the type specimens in the Linnaean herbarium, if there are any, show that this species is something else. Anyhow, *our* species has no right to the name. From the description of *P. parviflora* R. Br. in De Candolle's Prodromus,** it seems as if it were that species, but the original description in Robert Brown's Prodromus Novae Hollandiae†† is different, and *P. parviflora* R. Br. is now generally regarded as a form of *P. Indica* Lam. *P. parviflora* Lagasca‡‡ is the same as *P. minima,* not of Linnaeus, but as that species has

* Cont. U. S. Nat. Herb. 1: 18. 1890.
† Pittonia, 1: 268. 1889.
‡ Bull. Acad. Brux. 12: pt. 1, 132. 1845.
§ 8th Edition, no. 11. 1768.
‖ Lam. Encycl. 2: 102. 1786.
¶ DC. Prod. 13: pt. 1, 444. 1852.
** DC. Prodr. 13: pt. 1, 445. 1852.
†† R. Br. Prodr. Nov. Holl., 447. 1810.
‡‡ Lag. Gen. & Sp. 11. 1816.

been understood by Nees, Dunal, etc. As *P. parviflora* Lagasca is antedated by that of Robert Brown, we have to use the name *P. Lagascæ* R. & S.* for our species, unless it turns out to be a new one.

In the appendix to the second edition of Species Plantarum,† Linnaeus describes two more species, viz: *P. Pennsylvanica* and *P. Peruviana*, both American. Nothing need be said about the identity of the latter, as it is now well understood. According to Nees there is a specimen of this in the Linnaean herbarium labelled *P. pubescens*. Perhaps this was the reason why Robert Brown ‡ describes specimens of *P. Peruviana* under this name. Forms of this wide-spread species have been described under several names, as *P. esculenta* Willd., *P. tomentosa* Medic., *P. tuberosa* Zuccagni. *P. latifolia* Lam., *P. edulis* Sims, *P. Barbadensis* Lam. The name *P. Peruviana* has also been used erroneously by Roxburgh for *P. pubescens* and by Wallroth for P. *angulata*.

P. Pennsylvanica has caused much trouble, and the name has been applied to *P. Virginiana* Mill., *P. heterophylla* Nees, *P. Philadelphica*, *P. viscosa*, etc. The Linnaean description certainly does not help to identify it. There are only two American species that have the berry as small as the size of a pea, viz: *P. microphysa* Gray and *P. Carpenteri*.§ The first is a rare plant from Mexico; both are so different from others that no confusion is possible. In neither are the leaves smooth above and puberulent beneath. There are forms of *P. Virginiana* Mill.,‖ not Gray,¶ (*P. lanceolata* Gray,** not Michx.††) and *P. arenicola* Kearney,‡‡ that sometimes have leaves smooth above and slightly hairy beneath, especially on the veins, but both have berries of the size of a garden cherry and the pubescence cannot be called puberulent. The former and also forms of *P. Philadelphica* and *P. longifolia* Nutt. §§ are often found,

* R. & S. Syst. 4: 679. 1819.

† L. Sp. Pl. Ed. 2: 1670. 1762.

‡ R. Br. Prodr. Nov. Holl, 447. 1810.

§ See below.

‖ Mill. Gard. Dict. Ed. 8, no. 4. 1768.

¶ Gray, Syn. Fl. 2: pt. 1: 235. 1878.

** Proc. Am. Acad. 10: 67. 1874.

†† Michx. Fl. Bor. Am. 1: 149. 1803.

‡‡ Bull. Torr. Club, 21: 485. 1894.

§§ Trans. Am. Phil. Soc. (II.) 5: 193. 1833-37.

even in our largest herbaria, labelled *P. Pennsylvanica.* I suppose this is so because Dr. Gray used that name in the fifth edition of his Manual for the complex species which he afterward called *P. lanceolata.** From the description one would think that *P. Pennsylvanica* were one of the forms there included, rather than a form of *P. viscosa.* But as such careful workers as Nees and Dunal, and Gray in his later years, classed *P. Pennsylvanica* among the stellate species, either as a form of *P. viscosa* or as a species nearly related to it, I shall also leave it there, especially as I have seen at Harvard University, a tracing of the specimen in the Linnaean herbarium. It resembles a small-leaved form of *P. viscosa* and a note in pencil states that the pubescence is stellate. This does not agree with the Linnaean description which gives it as pruinose. The real nature of the pubescence of *P. viscosa* is hard to make out with the naked eye and Linnaeus states somewhere that he could not work with "*oculis armatis.*" This may be the reason why he called the pubescence pruinose instead of stellate.

In the eighth edition of Miller's Gardeners' Dictionary, 1768, there are several species named and described. Except those mentioned above, I do not know that there are any of interest to us, except *P. Virginiana.*† Most authors regard it as synonymous with *P. lanceolata* Michx.,‡ others as the same as *P. Pennsylvanica* L., probably because both have been misunderstood and confused. Dr. Gray adopted the name *P. Virginiana* for the common broad-leaved, viscid perennial, which should be known as *P. heterophylla* Nees.§ He gives the reason for so doing in the Synoptical Flora‖ where we read: "This early name of Miller, taken up for the present species in Proc. Am. Acad., *l. c.*, must from the size of the flower belong to it, or to a broad-leaved and hairy form of *P. lanceolata.* Miller's remark that the root does not creep in the ground is most applicable to the latter; but the color, as well as the size of the corolla and the 'pale yellow' fruit, also the diffuse growth, best accord with this common species." From this it may be seen that Dr. Gray was not certain that he applied the name

* Proc. Am. Acad. **10**: 67. 1874.

† Mill. Gard. Dict. Ed. 8, no. 4. 1768.

‡ Michx. Fl. Bor. Am. 1: 149. 1803.

§ Linnaea, **6**: 463. 1831.

‖ Gray, Syn. Fl. **2**: pt. 1, 235. 1878.

to the right species. Had he referred it to a broad-leaved and hairy form of *P. lanceolata* Michx., as he understood the same, he would have done the right thing. But evidently Dr. Gray had never seen this form exactly like the figure in Miller's Illustrations, *plate 206. f. 1.* As far as I can remember, there are no specimens of it in the Gray Herbarium. I have had for study all the important collections of Physalis in the United States. In all, it is represented by specimens from only a dozen localities and all collected since 1886. It is, therefore, easy to find an excuse for Dr. Gray's erroneous application of the name *P. Virginiana*. All forms of *P. Virginiana* Miller or *P. lanceolata* Gray* have a thick more or less fleshy and erect caudex, while *P. heterophylla* Nees (*P. Virginiana* Gray) generally has a slender creeping rootstock. As far as the size and color of the corolla is concerned there is no constant difference between them, both being very variable. The only character not agreeing with *P. lanceolata* Gray, as described in the Synoptical Flora, is the color of the fruit, but this varies in several species, and why not in this also. *P. lanceolata* Gray will therefore become *P. Virginiana* Miller. It represents the most common form of that species.

Physalis Philadelphica † is not very well understood. In our herbaria we find specimens under this name that belong to widely distinct species, viz: forms of *P. angulata* L., and of *P. aequata* Jacq.,‡ fruiting specimens of *P. Alkekengi* of *P. Virginiana* Mill and even of *P. Carpenteri.* § As I understand *P. Philadelphica* Lam., it is a species nearly related to *P. longifolia* Nutt., ‖ but with broader leaves. It is as often perennial as annual (the original description says annual), but is the only species of the eastern United States that fits the description of *P. Philadelphica* at all, except *P. aequata* Jacq., which, however, is not a native, but recently introduced. In describing *P. longifolia*, Nuttall states that it is nearly related to *P. chenopodifolia*. Evidently he meant *P. chenopodifolia* of Willdenow, ¶ and not that of Lamarck.**

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* Gray, Proc. Am. Acad., 10: 67. 1874.

† Lam. Encycl. 2: 101. 1786.

‡ Nees in Linnæa 6: 470. 1831.

§ See below.

‖ Trans. Am. Phil. Soc. II., 5: 193. 1833–37.

¶ Willd. Sp. Pl. 1: 1023. 1798.

** Lam. Ill. 2: 28. 1793.

The former has always been regarded as a synonym of *P. Philadelphica* Lam. Lamarck cites Miller's figure 1, plate 206, but as stated before this is *P. Virginiana.* Undoubtedly he only looked at the figure without reading the description. Miller describes his plant as perennial and hairy, Lamarck his as annual and glabrous. As far as Miller's figure is concerned it might as well represent one as the other. One thing that has caused much confusion, is that *P. Philadelphica* is generally described as the only species in which the berry fills and even bursts the calyx, a character that is far from constant, and also found in *P. longifolia* Nutt., and still more common in *P. aequata* Jacq. The character is not given in the original descriptions of either *P. Philadelphica* Lam. or *P. chenopodifolia* Willd. It is given in the original description of *P. ovata* Poir.,* which has been regarded as a synonym of *P. Philadelphica* Lam. To me it seems more likely to be a synonym of *P. aequata.* As far as this latter is concerned, it is rightly understood and the plant agrees perfectly with Jacquin's description and plate,† but unfortunately there is an older name *P. isocarpa* Brot., described in Hornem. Hort. Hafn, and the species must take that name.

N. J. Jacquin described *P. Barbadensis*‡ in 1781. It is nearly related to *P. pubescens* and *P. pruinosa,* and has been regarded as a variety of the former species. It differs from it in its erect habit, its larger, more cordate and more toothed leaves, and its larger, more elongated fruiting calyx. It was based on Dillenius' figure of "*Solanum Barbadense nanum Alliariae folio,*" which is cited by Linnaeus as a synonym under *P. pruinosa* in the second edition of Species Plantarum. Elliott, therefore, adopted the name *P. pruinosa* for *P. Barbadensis.* The reference is, however, not found in the first edition of Species Plantarum, and according to Dunal, and others, Linnæus erred when he referred Dillenius' plant to his species *P. pruinosa.* *P. Barbadensis* is well distinct from *P. pruinosa,* but differs from *P. obscura* Michx. § in no other respect than in its hairiness. The two are but one species.

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* Poir., in Lam. Encycl. Suppl. 2: 347. 1811.

† Jacq. f. Eclog. 2: *pl. 137.* 1844.

‡ Jacq. Misc. 2: 359. 1781.

§ Michx. Fl. Bor. Am. 1: 149. 1803.

Michaux describes also *P. obscura viscido-pubescens*, which must be *P. Barbadensis* Jacq. or perhaps *P. pruinosa*.

What *P. lanceolata* Michx.* is, is hard to determine. It should be a perennial species from North Carolina, with lanceolate, subentire and subsessile leaves and hirsute calyx. No species has, as a rule, subsessile leaves, but the other characters fit two different plants. One is a rare plant from the Southern States, Florida, Alabama, etc. It has thin subentire leaves, but otherwise resembles most *P. Virginiana*, but with the pubescence of the stem somewhat viscid, and in this respect approaches *P. heterophylla* Nees. The other one, för which I adopt the name *P. lanceolata*, resembles much *P. pumila* Nutt.† (*P. lanceolata hirta* Gray‡), except that it lacks the branching of the hairs on the lower surface of the leaves. It differs from P. *Virginiana* Miller (*P. Pennsylvanica* Gray§ and *P. lanceolata* Gray,‖ mainly, as to the description) in the fruit, which is greenish yellow, not reddish; in the fruiting calyx, which is scarcely angled and scarcely sunken at all at the base; and in the leaves, which are thicker, dark green, and with entire margins. Although Dr. Gray rather describes *P. Virginiana* in his Synoptical Flora, he evidently regarded this form as the typical *P. lanceolata* Michx., as he names it in his Manual, 5th edition, *P. Pennsylvanica lanceolata*¶. At first I doubted very much that it was the true *P. lanceolata* Michx., as it is mainly a western species, principally found west of Mississippi, but I found afterwards specimens collected by Ravenel in both North and South Carolina.

Physalis lanceolata, as treated by Gray in the Synoptical Flora, comprises with its varieties not less than six, or perhaps rather seven, distinct species, viz.:

1. *P. Virginiana* Mill (*P. Pennsylvanica* Gray, Man., 5th edition, and *P. lanceolata* Gray, Synoptical Flora, mainly).
2. *P. arenicola* Kearney.**

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*Michx. Fl. Bor. Am. 1: 149. 1803.

†Trans. Am. Phil. Soc. (II.)5: 193. 1833-37.

‡Proc. Am. Acad. 10: 68. 1874.

§Gray, Man. Ed. 5, 382. 1867.

‖Proc. Am. Acad. 10: 67. 1874.

¶Gray, Man. Ed. 5, 382. 1867.

**Bull. Torr. Club, 21: 485. 1894.

3. *P. lanceolata* Michx. (*P. Pennsylvanica lanceolata* Gray, Man., 5th edition).

4. *P. pumila* Nutt. (*P. lanceolata hirta* Gray*).

5. *P. longifolia* Nutt.† (*P. lanceolata laevigata* Gray‡).

6. *P. macrophysa* Rydberg.§

7. An undescribed Texan species, nearly related to *P. longifolia* and characterized in this paper.

In 1827 Dr. Torrey described *P. lobata*‖. Dr. Gray states ¶ that *Solanum luteiflorum* Dunal,** or at least the var. *subintegrifolium* is the same, but this is a mistake. The description does not fit *P. lobata* at all. There is a poor specimen, without flower and fruit, of the variety in the Torrey Herbarium at Columbia College, and another at Harvard from the original collection. Although they resemble somewhat *P. lobata* in the form of the leaves, etc., they may just as well belong to *Chamaesaracha*, as, for instance, a form of *C. Coronopus* Gray.†† Dunal in De Candolle's Prodromus places *Solanum luteiflorum* next before *S. Coronopus*, which is the same as *Chamaesaracha Coronopus* Gray.

In the addenda to the Synoptical Flora, Gray also refers *Chamaesaracha physaloides* Greene ‡‡ to *P. lobata*, which is another mistake. The former is Gray's own *Physalis Wrightii* §§ as shown by the type, which is only a better developed specimen than Gray's.

Nuttall describes five new species, viz: *P. angustifolia* and *P. Walteri* in the Journal of the Academy of Philadelphia,‖‖ and *P. pumila*, *P. longifolia* and *P. mollis* in the Transactions of the American Philosophical Society. *P. angustifolia* and *mollis* are known under their respective names. *P. Walteri* is *P. viscosa* L.¶¶ as

* Proc. Am. Acad. 10: 68. 1875.

† Trans. Am. Phil. Soc. (II.) 5: 193. 1833–37.

‡ Proc. Am. Acad. 10: 68. 1874.

§ Bull. Torr. Club, 22: 308. 1895.

‖ Ann. Lyc. N. Y. 2: 226. 1827.

¶ Gray, Syn. Fl. 2: pt. 1, 233. 1878.

** DC. Prodr. 13: pt. 1, 64. 1852.

†† Bot. Cal. 1: 540. 1876.

‡‡ Bull. Torr. Club, 9: 122. 1882.

§§ Proc. Am. Acad. 10: 63. 1874.

‖‖ 7: 112–113. 1834.

¶¶ 5: 193–4. 1833–37.

stated before. *P. longifolia* is the same as *P. lanceolata lævigata* Gray, but is a good species and should be known by its Nuttallian name. *P. pumila* is cited by Gray as a synonym of *P. lanceolata*, but Nuttall's type specimen in the herbarium of the Philadelphia Academy of Sciences, shows that it is the same as *P. lanceolata hirta* Gray. In the "New Check List"* it bears the name *P. cinerascens* (Dunal) Hitchcock,† with the synonym *P. Pennsylvanica cinerascens* Dunal.‡ This is simply an incorrect identification, as *P. mollis cinerascens* (Dunal) Gray § does not grow in Kansas.

In 1831 Nees ab Esenbeck published his revision of *Physalis* in Linnæa.‖ This excellent work seems to have served as the foundation for Gray's revision in the Proc. Am. Acad. **10**: 62–68. Gray follows Nees closely, but, as far as I can find, does not give him credit anywhere. The following new North American species are described: *P. heterophylla*, *lanceifolia* and *Linkiana*. *P. heterophylla* and *Linkiana* have been discussed before. *P. lanceifolia*¶ is mainly Mexican, but forms belonging to it come within the United States. Specimens collected by Schott and Thomas, and referred doubtfully to *P. Wrightii* by Gray,** belong here. It is nearly related to *P. Wrightii* and *P. angulata*, but has much smaller flowers. Specimens under the name *P. lanceifolia* Nees, collected by Rügel at the mouth of St. Mark's River, Florida, have caused much trouble, and several new species have been proposed for the same. The cause of the confusion can easily be seen. The original distribution contains at least three distinct species. The specimens preserved in the Engelmann Herbarium represent two, one annual, a form of *P. lanceifolia* Nees, but with narrower leaves, and one perennial, a form of *P. Virginiana* Mill. In the Columbia College Herbarium it is represented by specimens exactly like the original specimens of *P. Pennsylvanica spathulaefolia* Torr.†† It

* List of Pteridophyta and Spermatophyta, growing without cultivation, in Northeastern North America, in Memoirs of the Torrey Botanical Club, Vol. V.

† Hitchcock, Spring. Fl. Manh. 32. 1894.

‡ DC. Prod. 13: pt. 1, 435. 1852.

§ Proc. Am. Acad. 10: 66. 1874.

‖ Vol. 6: 431–483. 1831.

¶ Linnaea, 6: 473. 1831.

** Proc. Am. Acad. 10: 63. 1874.

†† Torr. Bot. Mex. Bound. 153. 1859.

was on these specimens of *P. lanceifolia*, at least in part, that Kunze based his *P. Elliottii.** It is so indicated on the label. His description agrees, except to the pubescence of the calyx, which must have been taken from the specimens of *P. Virginiana.* The name *P. viscosa spathulaefolia* has therefore to give away to *P. Elliottii*, which is the older. Kunze thinks that it may be *P. lanceolata* Ell. It might possibly be so (I have not seen Elliott's specimens); but from the original description, and according to Dr. Gray, who had seen Elliott's herbarium, this is a form of *P. viscosa.*

Gray included in his *P. viscosa spathulæfolia*,† also narrow-leaved forms of *P. viscosa* L. They are, so far as I can judge, what Nees and Dunal regarded as *P. Pennsylvanica* L. but this is, as stated before, only a small-leaved form of *P. viscosa* proper. The only available name is *P. maritima* Curtis. In the original description, Curtis gives only one synonym, viz.: *P. pubescens* Engel. & Gray, Pl. Lindh. and Lindheimer's specimens belong to this variety of *P. viscosa.* It will be known as *P. viscosa maritima* (Curtis).

In 1874, Dr. Gray published his revision of the genus in the Proc. American Academy. Here three species and several varieties are described. The species are *P. Wrightii*, *P. hedreaefolia* and *P. Fendleri.* A few remarks on *P. Wrightii* were made under *P. lobata. P. hederaefolia*‡ and *P. Fendleri* are also good species The name of the former has been changed in the "New Check List" to *P. digitalifolia* (Torr.) Britton.§ The change, however, was unwarranted. It is true that it is the same as *P. Alkekengi*? var. *digitalifolia* Torr.,‖ but this was simply a wrong identification. Dr. Torrey believed that it was *P. Alkekengi digitalifolia* Dunal.¶ Dr. Gray also held that the identification was erroneous as he gives as a synonym under *P. hederaefolia, P. Alkekengi*? var. *digitalifolia* (vix. Dunal) Torr. l. c.

In the Synoptical Flora, Dr. Gray adds *P. Palmeri.*** I have

* Linnaea, **20**: 33. 1847.

† Proc. Am. Acad. **10**: 67. 1874.

‡ Proc. Am. Acad. **10**: 65. 1874.

§ Mem. Torr. Bot. Club, **5**: 288. 1894.

‖ Torr. Mex. Bound. Surv. 153. 1859.

¶ DC. Prod. **13**: pt. **1**, 438. 1852.

** Gray, Syn. Fl. **2**: pt. **1**, 235. 1878.

the type specimens as a loan from Harvard and they show that it is nothing but a form of *P. hederaefolia* with the pedicels slightly longer than usual. It scarcely deserves varietal rank.

In a note just before *P. grandiflora*, Dr. Gray writes:* "*P. Carpenteri* Riddell, Cat. Fl. Ludov. (N. O. Med. and Surg. Journal **8**: 758, 1852, name only), referred to *Withania Morisoni* in Bot. Gazette, **3**: 11, is some adventitious *Athenaea*." In the collections there are about half a dozen specimens from Louisiana, Alabama and Florida. It is plain that it is not *Withania Morisoni* Dunal.† It is not an *Athenaea*, as characterized by Bentham & Hooker or Dunal, as the corolla is not divided to or below the middle and its lobes are not valvate. It has the corolla of *Physalis*. The calyx is inflated, as in that genus, but not angled, in the original specimens often with very unequal lobes. The latter characters and the fact that the flowers are in fascicles seem to throw it out of *Physalis* and into *Athenaea*. But in *P. Wrightii* Gray, the flowers are sometimes found in twos, threes or even fours, and in specimens of *P. Carpenteri* of later collections, as, for instance, Nash, no. 2503, the calyx-lobes are short and equal and the flowers solitary. I have compared the present species with *P. leptophylla* Robinson & Greenman, ‡ which is without doubt a *Physalis*, and the latter differs in no respect except that the flowers are always solitary, somewhat smaller, the lobes of the calyx equal, and the fruiting calyx a little larger and of somewhat firmer texture. I regard, therefore, *P. Carpenteri* as a *Physalis*, but what name shall it receive and how shall it be cited? *Physalis Carpenteri* Riddell, in Cat. Fl. Ludov. is a nomen nudum. In the Botanical Gazette, Dr. Chapman describes it under *Withania Morisoni*, but it is not *W. Morisoni* Dunal. The description is not long, but well characterizes the plant. *Physalis Carpenteri* Riddell, is given as a synonym. So here is a description and a name, hence a publication, and it should be cited: *Physalis Carpenteri* Riddell; Chapman in Bot. Gaz. 3: 11, 1878, as a synonym under *Withania Morisonii* Chapman, not Dunal.

A few changes are also here proposed in the limitations of

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* Syn. Fl. **2**: pt. 1, 233. 1878.

† DC. Prod. 13: pt. 1, 454. 1852.

‡ Proc. Am. Acad. **29**: 389. 1894.

genera. *Physalis grandiflora* Hook is made the type of a new genus. It rather belongs to *Chamaesaracha* than to *Physalis*. It lacks the essential characters of the latter. The fruiting calyx is neither angled, nor ten-ribbed, nor reticulate. It is thin, indistinctly veined, closely fitting to the fruit and open at the mouth. The only floral character which differs from *Chamaesaracha nana* is the length of the calyx-lobes, which much exceed the fruit. The corolla of *P. grandiflora* is that of a *Chamaesaracha*, *i. e.*, widely rotate and white, or sometimes tinged with purple. In *Physalis* the corolla is open-campanulate rather than rotate and with a few exceptions more or less yellow. Evidently *P. grandiflora* should be removed from *Physalis*. As it is so nearly related to *Chamaesaracha nana* (differing, as I thought, principally in the length of the calyx), I transferred it at first to that genus, but have decided at last to make it the type of a new one. I have so decided mostly from the fact that the calyx is at first somewhat inflated, a character never found in *Chamaesaracha*. This is not seen in herbarium specimens, but my authority is Prof. C. F. Wheeler, of Michigan Agricultural College, who knows the plant in the field.

Physalis lobata is also taken out of the genus. It comes nearer to *Chamaesaracha* than to *Physalis* in every respect except in the fruiting calyx. It differs however from both genera in the structure of the seeds, in the color and form of the corolla and in being somewhat fleshy. It is the type of a distinct genus.

If two more of the species, *P. microphysa* and *P. Alkekengi* could be also removed, the genus would be a very natural one. In the former the fruiting calyx is nearly that of an *Athenaea*, while the corolla is of a true *Physalis*. In *P. Alkekengi*, the corolla is whitish and much deeper cleft. If held distinct from *Physalis*, it would together with *P. Sendtneri* constitute a genus (*Megista* Tourr.) of European origin, while *Physalis* proper is principally American.

The genera included in the monograph all belong to the tribe

Solaneae: Corolla (mostly short) with regular limb plicate or valvate in the bud, usually both, *i. e.*, the sinuses or what answers to them plicate and the edges of the lobes induplicate. Stamens (normally 5) all perfect. Fruit baccate or at least indehiscent, sometimes nearly dry. Seeds flattened; embryo curved or coiled, slender, the semiterete cotyledons not broader than the radicle.*

1. Anthers unconnected, destitute of terminal pores, dehiscent longitudinally.

a. Fruiting calyx bladdery-inflated, 5-angled and deeply 5-parted; ovary 3-5-loculed. (*Physalodes.*)

b. Fruiting calyx bladdery-inflated, 5-lobed, but not parted, 10-costate and often 5-10-angled, reticulated, wholly enclosing the berry, lobes mostly connivent; ovary 1-loculed.

Corolla yellowish or greenish, often tinged with violet, urceolate, minutely toothed on the more or less contracted orifice. *Margaranthus.*

Corolla open-campanulate, yellowish or whitish, often with a dark center; seeds with a thin margin, finely pitted. *Physalis.*

Corolla flat-rotate, violet or purple; seeds thick, rugose-tuberculate. *Quincula.*

c. Fruiting calyx somewhat enlarged, but closely fitted to the fruit, thin, obscurely veiny, open at the mouth.

Corolla rotate, whitish; lobes of the fruiting calyx much exceeding the berry. *Leucophysalis.*

Corolla rotate, whitish sometimes tinged with purple; fruiting calyx not exceeding the berry. *Chamaesaracha.*

Corolla tubular, ochroleucous or purplish. *Oryctes.*

d. Fruiting calyx enlarged, rotately expanding under the fruit. (*Saracha*).

e. Fruiting calyx not much enlarged, generally small. (*Capsicum, Salpichroa*, etc.).

2. Anthers connate or connivent, either tipped with an empty acumination or with an apical pore. (*Lycopersicum, Solanum*, etc.).

1. Margaranthus Schlecht.

Margaranthus Schlecht. Ind. Sem. Hort. Hal. 1883.

Annual smooth or slightly strigose, divergently branched herbs, much resembling *Physalis* in habit. Calyx campanulate, 5-toothed, in fruit enlarged and inflated, ribbed and reticulate, inclosing the rather dry berry. Corolla urceolate, from a narrow cylindrical base, expanding above the calyx and more or less contracted at the orifice, minutely 5-toothed. Stamens inserted at the upper end of the tubular portion, with short filaments, more or less connivent and included in the corolla, opening by 2 longitudinal slits. Style slightly exserted; stigma entire. Seeds numerous, flattened, kidney-shaped, minutely tubercled.

Corolla urceolate, much constricted at the orifice, very saccate, sinuses between the lobes narrow; anthers long, slightly tapering upward. 1. *M. tenuis.*

Corolla urceolate, less constricted at the orifice, less saccate; sinuses broad and shallow; anthers shorter, oblong; calyx about ½ the length of the corolla, in fruit about 8 mm. in diameter. 2. *M. solanaceus.*

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* These characters of the tribe are taken from Gray, Syn. Fl. 2: part 1, 224.

Corolla as in preceding, but tubular portion longer; anthers oblong; calyx larger, fully ⅔ the length of the corolla, in fruit 12–15 mm. in diameter.

3. *M. purpurascens*.

Corolla campanulate-urceolate, little if at all constricted at the orifice.

4. *M. Lemmoni.*

1. **Margaranthus tenuis** Miers, Ill. S. A. Pl. **2**: *74. pl. 57.* 1849–57; Dunal, in DC. Prod. **13**: part 1, 685.

Stem very slender, sharply angled, divaricately branched, glabrous or the upper parts slightly strigose with short hairs; leaves lanceolate, membranaceous, long-acuminate, subentire or sometimes few-toothed, tapering into a slender petiole; the short peduncles and calyx strigose; the latter campanulate, less than half the length of the corolla, its lobes short, broadly triangular; corolla urceolate, obtusely 5-angled, considerably saccate, much constricted at the orifice so that the orifice is narrower than the short cylindrical tube below, yellowish, with the sacs and the teeth tinged with purple; teeth lanceolate, divergent, the sinuses between them narrow; anthers long, half as long as the corolla, tapering upward; fruiting calyx round-ovoid, about 10 mm. long and 8 mm. in diameter.

Gray includes *M. tenuis* in *M. solanaceus*, but a comparison between Miers' figures of the first and Schlechtendal's plate of the second, is only needed to show that the structure of the flower is very different. The herbarium specimens show the same characters.

The specimens of *M. tenuis* from the original collection, the only ones I have seen, are much more slender than any of *M. solanaceus* and have much narrower leaves.

Mexico: Coulter, no. 1220. (Type).

2. **Margaranthus solanaceus** Schlecht. Ind. Sem. Hort. Hal. 1838; Linnaea, **13**: litt. 99. (1839); Dunal, in DC. Prod. **13**: part 1, 453; Gray, Syn. Fl. **2**: part 1, 237; Hemsley, Biol. Cent. Am. **2**: 24; Torr. Bot. Mex. Bound. 154; Coult. Cont. U. S. Nat. Herb. **2**: 301.

Stem slender, more obtusely angled, divaricate, slightly strigose or glabrous; leaves membranaceous, ovate or ovate-lanceolate, subentire or repandly few-toothed; peduncels short, strigose; calyx campanulate, about half the length of the corolla, its lobes broadly triangular; corolla yellowish, tinged with purple, upper portion nearly spherical, slightly saccate, less constricted at the orifice; teeth very small, sinuses between them very broad and shallow; anthers about one-fourth the length of the corolla, oblong, not tapering upward; fruiting calyx round-ovoid, of about the same size as in the preceding.

Dr. Gray includes in this, Berlandier's no. 2277, which Dunal refers to *Physalis divaricata*. These specimens do not belong to *M. solanaceus*, as they differ both in habit and leaves. There are two sheets from the original collection in the Torrey Herbarium and neither in flower. It is doubtful to which genus they belong. Very likely Dunal's determination was correct. *M. solanaceus* occurs from Texas to Arizona and Mexico. Specimens examined:

New Mexico: Bigelow, 1851 (Mex. Bound. Surv.); C. Wright, no. 1603, 1851–2; H. H. Rusby, no. 307, 1881 (in part).

Arizona: T. E. Wilcox, 1883.

Mexico: C. G. Pringle, no. 1079, 1886; no. 342, 1885.

3. **Margaranthus purpurascens** n. sp.

Stouter than the preceding, which it resembles; leaves broadly lanceolate, acuminate, thin, subentire, tapering into a slender petiole; peduncles very short; calyx campanulate-cylindrical, much larger than in the preceding, fully two-thirds the length of the corolla, lobes short-triangular; corolla yellowish, tinged with purple, with longer cylindrical portion; upper portion not fully as round as in the preceding, more tapering upward, but not as much constricted as in *M. tenuis*; lobes short, sinuses broad and shallow, anthers less than one-fourth the length of the corolla, oblong; fruiting calyx ovoid, 15–20 mm. long and 12–15 mm. in diameter, generally purplish at the base and purple-veined.

It differs from the preceding mainly in the stouter habit, in the form of the corolla, and in the form and size of the calyx.

Type specimens:

New Mexico: H. H. Rusby, no. 307, 1881. (mainly).

4. **Margaranthus Lemmoni** Gray, Proc. Am. Acad. **19**: 91. 1883; Syn. Fl. **2**: part 1, 437.

Very much branched and decumbent, more leafy than *M. solanaceus* which it much resembles; leaves entire; calyx campanulate, teeth half as long as the tube; corolla white, campanulate-urceolate, scarcely constricted at the orifice, which is obtusely 5-lobed; fruiting calyx as in *M. solanaceus*.

The only specimens extant, as far as I know, are those of the original collection, which I hastily looked at, while studying the genus *Physalis* at Harvard University. They seemed to me scarcely distinguishable from *M. solanaceus*, except in the form of the corolla, which approaches that of *Physalis* in form. Perhaps it is only a form of *M. solanaceus*.

Arizona: Cave Cañon, Lemmon.

2. Physalis L.

PHYSALIS L. Sp. Pl. 183. 1753.

ALKEKENGI Tourn.; Adans. Fam. Pl. 2: 218. 1763.

HERSCHELLA Bowdich, Excurs. Mader. 159. 1825.

ALICABON Raf. Sylva Tell. 56. 1838.

MEGISTA Tourr. in Ann. Soc. Linn. (II) 17: 115. 1869.

Annual or perennial herbs, sometimes a little woody below, with entire or sinuately toothed leaves. Peduncles slender, generally solitary from the axils of the leaves, but sometimes (as for instance in *P. Wrightii* and *P. Carpenteri*) in fascicles of 2–4. Calyx campanulate, 5-toothed, in fruit enlarged and bladdery-inflated, membranaceous, 5-angled or prominently 10-ribbed and reticulate, wholly inclosing the pulpy berry; teeth in most cases connivent. Corolla yellowish or whitish, often with a darker, brownish or purplish center, openly campanulate or rarely campanulate-rotate, plicate, with very short and broad lobes which are slightly imbricate in the bud. Stamens inserted near the base of the corolla; anthers oblong, opening by a longitudinal slit. Style slender, somewhat bent; stigma minutely 2-cleft. Seeds numerous, kidney-shaped, flattened, with a thin edge, finely pitted.

Physalis is principally an American genus. One section (*Megista*), consisting of two species, is of European origin, and about half a dozen are natives of India and Australia. The rest are American,* although several have been introduced into the Old World and Australia. The number of recognized species is about 50. The actual number is, however, much larger as there are many yet to be described. Mexico is especially rich in species and of those native to that country perhaps more than one-half remain unnamed.

* Photographs, one half natural size, have been taken of all North American species and varieties of *Physalis* except *P. Texana* and *P. Neo-Mexicana*. In some cases interesting forms have been added. What makes the set more valuable is that it includes the photographs of all type specimens preserved in American herbaria, except that of *P. angustifolia*, which is a mere fragment. The photographs number about 60, and may be had at about 15 cents each, either from Dr. Chas. E. Bessey, University of Nebraska, or from the author.

§. I. EUPHYSALIS. Flowers yellowish, often with a dark center, limb only slightly 5-lobed, pentagonal in outline; lobes of the distinctly ribbed fruiting calyx much shorter than the tube.

A. Annuals.

a. PLANTS MORE OR LESS PUBESCENT (EXCEPT *P. Barbadensis obscura*).

I. Fruiting calyx sharply 5-angled, more or less acuminate at the summit and sunken at the base; calyx-lobes (at flowering time) lanceolate or acuminate, as long as the tube or longer.

aa. Calyx-lobes ending in a subulate acumination.

Leaves broadly oval or round, sinuately dentate; calyx in fruit not unusually firm. 1. *P. subulata.*

bb. Calyx-lobes narrow, but not with a subulate tip.

Leaves ovate, oblique, acute or acuminate, subentire at the base; upper part repand or subentire; fruiting calyx small and short; stem slender, diffuse, sharply angled. 2. *P. pubescens.*

Leaves generally very oblique, cordate, strongly sinuately toothed to the base; stem stout, generally erect, obtusely angled; fruiting calyx more rounded. 3. *P. pruinosa.*

Leaves orbicular or broadly ovate, sinuately crenate, at the base scarcely cordate and scarcely oblique; stem very stout and strict; fruiting calyx broadly cordate. 4. *P. Neo-Mexicana.*

Leaves cordate, scarcely oblique, more or less abruptly acuminate, acutely repand dentate; stem tall and erect or widely spreading, acutely angled; fruiting calyx larger, long-acuminate. 5. *P. Barbadensis.*

II. Fruiting calyx obtusely or indistinctly 5–10-angled; calyx-lobes (at flowering time) triangular to lanceolate, generally shorter than the tube, except sometimes in *P. Carpenteri.*

aa. Leaves not long-acuminate.

Peduncles very short, shorter than the fruiting calyx; leaves ovate, more or less sinuately dentate. 6. *P. Lagascae.*

Peduncles 2–3 cm. long, longer than the fruiting calyx; leaves deltoid-ovate, subentire. 7. *P. Greenei.*

bb. Leaves with long acumination, subentire.

Peduncles much shorter than the fruiting calyx; flowers solitary, 4–6 mm. in diameter; fruiting calyx 2–3 cm. long. (Mex.) 8. *P. leptophylla.*

Peduncles about the length of the fruiting calyx or longer; flowers often in fascicles of 2–4, about 1 cm. in diameter; fruiting calyx 1–2 cm. long. 9 *P. Carpenteri.*

b. PLANTS GLABROUS OR THE UPPER PART SPARINGLY BESET WITH SHORT HAIRS OR IN *P. ixocarpa* SOMETIMES A LITTLE PUBERULENT WHEN YOUNG.

III. Fruiting calyx obtusely 5–10-angled, not sunken at the base; corolla yellow, sometimes with the center a little darker but never brown or purple.

aa. Peduncles generally much longer than the fruiting calyx.

Corolla rotate-campanulate, white or cream color, 10–20 mm. in diameter, leaves sinuately toothed. 10. *P. Wrightii.*

Corolla campanulate, yellow, 3–8 mm. in diameter; leaves sinuately toothed or subentire. 11. *P. lanceifolia.*

bb. Peduncles scarcely exceeding the fruiting calyx.

Corolla campanulate, yellow, 8–10 mm. in diameter; leaves sharply dentate. 12. *P. angulata.*

IV. Fruiting calyx obscurely 5–10-angled, not sunken at the base; corolla yellow with a brown or purple center.

Peduncles short, scarcely as long as the flowers, which are 1–1½ cm. in diameter; calyx-lobes broadly triangular. 13. *P. ixocarpa.*

Peduncles longer than the flowers which are 1½–2½ cm. in diameter; calyx-lobes lanceolate-triangular. 14. *P. Philadelphica.* ✓

B. Perennials.

a. Lobes of the fruiting calyx more or less connivent; flowers generally with a brownish or purplish center.

*Pubescence not stellate (although in *P. pumila* of branched hairs).

IV. Pubescence on the leaves none, on the upper part of the stem and the calyx sparse and short, if any; flowers large, 1½–2½ cm. in diameter.

aa. Fruiting calyx ovoid, nearly filled with the berry, scarcely sunken at the base.

Plant tall and erect; leaves ovate-lanceolate to broadly ovate, usually thin. 14. *P. Philadelphica.*

Plant usually tall; leaves lanceolate, oblanceolate or linear. 15. *P. longifolia.*

Plant low and spreading; leaves more or less fleshy, elliptic-oblong, tapering into a winged petiole. 16. *P. Texana.*

bb. Fruiting calyx pyramidal, very much inflated and deeply sunken at the base.

Leaves broadly ovate, usually coarsely dentate. 17. *P. macrophysa.*

V. Pubescence sparse, consisting of flat, sometimes jointed, and in *P. pumila* branched hairs, in *P. Virginiana* and *P. arenicola* sometimes a little viscid.

aa. Fruiting calyx ovoid, scarcely angled and scarcely sunken at the base; leaves thick, obovate or spatulate to rhomboid, subentire.

Leaves obovate or spatulate; hairs all simple. 18. *P. lanceolata.*

Leaves broader, inclined to be rhomboid; hairs on the lower surface of the leaves branched. 19. *P. pumila.*

bb. Fruiting calyx pyramidal, more or less 5-angled and deeply sunken at the base; leaves ovate or cordate to lanceolate, generally more or less dentate.

Fruiting calyx ovoid-pyramidal; stem stout; rootstock somewhat fleshy; leaves ovate or lanceolate. 20. *P. Virginiana.*

Fruiting calyx oblong-pyramidal or nearly cylindrical; stem and rootstock generally very slender; leaves broadly ovate to cordate, coarsely toothed and reticulate. 21. *P. arenicola.*

Fruiting calyx oblong-pyramidal; stem and rootstock very slender; leaves ovate, truncate, or rarely slightly cordate at the base, subentire; veins not prominent. 22. *P. ciliosa.*

VI. Pubescence dense, short, more or less viscid or glandular (except in *P. Peruviana*), often mixed with long flat jointed hairs.

aa. Pubescence not viscid, short, peduncles much shorter than the leaves.

Leaves large, cordate, generally long-acuminate; anthers generally purple. 23. *P. Peruviana.*

bb. Pubescence more or less glandular or viscid, in the first two mixed with long jointed hairs; peduncles much shorter than the leaves.

Leaves large; blade generally over 5 cm. long, generally more or less cordate; anthers generally yellow, but sometimes purple. 24. *P. heterophylla.*

Leaves less than 5 cm., rounded ovate or rhombic, scarcely at all cordate at the base; calyx, peduncles and younger branches with long white flat and jointed hairs. 25. *P. comata.*

Leaves small, less than 5 cm., reniform or cordate, coarsely toothed, calyx, etc., finely and densely viscid pubescent, seldom with any long hairs; stem rarely diffuse. 26. *P. hederæfolia.*

Leaves small, 2–4 cm. in diameter, nearly orbicular, sometimes a little cordate at the base, not coarsely toothed; stem diffuse or prostrate. 27. *P. rotundata.*

cc. Pubescence fine, more or less glandular or viscid; peduncles often as long as the subtending leaves or longer.

Leaves oblong to ovate cordate. 28. *P. muriculata.*

**Pubescence more or less stellate.

VII. (The stellate character of the pubescence is scarcely distinguishable by the naked eye, and is sometimes obscure even under the lens, except on the calyx or at least on the margin of its lobes).

aa. Pubescence dense, beautifully stellate.

Leaves cordate, reniform or round, more or less angulately toothed. 29. *P. mollis.*

Leaves elliptic, sometimes a little cordate at the base, to spatulate or oblanceolate, subentire or repand. 30. *P. viscosa.*

bb. Pubescence very fine, partly of stellate, and partly of simple hairs.

Leaves deltoid or cordate, coarsely toothed. 31. *P. Fendleri.*

Leaves elliptic oblong, subentire. 32. *P. fuscomaculata.*

cc. Plant often perfectly smooth, except on the margins of the calyx-lobes, rarely stellate all over when young.

Leaves oblong, oblanceolate or spatulate, or in luxuriant specimens even oval, thin; lateral veins distinct. 33. *P. Elliotti.*

Leaves linear, thick; mid-rib prominent, but lateral veins obsolete. 34. *P. angustifolia.*

b. FRUITING CALYX RETICULATE, OPEN, ITS LOBES NOT CONNIVENT; PUBESCENCE, IF ANY, SHORT AND FINE.

VIII. Corolla yellowish with a darker center, in age turning purple; leaves not fleshy.

Leaves reniform-cordate to ovate, nervose. 35. *P. versicolor.*

IX. Corolla yellow, generally without darker center; leaves more or less fleshy, small.

Leaves oblong or cordate. 36. *P. crassifolia.*

Leaves lanceolate, more or less hastate at the base. 37. *P. hastata.*

§ 2. MICROPHYSALIS. Flowers yellowish; fruiting calyx small, not ribbed, open at the mouth, its lobes equalling or exceeding the tube. Plant covered with long viscid hairs.

Leaves small, ovate or cordate repand crenate; peduncles very short.
38. *P. microphysa.*

§ 3. MAGISTA. Flowers whitish, limb more decidedly 5-lobed. Plant tall, hirsute or glabrate.

Leaves large, broadly deltate. 39. *P. Alkekengi.*

§ I. EUPHYSALIS.

I. *Pubescentes:* Annuals; root much branched, generally weak; fruiting calyx sharply 5-angled, more or less acuminate at the summit, and sunken at the base; calyx-lobes (at flowering time) lanceolate or acuminate, as long as the tube or longer; plant somewhat villous or viscid pubescent (except in *P. Barbadensis obscura*).

1. **Physalis subulata** Rydb. Bull. Torr. Club, 22: 306. 1895.

Annual from a branching root, erect, dichotomously branched, 2–4 decimeters high, stem angular and striate; leaves round-ovate, somewhat oblique at the base, generally coarsely dentate; peduncles shorter than the small corolla, which is 2–3 millimeters in diameter; calyx-lobes shorter than the corolla, ending in a subulate acumination; fruiting calyx sharply angled and purple-veined, heart-shaped in section.

This is intermediate between *P. Barbadensis* and the South Mexican *P. nicandroides* Schlecht. From the former it differs in the more glandular pubescence, and the long acumination of the calyx-lobes; from the latter in its smaller rounder leaves, in its calyx-lobes, which are shorter than the corolla, and in the fruiting calyx, which is smaller and not of a firm texture.*

P. subulata has not yet been collected within the United States, but comes near to its border.

Mexico, State of Chihuahua: C. G. Pringle, no. 1344, 1887 (type). It is in the following herbaria: Columbia University; Harvard University; College of Pharmacy, New York City; University of Minnesota, and Professor Greene.

2. **Physalis pubescens** L. Sp. Pl. 183. 1753; Ed. 2: 262; Lam. Enc. Meth. 2: 101; Roem. & Sch. Syst. Veg. 4: 675; Willd. Sp. Pl. 1: 1023; Enum. Hort. Ber. 1: 232; Pursh, Fl. Am. Sept. 157; Eat.† Man. Ed. 5: 329; Ed. 6: 263; Eat. & Wr. N. A. Bot. 357; Nees†, Linnaea 6: 467; Don. Gard. Dict. 4: 449;

* Another related Mexican species is *P. hirsuta* Mart. & Gal., not Dunal. It differs from *P. subulata* in its larger, less veiny fruiting calyx, from *P. nicandroides* by the calyx, which is not of a firm texture, and from both by its subentire leaves. It most resembles *P. pubescens*, but differs in its subulate calyx-tips.

† These references apply also partly to *P. Barbadensis* and *P. pruinosa.*

Walp. Rep. 3: 24; Gray*, Man. Ed. 2: 340; Ed. 5: 381; Bot. Cal. 1: 541; Proc. Am. Acad. 10: 64; Syn. Fl. 2: part 1, 234; Wats. & Coult*., Gray, Man. Ed. 6 375; Coulter, Man. Rocky Mt. 270 (in part); Nutt. Trans. Am. Phil. Soc. (II.) 5: 193; (1834). Wood, Class-Book, 579 (1863); Bot. & Flor. 264 (1873); Chapman*, Fl. So. U. S. 351; Coulter*, Cont. U. S. Nat. Herb. 2: 300.

P. ramosa Mill. Gard. Dict. Ed. 8: no. 9; Willd. Sp. Pl. 1: 1023.

P. hirsuta Dunal, in DC. Prod. 13: part 1, 445. 1852; Darby, Bot. So. St. 451; not Mart. & Gal.†

Alkekengi procumbens Moench, Meth. 2: 473. 1794.

Stem generally diffuse or spreading, much branched, angled, often a little swollen at the nodes, villous-pubescent or sometimes nearly glabrous; leaves thin, 2–6 cm. long, ovate, acute or acuminate, at the base oblique, slightly cordate and generally entire, upwards repand-denticulate or entire, pubescent, sometimes becoming nearly glabrous except along the veins; peduncles short, 3–5 mm., or in fruit about 1 cm. long; calyx-lobes narrow but not with a subulate tip; corolla 5–10 mm. in diameter yellow with dark centre; anthers usually purplish; fruiting calyx membranaceous, 2–3 cm. long, pyramidal, ovoid-acuminate and more or less retuse at the base.

From Pennsylvania and Florida to California; also in Mexico, Central and South America and India. Specimens from New Mexico, Arizona and Mexico sometimes have a little thicker leaves and longer petioles. They have been labelled *P. montana* by Prof. Greene, but can scarcely be distinguished from some eastern forms.

The following specimens have been examined:

Maryland: Wm. M. Canby, 1863.

Pennsylvania: S. W. Knipe, 1869; Porter, 1869.

District of Columbia: J. W. Chickering; W. M. Canby, 1881.

Virginia: G. Vasey, 1874; Wm. M. Canby, 1878.

Georgia: Chapman, 1884.

Florida: Chapman; J. Donnell Smith; A. P. Garber, 1877.

Tennessee: A. Gattinger, 1887.

Ohio: Wm. Cooper, 1828; Wm. C. Werner, no. 141, 1888.

*These references refer also partly to *P. Barbadensis* and *P. pruinosa*.

†Bull. Brux. 12, 1: 132. 1845.

Indiana: A. H. Young, no. 40 (in part), 1875.

Illinois: J. Wolf, 1881.

Iowa: Wm. Booth, 1859.

Wisconsin: Wm. M. Canby, 1868.

Missouri: Riehl, No. 7, 1838; Engelmann, no. 325, 1841; Bush, 1887, 1893; Eggert, 1893.

Kansas: ? J. E. Bodin, 1891.

Arkansas: H. E. Hasse, 1886; Nuttall.

Texas: Vinzent, no. 107; J. Reverchon, 1874.

New Mexico: H. H. Rusby, no. 310 (*P. montana*), 1881; Wright, No. 1601.

Arizona: E. L. Greene, no. 446, 1880 (*P. montana* Greene).

California: K. C., 1883; C. R. Orcutt, 1883; Maj. Thomas.

Cuba: Wright, no. 3022, 1860–4.

Jamaica: Hitchcock, 1890.

Panama: A. Fendler, no. 248, 1850.

Mexico: E. L. Greene, 1880; Ed. Palmer, no. 140 (in part), 1885.

Venezuela: A. Fendler, no. 2100, 1856–7.

Loo Choo Islands: C. Wright, no. 199, 1853–56.

3. **Physalis pruinosa** L. Sp. Pl. 184. 1753; Ed. 2: 263; Willd. Sp. Pl. **1**: 1024; Spreng. Syst. Veg. **1**: 698; Roem. & Sch. Syst. Veg. **4**: 678.

P. obscura viscido-pubescens Michx. Fl. Bor. Am. 1: 149, partly (?).

P. pubescens Dunal, in DC. Prod. **13**: part 1, 446. 1852, as to the description, but not the synonyms, also American authors; (?) Ell. Bot. S. Car. and Ga. **1**: 280.

P. hirsuta repando-dentata Dunal, in DC. Prod. **13**: part 1, 445. 1852, in part.

P. pubescens β. Nees, Linnaea, **6**: 467, in part.

P. pubescens β. pruinosa Don, Gard. Dict. **4**: 449. 1838 (in part).

? *P. villosa* Roth, Nov. Pl. Sp. 122, 1821; not Mill.*

? *P. Rothiana* Roem. & Sch. Syst. Veg. **4**: 677. 1819.

? *P. viscosa* Ell. Bot. S. C. and Ga. **1**: 279. 1817.

Stout, generally erect and more hairy than the preceding and the next two; stem obtusely angled, finely villous or somewhat viscid; leaves firm, 3–10 cm. long, finely pubescent, ovate cordate,

*Gard. Dict. Ed. 8: no. 14, 1768.

generally very oblique at the base, and deeply sinuately toothed with broad and often obtuse teeth; peduncles 2–4 mm., in fruit about 1 cm.; calyx villous or viscid: lobes as long as the tube, narrow but not subulate-tipped; corolla 3–8 mm. in diameter; anthers yellow or tinged with purple; fruiting calyx of a little firmer texture and more pubescent than in the preceding, reticulate, 2–3 cm. long, ovoid, cordate; berry yellow or green.

The pubescence of the stem is often dense and whitish, but only apparently pruinose. It extends farther north than either *P. pubescens* or *P. Barbadensis*, ranging from Massachusetts to Iowa, Missouri and Florida. No specimens seen either from Mexico or the West Indies.

Massachusetts: W. Deane, 1884; Morong, 1878; Harvard Bot. Garden, 1878.

Connecticut: Miss F. W. Wilson, no. 391, 1892.

New York: T. F. Lucy; A. W. Young, 1892; M. Ruger, 1868.

New Jersey: C. F. Parker, 1870.

Pennsylvania: J. K. Small, 1889.

Delaware: Wm. M. Canby, 1871; A. Commons, 1877.

Virginia: A. H. Curtiss, 1871, 1872.

North Carolina: Beardslee & Kofoid, 1891.

Georgia: Chapman, 1864; J. K. Small, 1895.

Florida: Chapman.

Tennessee: A. Ruth, 1894; Kearney, 1891.

Kentucky: C. W. Short.

Illinois: E. Hall, 1872.

Missouri: Engelmann, 1841; B. F. Bush, 1888.

Kansas: Kellerman, 1888.

Iowa: A. S. Hitchcock, 1875, 1889.

Wisconsin: T. J. Hale, 1861; L. H. Pammel, 1883.

Michigan: Agricultural College, 1886.

*Washington:** L. F. Henderson, no. 2496, 1892; W. H. Suksdorf, no. 2285, 1894.

4. Physalis Neo-Mexicana.

P. pubescens Porter & Coulter, Syn. Fl. Colo. 110. 1874; Coulter, Man. Rocky Mts., 270, in part. Not L.

* Probably introduced.

Stem stout and strict, obtusely angled; pubescence very fine, dense and short, scarsely viscid; leaves 3–5 cm. long, thicker than in the preceding, broadly ovate or orbicular, very obtuse, scarcely cordate at the base, scarcely at all oblique, sinuately crenate; peduncles very short, even in fruit scarcely more than 2 cm. long; calyx finely pubescent, calyx-lobes lanceolate but not subulate-acuminate; fruiting calyx of a firmer texture than the three preceding, more sharply angled and deeper sunken at the base than in *P. pruinosa.*

This species is very near related to *P. pruinosa*, and has been labeled by me *P. pruinosa neomexicana* in the herbaria, but as its range is widely separated from that of *P. pruinosa*, it is perhaps best to regard it as distinct. It differs in the strict habit, the finer pubescence, the shorter, more round and obtuse leaves and the sharper angled fruiting calyx, which resembles that of *P. subulata*, but does not have the subulate tips characteristic of that species. The following specimens have been examined:

New Mexico: Fendler no. 679 and 678 in part, 1847; E. L. Greene, no. 213, 1880; Vasey, 1889; Chestnut & Drew.*

Colorado: Brandegee (Porter & Coult. Syn. Fl. Colo. 110), Miss Mulford, 1892.*

Lower California: C. R. Orcutt, 1883.

5. **Physalis Barbadensis** Jacq. Misc. 2: 359. 1781; Ic. Rar. 1: *t.* 39; Willd. En. Hort. Ber. 1: 232; Sp. Pl. 1: 1023; Roem. & Sch. Syst. Veg. 4: 676; Spreng. Syst. 1: 697 (in part); Mart. & Gal. Bull. Brux. 12: 13.

?*P. patula* Miller, Gard. Dict. Ed. 8: no. 12, acc. to Dunal; Don, Gard. Dict. 4: 451; Walp. Rep. 3: 27.

P. obscura viscido-pubescens Michx. Fl. Bor. Am. 1: 149. 1803.

P. obscura pubescens Pursh, Fl. Am. Sept. 157. 1814.

P. pubescens American authors (in part).

P. pubescens β Nees, Linnaea, 6: 467 (in part) 1831; Sendtn. in Mart. Fl. Bras. 2: 132.

P. pubescens β. pruinosa Don, Gard. Dict. 4: 449. 1838 (in part).

P. hirsuta Barbadensis Dunal, in DC. Prod. 13: part 1, 446. 1852.

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* These specimens are doubtfully referred here. The material is too poor for a definite determination.

P. pruinosa L. Sp. Pl. Ed. 2: 263 (in part) 1762; Ell. Bot. S. Car. and Ga. 1: 279. 1817.

Alicabon Barbadense Raf. Sylv. Tell. 57. 1838.

Stem stouter than in *P. pubescens*, tall and erect or widely spreading, acutely 3–4-angled, pubescent, viscid or sometimes nearly glabrous; leaves 3–6 cm. long, heart-shaped, acute or generally abruptly acuminate, sharply repand dentate, pubescent with short hairs; peduncles short, 3–4 mm., in fruit sometimes 2 cm. long; calyx generally densely viscid-hirsute, lobes lanceolate, acuminate, but not subulate-tipped; corolla 5–10 mm. in diam.; anthers generally purplish; fruiting calyx longer than in the four preceding, 2½–3 cm. long, acuminate and reticulate, retuse at the base.

P. Barbadensis has been known in our herbaria either as *P. pubescens* L. or as *P. obscura*, Michx. It is most nearly related to the latter, differing only in the pubescence. They are evidently only varieties of the same species, which must take the name *P. Barbadensis* Jacq., which is the older. *P. Barbadensis* is in habit intermediate between *P. pubescens* and *P. pruinosa*, but differs from both in the more elongated fruiting calyx. Its distribution is from North Carolina and southern Illinois to Mexico, the West Indies and South America. The following specimens have been examined:

Florida: Blodgett; Chapman; A. P. Garber, 1877; G. V. Nash no. 1251, 1894.

North Carolina: Darlington.

Pennsylvania: S. W. Knipe, 1869.

South Illinois: Geo. Vasey.

Missouri: Engelmann, 1847; Bush, no. 49, 1888; Weller, 1890.

Indian Territory: Butler, 1877.

Louisiana: Dr. Ingalls; Hale; Teinturier.

Texas: Crawford, 1893; Mex. Bound. Surv. no. 1019 (in part).

Mexico: C. E. Lloyd; E. Palmer, no. 140, 1885; no. 473, 1886; no. 14, 1887; no. 433, 1894.

Venezuela: A. Fendler, no. 1013, 1854-5.

Cuba: C. Wright, no. 3635.

Physalis Barbadensis obscura (Michx.).

P. angulata Walt. Fl. Car. 99. 1788, not L.; Nees, Linnaea, 6: 474 (in part); Walp. Rep. 3: 25; Wood, Class-book, 579 (1863); Bot. and Flor. 264 (1873).

P. obscura Michx. Fl. Bor. Am. 1: 149. 1803; Pursh, Fl. Am. Sept. 157; Poir. Enc. Meth. Suppl. 2: 347; Roem & Sch. Syst. 4: 677; Eat. Man. Ed. 3: 390; Ed. 5: 328; Ed. 6: 263; Beck, Bot. 258; Don, Gard. Dict. 4: 451; Walp. Rep. 3: 27; Gray, Proc. Am. Acad. 10: 64; Syn. Fl. 2: part 1, 234; Eaton & Wr. N. Am. Bot. 357; Coult. Cont. U. S. Nat. Herb. 2: 300.

P. Brasiliensis Sendtner, in Mart. Fl. Bras. 10: 131. 1854. See Gray, *l. c.*

P. hirsuta repandodentata Dunal, in DC. Prod. 13: part 1, 445. 1852, in part.

Greener; perfectly smooth or sometimes minutely pubescent, when it grades into *P. Barbadensis* proper.

The distribution is about the same as that of the species.

Georgia: Chapman, No. 80.

Florida: Chapman, 1889.

Alabama: C. Mohr, 1878.

Louisiana: A. B. Langlois, 1880.

Tennessee: A. Gattinger.

Arkansas: A. E. Heacox, 1889.

Texas: E. Hall, no. 503, 1872.

Missouri: Eggert, 1893; B. F. Bush, no. 98, 1893.

Mexico: Schott, no. 5, 1864.

Cuba: Wright, no. 3635 (in part).

Jamaica: Hitchcock.

St. Vincent: H. H. & G. W. Smith, 1328a & 1329, 1890.

Porto Rico: I. Urban, no. 745, 1885.

II. *Leptophyllae:* Annuals; root branched and weak; fruiting calyx obtusely or indistinctly 5–10-angled, scarcely sunken at the base; calyx lobes (in flowering time) triangular to lanceolate, generally shorter than the tube, except sometimes in *P. Carpenteri.* Plants generally more or less pubescent.

7 6. **Physalis Lagascae** Roem. & Sch. Syst. Veg. 4: 679. 1819.

P. minima Roxb. Fl. Ind. 1: 563, 1820 not L.;* Nees, Linnaea 6: 479; Don, Gard. Dict. 4: 450 (in part); Walp. Rep. 3: 26; Dunal, in DC. Prod. 13: part 1, 445.

P. parviflora Lag. Gen. & Sp. 11, no. 147. 1816. Not R. Br.†

P. villosa Roth, Nov. Pl. Sp. 122, 1821, not Mill.

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*Sp. Pl. 183. 1753.

† Prod. Nov. Holl. 447. 1810.

?*P. Rothiana* Roem. & Sch. Syst. Veg. 4: 677. 1819.

P. pubescens Wats. & Coult. in Gray, Man. Ed. 6: 375, as to B. F. Bush's plant.

Stem spreading, often zigzag, branched, striate or slightly angled, villous with short hairs; leaves 1–8 cm. long, ovate, oblique and cuneate, obtuse, or cordate at the base, acute but not acuminate, repand or sinuately dentate, hairy at least on the veins; peduncles 1–5 mm., erect, in fruit 5–10 mm., reflexed, shorter than the fruiting calyx; calyx villous, lobes shorter than the tube, triangular; corolla 3–8 mm. in diameter, yellow, generally with a dark centre, anthers generally yellow; fruiting calyx 1½–2 cm. long, round-ovoid, nearly filled with the berry, not sunken at the base.

Resembles most *P. pubescens* and *P. pruinosa* but differs by its short calyx-lobes and the fruiting calyx, which is neither sharp-angled nor sunken at the base. It is a native of Mexico, the West and East Indies; in the United States, probably only introduced. Specimens examined:

Kansas: W. A. Kellerman no. 44, no. 47, 1882; W. T. Swingle, 1887; E. K. Popenoe, 1879; Stuart Weller, 1887; Gattinger, 1884.

Missouri: H. Eggert, 1887, 1891; B. F. Bush, 1887, 1888, and 1893, no. 25, no. 1023; J. W. Blankinship, 1893; Engelmann, 1841 and 1847; A. E. Heacox.

Arkansas: Engelmann.

Indian Territory: J. E. Bodin, 1891.

West Indies: Wright, no. 1590.

7. **Physalis Greenei** Rose, Cont. U. S. Nat. Herb. 1: 18. 1890.

P. pedunculata Greene, Pittonia 1: 268. 1889. Not Mart. & Gal.*

Erect-spreading, the flexuous branches angular, 2–3 dm. long; leaves ovate or rhombic, acute, but not long-acuminate, entire or with few shallow teeth, 2–3 cm. long, the slender petioles of about the same length as the blade; corolla greenish yellow, 12–15 mm. in diameter; fruiting calyx 1–1½ cm. long, pendulous on the long peduncle, which exceeds it in length.

Mexico, Cedros Island: Lieut. C. F. Pond, 1889 (Type of *P. pedunculata* Greene); Dr. Sheets; *Lower California:* Edw. Palmer, no. 561, 1887; *Carmen Island:* Edw. Palmer, no. 10, 1870.

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* Bull. Brux. 12: 132. 1845.

California: O. D. Allen, no. 11, 1884 (Harvard University herbarium); M. E. Jones, no. 88, 1882.*

8. **Physalis leptophylla** Robinson & Greenman, Proc. Am. Acad. **29**: 389. 1894.

Stem sometimes slightly woody below, striate, finely pubescent; leaves ovate, entire, abruptly long-acuminate, obtuse or cordate at base, green, of a delicate texture, often nearly glabrous except the ciliate margins; peduncles solitary, shorter than the fruiting calyx, calyx-teeth short, ovate; corolla apparently whitish with a dark spot at the base, 4–6 mm. long; fruiting calyx 2–3 cm. long.

I have seen no roots of this species and cannot tell if it is an annual or not, but otherwise it comes nearest to the two preceding. It is a native of northern Mexico. Specimens examined:

Mexico, Sonora: Edw. Palmer, 709, 1890; W. G. Wright, no. 1252, 1889; C. G. Pringle, no. 5455, 1893.

9. **Physalis Carpenteri** Riddell,† Chapman in Coulter's Bot. Gaz. **3**: 11, as synonym. 1878.

Withania Morisoni Chapman *l. c.*, not Dunal.

Athenaea sp. Gray. Syn. Fl. **2**: part 1, 233. 1878.

Stem tall, erect, branching above, somewhat angled and striate, closely and finely puberulent; leaves very thin, oval or ovate, abruptly contracted into a long acumination, entire or slightly wavy, nearly smooth or puberulent, much resembling those of *P. leptophylla*, somewhat cordate and oblique at the base; peduncles about 1 cm. long, very slender; flowers often in fascicles of 2–4; corolla about 1 cm. wide, open-campanulate; fruiting calyx small, only 1 cm. in diameter, nearly globose, scarcely angled and faintly nerved; the lobes sometimes very unequal.

P. Carpenteri is very variable. Among the few specimens found in our herbaria, viz.: those of Columbia University, Harvard University and the Missouri Botanical Garden, there are several forms. In some the leaves are very broad, in others narrower; in some the flowers are solitary, in others in fascicles; in some the calyx-lobes are short and equal, in others much elongated and unequal; but without doubt they all belong to one species.

* Doubtfully referred here. The leaves are unusually large for this species. As there is no fruit, the determination is uncertain. Mr. Jones' specimens are labeled *Chamaesaracha* sp.

† In Riddell's Cat. Fl. Ludov. in N. O. Med. and Surg. Jour. **8**: 758. 1852, *P. Carpenteri* is a *nomen nudum*.

Louisiana: Riddell; Buckley; Dr. Ingalls, 1835; Curtiss, 1886.

Alabama: Buckley.

Florida: Nash, no. 2503, 1895.

III. *Angulatae*: Annuals with a branching root, glabrous or the upper parts sparingly beset with short hairs; fruiting calyx on a slender peduncle, obtusely 5–10-angled, not sunken at the base; flowers yellowish or whitish, sometimes with the center a little darker but never brown or purple.

10. **Physalis Wrightii** Gray, Proc. Am. Acad. **10**: 63. 1874; Syn. Fl. **2**: part 1, 234; Coulter, Cont. U. S. Nat. Herb. **2**: 299.

Chamaesaracha physaloides Greene, Bull. Torr. Bot. Club, **9**: 122. 1882; Gray, Syn. Fl. **2**: part 1, 437.

Stem erect or ascending, 1–10 dm. high, branched, angled, smooth or the upper parts sparingly beset with short hairs; leaves as in the next but generally more deeply sinuately toothed, broader and with stronger veins; peduncles and fruiting calyx as in the next; calyx-lobes lanceolate, generally longer than the tube; corolla 10–20 mm. in diameter, widely rotate-campanulate, according to Gray l. c. "apparently white," according to Greene, l. c., cream color, and according to Lemmon on the herbarium label, white with yellowish throat (in the herbarium specimens it is light sulphur yellow).

The original specimens of Gray are in an undeveloped and perhaps depauperate state. The better developed specimens of later collections are generally labelled *P. angulata Linkiana*, to which it bears scarcely any relationship.

The following specimens have been examined:

Texas: C. Wright, no. 1602, 1851–2; Schott, no. 28.

Arizona: Pringle (broad-leaved) 1884, 1894; Palmer, no. 203, 1867; Engelmann, 1880; Lemmon, 1881, with *Quincula lobata.*

New Mexico: Vasey, 1889; Wright, no. 1602, 1851–2.

California: Buckmeister, 1881 (Type of *Chamaesaracha physaloides* Greene); Lemmon no. 294, and no. 10, 1880.

Mexico: Palmer, no. 175, 1887; C. V. Hartman, no. 63, 1894.

11. **Physalis lanceifolia** Nees, Linnaea **6**: 473. 1831; Don, Gard. Dict. **4**: 450; Walp. Rep. **3**: 25; Dunal, in DC. Prod. **13**: Part 1, 477; Schlecht. Linnaea, **19**: 309. 1847.

P. angulata Ruiz & Pav. Fl. Peruv. **2**: 43. 1799, and American authors in part, as Coulter Cont. U. S. Nat. Herb. **2**: 300; not L.

Erect, generally one-half meter high, branched; stem angled, glabrous; leaves in the typical form lanceolate, subentire or slightly toothed; calyx cylindrical-campanulate, lobes broadly triangular, shorter than the tube; peduncles filiform, about 2 cm. long, erect with nodding flower, in fruit 4–5 cm. long and reflexed; corolla 5–8 mm. in diameter, campanulate, yellow, without a dark spot; anthers yellow, more or less tinged with purple; fruiting calyx about 2 cm. long, rounded ovoid, indistinctly 10-angled and purple-veined, nearly filled with the berry.

It is a native of Peru, Mexico, etc. No specimens of the typical form have been collected in the United States. The only specimens approaching it are those collected by Rugel near St. Mark's River, Florida (Herbarium of Missouri Botanical Garden), but these have much narrower leaves.

Two forms are found, however, in the United States, which come nearer to this species than to any other, although they connect it with *P. Wrightii* and *P. angulata* respectively.

In the first the leaves are more or less sinuately toothed and often more strongly veined, resembling those of the preceding species, which it also resembles in general habit and in the sparse scabrous hairs on the upper parts, but differs in the small flowers (only 3–5 mm. in diameter), which in form perfectly agree with the true *P. lanceifolia*, that is, they are truly campanulate. The following specimens belong to this form:

Arizona: Lemmon, 1881 (in part); Dr. Smart, no. 375, 1867; Loew, 1875; Maj. Thomas; Schott, no. 2. (The last two, doubtfully referred to *P. Wrightii*, by Dr. Gray, Proc. Am. Acad. **10**: 63).

California: K. C., 1883; C. R. Orcutt, no. 2069, 1890.

Texas: E. Hall, no. 504, 1872; Chas. Wright, no. 529, 1849 (locality not given).

The other form connects *P. lanceifolia* with *P. angulata*. The leaves are broader than in the typical form and often with sharp teeth as in *P. angulata*, but the very long peduncles, small round fruiting calyx, and general habit, make it more nearly related to *P. lanceifolia*. Its range is much more northern than that of the typical *P. lanceifolia* and more northwestern than that of *P. angulata*, as can be seen from the following specimens studied:

Illinois: Vasey, 1862.

Missouri: Engelmann, 1841; A. Geyer, 1841 (both in the herbarium of Mo. Bot. Garden); H. Eggert, 1877 (herb. J. Donnell Smith).

Arkansas: F. L. Harvey, no. 65 (herb. Univ. Nebraska); H. E. Hasse, 1886 (herb. Univ. Tennessee).

Texas: H. 1862 (herb. Mo. Bot. Garden).

12. **Physalis angulata** L. Sp. Pl. 183. 1753; Ed. **2**: 262; Mill. Gard. Dict. Ed. 8: no. 10; Lam. Enc. Meth. **2**: 101; Spreng. Syst. Veg. **1**: 697 (in part); Willd. Sp. Pl. **1**: 1022; Enum. Hort. Ber. **1**: 232; Roem. & Sch. Syst. Veg. **4**: 676; Don. Gard. Dict. **4**: 450; Walp. Rep. **3**: 25; Nees, Linnaea, **6**: 474 (in part); Dunal in DC. Prod. **13**: part 1, 448; Gray, Man. Ed. **2**: 339; Ed. 5: 381; Proc. Am. Acad. **10**: 64; Syn. Fl. **2**: part 1, 234; Wats. & Coult. in Gray, Man. Ed. 6: 375; Ell. Sk. Bot. S. C. and Ga. **1**: 278; Chapman, Fl. So. St. 351; Coult. Man. Bot. Rocky Mt. 269 (in part).

P. dubia Link, Enum. Hort. Berol. **1**: 181, 1821; not Gmelin.

P. Linkiana Nees, Linnaea, **6**; 471. 1831; Don, Gard. Dict. **4**: 449; Walp. Rep. **3**: 25; Dunal in DC. Prod. **13**: part 1, 448; Sendt. in Mart. Fl. Bras. **10**: 131; Wood, Class Book 579, 1863; Bot. and Flor. 264, 1873.

P. arenaria Nees. l. c. as synonym.

P. Peruviana and *P. minima* Wallr. Cat. acc. to Nees, l. c. and Dunal, l. c.

P. angulata Linkiana Gray, Proc. Am. Acad. **10**: 64. 1875; Syn. Fl. **2**: part 1, 234.

P. ciliata Sieb. & Zucc. Fl. Jap. Fam. Nat. **2**: 22, 1846; acc. to Kew Index.

Erect, ½–1 m. high, glabrous, stem angular; leaves ovate, with more or less cuneate base, somewhat sinuately toothed with long acuminate teeth; blade 4–7 cm. long, on slender, 2–4 cm. long petioles, thin, veins not prominent; peduncles slender, 2–3 cm., erect, in fruit often reflexed but seldom exceeding the fruiting calyx in length; calyx smooth, lobes triangular to lanceolate, generally shorter than the tube; corolla 5–10 cm. in diameter; anthers more or less purplish tinged; fruiting calyx about 3 cm. long, ovoid, not prominently 5–10-angled, sometimes purple-veined and at last nearly filled with the yellow berry.

Its range extends from North Carolina to Texas, Central America, Brazil and the West Indies; also in India.

North Carolina: G. McCarthy, no. 18, 1885; Darlington; Wm. M. Canby, 1867.

South Carolina: T. C. Porter, (a narrow-leaved form); Ravenel; M. A. Curtis.

Florida: Blodgett; Chapman, no. 115; A. H. Curtiss, no. 1043, 1876; no. 2208; G. V. Nash, no. 1052, 1894; A. W. Chapman.

Georgia: J. K. Small, 1894.

Louisiana: Riddell; S. T. Olney; Hale.

Illinois: H. Eggert.

Indian Territory: Bush, no. 397, 1894.

Cuba: C. Wright, no. 3637, 1865, etc.

Jamaica: Hitchcock, no. 1130, 1892.

St. Thomas: Eggers, no. 295, 1830.

Panama: Fendler, no. 247, 1850.

British Guiana: Jenman, no. 5155.

Brazil: Saint-Hilaire, no. 41 B, 1816–21.

Peru: Wilkes Exp., 1838–42.

IV. *Philadelphicae:* Annuals with a branching root or perennials with a thick more or less fleshy rootstock; fruiting calyx (except in *P. macrophysa*) indistinctly 5–10-angled and seldom sunken at the base; flowers large, 1–2½ cm. in diameter, yellow with a brown or purple center; pubescence on the leaves none, on the upper part of the stem and the calyx sparse and short, if any, or in young plants of the first species sometimes finely puberulent.

12. **Physalis ixocarpa** Brot.* Horneman, Hort. Hafn. Suppl. 26. 1819.

P. *aequata* Jacq. f.; Nees in Linnaea, **6**: 470. 1831; Don, Gard. Dict. **4**: 449; Jacq. f. Ecl. **2**: *t. 137.* 1844; Walp. Rep. **3**: 25; Schiede & Schlecht. Linnaea, **19**: 309; Dunal in DC. Prod. **13**: part 1, 447; Gray, Proc. Am. Acad. **10**: 64; Syn. Fl. **2**: part 1, 234; Bot. Cal. **1**: 541. Coulter, Cont. U. S. Nat. Herb **2**: 300; S. B. Parish, Zoe, **1**: 122.

P. Philadelphica minor Dunal in DC. Prod. **13**: Part 1, 450. 1852.

At first erect, later widely spreading, much branched; stem angled, glabrous or the younger parts sparingly hairy; leaves from cordate to ovate with cuneate base, which is somewhat oblique, sinuately dentate or entire, 3–6 cm. long; peduncles short, 2–5 mm.; calyx sparingly hairy, lobes short, broadly triangular, shorter

* The name was published in 1183 in DC. Cat. Hort. Monsp.

than the tube; corolla bright yellow with purple throat, 1–1½ cm. (sometimes nearly 2 cm.) in diameter; fruiting calyx rounded ovoid, obscurely 10–angled, often purple-veined, at last often filled with the purple berry, which sometimes bursts it.

P. ixocarpa is a native of Mexico and bordering states. It is often cultivated for its fruit and escapes frequently from cultivation. The cultivated specimens have often larger flowers and more sinuately toothed leaves, and have often been mistaken for *P. Philadelphica*, from which it can be distinguished by its short peduncles which are scarcely longer than the calyx, and by its short and broad calyx-lobes.*

The following specimens have been examined:

Native:

California: Dr. T. Coulter, no. 584; Parry and Lemmon, 1876; J. C. Nevin, 1878; Engelmann, 1880; S. B. and W. F. Parish, no. 585, 1882; 1888; W. G. Wright, 1889; C. P. Bingham, no. 29; S. B. Parish, 1893; Dr. E. Hasse, 1887.

Colorado: Brandegee, 1873.

New Mexico: Fendler, no. 680, 1847.

Texas: Berlandier, no. 857; C. Wright, 1848.

Mexico: Dr. J. Gregg, no. 308, 1848; Thurber, no. 852, 1852; Bourgeau, no. 871 and 2694, 1865-6; J. G. Schaffner, no. 701. 1876; H. E. Seaton, no. 453, 1891; Halsted; E. Kerber, no, 288A; Parry and Palmer, no. 640 and 646, 1878; Palmer, no. 946, 1880; no. 1 and 2, 1886; W. G. Wright, no. 1253, 1889; Pringle, no. 896, 1886.

Cuba: C. Wright, no. 36361.

Introduced or cultivated:

Massachusetts: W. Deane; Harvard Botanic Garden.

New York: Geneva (Nat. Herb. nos. 126164 and 126165), 1887; T. F. Allen.

New Jersey: C. F. Parker, 1874.

Pennsylvania: Martindale, 1876, 1879, Parker, 1874.

District of Columbia: Richardson, 1878.

Maryland: J. Donnell Smith, 1876.

Virginia: Schriver, no. 38, 1882.

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* Specimens collected by W. N. Suksdorf (no. 2284) in W. Klickitat county, Wash., has the general habit and leaves of *P. Philadelphica*, the short peduncles and fruit of *P. ixocarpa* and the flowers intermediate between the two. It may be distinct but the material is incomplete.

Ohio: Beardslee.

Missouri: Engelmann, 1880.

Illinois: Engelmann, 1881.

Michigan: Bailey, 1884; no. 4, 1887.

Wisconsin: T. J. Hale, 1861.

Minnesota: Holzinger, 1889; Wm. M. Canby, 1868.

Dakota: J. M. Coulter.

Oregon: L. F. Henderson, no. 93, 1885.

Washington: T. S. Brandegee, 1885; H. E. Seaton, no. 372. 1891, in part.

14. **Physalis Philadelphica** Lam. Enc. Meth. **2**: 101. 1786; Pursh, Fl. Am. Sept. 157; Roem. & Sch. Syst. Veg. **4**: 677; Nees, Linnaea, **6**: 481; Don, Gard. Dict. **4**: 450; Walp. Rep. **3**: 26; Dunal, DC. Prod. **13**: part 1, 450; Eat. Man. Ed. 2: 358; Ed. 3: 390; Ed. 5: 329; Ed. 6: 263; Gray, Man. Ed. 1: 354; Ed. 5: 381; Proc. Am. Acad. **10**: 64; Syn. Fl. **2**: part 1, 234; Wats. & Coulter in Gray, Man. Ed. 6: 375; Torr. Fl. N. & M. U. S. 235; Eat. & Wright, N. Am. Bot. 357; Wood, Class Book, 579 (1863); Bot. & Flor. 264 (1873); Noll, Fl. Pa. 282; Coult. Cont. U. S. Nat. Herb. **2**: 300.

P. chenopodifolia Willd. Sp. Pl. 1: 1023. 1798. Not Lam.*

P. atriplicifolia Jacq. Frag. 58, *pl. 85* (1800–8), Poir. Enc. Meth. Suppl. **2**: 348; Roem. & Sch. Syst. Veg. **4**: 677.

P. ovata Poir. Enc. Meth. Suppl. **2**: 347. 1811.

P. megistocarpa Zuccagn. Obs. Cent. no. 57; Roem. Coll. Bot. 130. 1809.

P. angulata Philadelphica Gray, Man. Ed. 2: 340. 1856.

P. angulata Spreng. Syst. Veg. **1**: 697. 1825 (in part); Porter & Coulter, Syn. Fl. Col. 110. In part. 1874.

Annual, or perennial from a deep rootstock, tall, erect, ½–1½ m. high; stem angled, dichotomously branched, glabrous or sometimes slightly pubescent with sparse and short hairs on the upper parts; leaves ovate to ovate-lanceolate, often very oblique at the base and more or less acuminate, entire or repand-denticulate, 6–10 cm. long, on petioles 4–6 cm., often in pairs; peduncles slender, 1–2 cm. long, generally longer than the flower; calyx glabrous or minutely ciliolate, lobes ovate-lanceolate or triangular, sometimes broadly ovate and unequal, generally equalling the

*Ill. **2**: 28 (1791–3).

tube; corolla yellow or greenish yellow with purplish throat, 1.5–2.5 cm. in diameter, anthers tinged with purple; fruiting calyx at first somewhat 10–angled and sunken at the base, at last often filled with or even burst by the large red or purple berry.

Broad-leaved forms somewhat resemble *P. macrophysa*, with which they may be confused if the fruit is not examined. Narrow-leaved specimens seem to connect it with *P. longifolia*. *P. Philadelphica* is generally described as an annual. In the western part of its range, it is, as a rule, perennial from a deep rootstock resembling that of *P. longifolia*, *P. macrophysa* and *P. Virginiana*; but perennial specimens have been collected as far east as New Jersey (F. L. Stevens). In the East, as a rule, it is an annual with branching roots, and somewhat resembles *P. ixocarpa*. The perennial specimens generally have broader leaves, of a somewhat firmer texture, and are less oblique at the base, but these characters are not constant, and I have failed to find any character which would warrant the division of the species into two, one annual and one perennial. The general habit, the form and size of the flower, the peduncles and the fruiting calyx are always the same. If it can be divided into two, the name *P. Philadelphica* should be retained for the annual form.

P. Philadelphica ranges from Rhode Island and Georgia to Texas and Nebraska. The following specimens have been examined:

New York: G. W. Clinton.

Rhode Island: I. T. Collins, no. 7, 1892.

New Jersey: Rusby, 1879; F. L. Stevens (perennial).

Pennsylvania: J. B. Brinton, 1891; R. G. Bechdoldt, 1889; T. C. Porter, 1858, 1889; J. K. Small, 1889.

North Carolina: C. F. Millspaugh, no. 627, 1890.

Georgia: Chapman.

Kentucky: H. H. Eaton, 1831; O. Mueller.

Tennessee: Gattinger, 1880; C. W. Short; Wm. M. Canby, 1878.

Louisiana: Chapman; Dr. J. Hale, 1884.

Texas: Mrs. M. L. Nash,* 1888; E. Palmer, no. 947,† 1880, 1879; E. Hall, 499† (in part); Reverchon, 1874.

* Narrow-leaved with more inflated calyx.

† Thick-leaved forms, doubtfully referred here. They may perhaps belong to *P. Texana*.

Colorado: Brandegee, 1873, 1874.

Nebraska: T. N. Hayden, 1853; H. Engelmann, 1856.

Missouri: Lindheimer, 1839; Engelmann, 1841; L. H. Pammel, 1894; B. F. Bush, no. 263, 1893.

Illinois: Dr. Brendel, 1873; J. Wolf, 1881; H. N. Patterson, 1874.

Arkansas: F. L. Harvey.

Ohio: E. Wilkinson, 1887; C. G. Lloyd, 1882; H. C. Cowles, 1890.

Iowa: P. H. Rolfs, 1891; A. S. Hitchcock, 1884 and 1889; L. H. Pammel, 1894; Stewart, 1891.

Venezuela: A. Fendler, no. 1012, 1854–5.

15. **Physalis longifolia** Nutt. Trans. Am. Phil. Soc. (II) **5**: 193. (1834); Dunal in DC. Prod. **13**: part 1, 447; Torr. Bot. Mex. Bound. Surv. 153.

P. pumila Sonorae Torr. Bot. Mex. Bound. Surv. 153. 1859.

P. lanceolata laevigata Gray, Proc. Am. Acad. **10**: 68. 1875; Syn. Fl. **2**: Part 1, 237; Coult. Man. Rocky Mt. 270; Wats. & Coult. in Gray, Man. Ed. **6**: 376; Coult. Cont. U. S. Nat. Herb. **2**: 301.

Perennial from a thick rootstock; stem in the common form stout and tall, ½–1 m. high, slightly angled, branched above, the branches strict, glabrous; leaves lanceolate, oblanceolate or linear, tapering into a stout short petiole 1–2 cm. long, subentire or repand; peduncles 1–2 cm. long, in fruit often recurved; calyx generally glabrous, lobes triangular-lanceolate, about the length of the tube; corolla 1–2 cm. in diameter, yellow with a dark commonly brownish center; anthers yellow, tinged with purple; fruiting calyx ovoid, about 3 cm. long, not sunken at the base; berry yellow, the lower portion and the stipe glutinous.

P. longifolia is nearly related to the preceding. Nuttall, in the original description, states that it is very near to *P. chenopodifolia*. Probably he meant *P. chenopodifolia* Willd. (changed to *P. atriplicifolia* Jacq.), which is the preceding species, not that of Lamarck. The original specimens of Nuttall are not of the normal type. They lack the strict habit characteristic of the common form. The leaves are also more plainly lanceolate than usual.

P. longifolia grows generally in rich soil in the prairie and plain region of central United States, viz:

Iowa: L. H. Pammel, No. 94.

Nebraska: F. C. Clements, no. 2604, 1893; Rydberg, no. 272, 1891; Seigcrist, 1889; Woods & Saunders, 1893; J. M. Bates, no. 95, 1892; Misses Smith and Lee, 1894.

South Dakota: Hayden, 1853; T. A. Williams, 1891; Rydberg, no. 910, 1892.

Wyoming: H. Engelmann, 1856.

Colorado: Greene, no. 323, 1870; Miss A. Eastwood, 1892; T. S. Brandegee, 1873; L. F. Ward, 1881; M. E. Jones, no. 573, 1878.

Utah: C. C. Parry, 1875; L. F. Ward, no. 676, 1875.

New Mexico: Dr. Henry; C. Wright, no. 1605, 1851–2; Fendler, no. 681, 1847; Parry, no. 170, 1867.

Arizona: Dr. Smart, no. 365, 1867; C. G. Pringle, no. 30, 1881; 1891; Palmer, no. 363½, 1877; Dr. Patzky, 1890.

Arkansas: Coville, no. 207, 1886–7; Marcy's Exp.

Missouri: S. B. Parish, 1883; S. Weller, 1890; Wm. M. Canby, 1871.

Kansas: C. L. Shear, no. 125, 1894; Kellerman, no. II. (in part); J. E. Bodin, 1887; E. E. Gay, no. 492, 1892.

Texas: Wright, no. 1605, 1851–2.

Mexico: Parry & Palmer, no. 643 and 647, 1878; G. Thurber. no. 418, 1851; Cooper; Dr. Gregg, no. 422, 1848–49; Pringle, no. 2804, 1889.*

Without given locality:

Mex. Bound. Sur., no. 1022, 1852.

Fremont, 3d Exp., no. 467, 1845.

Nicoll. Exp., A. Geyer, no. 249, 1839.

16. **Physalis Texana** n. sp.

Perennial from a deep rootstock, low and diffuse, glabruos; stem angular and striate, somewhat fleshy; leaves broadly ovate, generally very oblique at the base and decurrent on the long margined petiole, somewhat fleshy, entire or slightly wavy and with the veins prominent on the lower surface; peduncles short, about 1 cm. long, scarcely longer than the flower, in fruit 2–3 cm.; calyx-lobes broadly ovate-triangular, about the length of the short tube; corolla lemon-yellow with darker spots, 2–2½ cm. in diameter, very villous in the throat; anthers yellow; fruiting calyx about 3 cm. long, ovoid, indistinctly 10-angled, not sunken at the base; berry purplish.

* Broad-leaved.

It is nearly related to the two preceding. Perhaps all three are but varieties of the same species. It differs from *P. Philadephica* in the subentire more obtuse leaves, which are generally long-petioled, from *P. longifolia* in the much broader and shorter leaves, and from both in its low, diffuse and more fleshy habit, its shorter peduncles and the very dense and woolly pubescence of the throat of the corolla.

The following specimens have been examined:

Texas: A. A. Heller, no. 1507, 1894 (type); F. Lindheimer, 1828; E. Hall, no. 499, 1872, in part (Herb. College of Pharmacy, New York City).

17. **Physalis macrophysa** Rydberg, Bull. Torr. Bot. Club, **22**: 308. 1895.

Perennial; root somewhat thick and fleshy; stem erect, 0.5–1 meter high, comparatively slender, angled, perfectly glabrous, or the upper parts sparingly pubescent with very short hairs; leaves large, thin, 4–8 centimeters long, 2–5 centimeters wide, the lower obtuse, the upper acute or acuminate, on slender petioles 2–4 centimeters long; peduncles 1–1.5 centimeters long, erect, in fruit reflexed; calyx smooth, lobes ovate-triangular or broadly lanceolate, generally a little shorter than the tube; corolla yellow with a dark center, about 2 centimeters in diameter; anthers generally yellow, sometimes tinged with purple; fruiting calyx large, 3–4 centimeters long, 2.5–3 centimeters in diameter, pyramidal to ovoid-conic, indistinctly 10-angled, deeply sunken at the base; berry small, in the center of the calyx.

This is nearly related to *P. longifolia* and *P. Philadelphica*, but differs from both by its very large and inflated fruiting calyx and its broader leaves. The following specimens have been examined:

Arkansas: A. E. Heacox, 1889.

Kansas: E. A. Popenoe, no. 68, 1875.

Texas: Lindheimer, 1828; A. A. Heller, no. 1756. 1894.

North Carolina (?): Small and Heller, no. 389. 1891.*

Ohio (?): T. H. Horsford,* 1879; C. W. Short,* garden.

V. *Lanceolatae:* Perennials from a rootstock, which, in most of the species, is slender and creeping, but in *P. Virginiana* thick and somewhat fleshy; pubescence sparse, consisting of flat, sometimes jointed, simple or in *P. pumila* branched hairs (but on the calyx never stellate), in the last three sometimes a little viscid; leaves from lanceolate to ovate-cordate.

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* These specimens lack fruit, and may belong to *P. Philadelphica*, but the leaves most resemble those of *P. macrophysa*.

18. **Physalis lanceolata** Michx. Fl. Bor. Am. 1: 149, 1803. Pursh, Fl. Am. Sept. 157; Eat. Man. Ed. 2: 358; Ed. 3: 390; Ed. 5: 329; Ed. 6: 263; Eat. & Wr. N. A. Bot. 357;* Holzinger, Cont. U. S. Nat. Herb. 1: 212, in part.

P. Pennsylvanica lanceolata Gray, Man. Ed. 5: 382. 1867; Wood, Bot. & Fl. 263; Porter & Coult. Syn. Fl. Col. 110.

Perennial; rootstock apparently as a rule slender and creeping; stem about ½ m. high, first erect, later spreading or diffuse, only slightly angled, sparingly hirsute with flat hairs; leaves broadly oblanceolate or spatulate, tapering into the petiole, acute or obtuse, nearly always entire, rarely wavy, but never sinuately toothed, thickish, sparingly hairy with short hairs; peduncles 1–2 cm. long, in fruit reflexed; calyx strigose or villous, rarely glabrous, lobes triangular-lanceolate; corolla dullish yellow with a brownish center, about 1½ cm. in diameter; fruiting calyx rounded ovoid, not sunken at the base, indistinctly 10-angled; berry yellow or greenish yellow.

It has generally been confused with *P. Virgianana* Mill., not Gray, but is easily distinguished by the fruiting calyx which is not sunken at the base and scarcely angular, by the slender rootstock, by the dullish yellow corolla, and by the leaves, which are much thicker in texture, of a darker green color, and entire or nearly so. Its nearest relative is the next species into which its broader-leaved forms seem to pass.

P. lanceolata grows on dry prairies and is common west of the Missouri River, but extends eastward to the Carolinas.

North Carolina: H. W. Ravenel, 1869.

South Carolina: H. W. Ravenel, 1866.

Louisiana: Marcy Exp.

Illinois: W. S. Moffatt, 1893.

Iowa: Arthur, no. 37, 1858.

Missouri: L. H. Pammel, 1888.

Kansas: Kellerman, no. 5,† 1888; E. Bartholomew, 1891; M. A. Carleton, no. 298, 1891.

Nebraska: H. Englemann; Rydberg, no. 273, 1891; no. 1330, 1893; F. C. Clements, no. 2968, 1893; Webber, 1889; Hapeman, 1891; Smith & Pound, no. 151, 1892; A. F. Woods, no. 330, 1892; Fremont, no. 4.

* In later American works, the references belong only partly to this species, but mainly to *P. Virginiana*, under which they will be found.

†Approaches *P. pumila* in habit.

Colorado: T. S. Brandegee, no. 58951, 1872; Miss Eastwood, 1892; M. A. Carleton, 1890; H. C. Beardslee, no. 2216, 1879; W. A. Henry, 1875*; Geo. Vasey, 461, 1868; Hall & Harbour, no. 162, 1862; Hayden.

Wyoming: Spec. in Herb. University of Wyoming.

Arizona: J. G. Lemmon, 1882,* 1848.

New Mexico: Fendler, no. 682, 1847; Wislizenus, no. 466, 1846.

19. Physalis pumila Nutt. Trans. Am. Phil. Soc. (II.) **5**: 193. 1834.

P. lanceolata hirta Gray, Proc. Am. Acad. **10**: 68, 1874; Syn. Fl. **2**: part 1, 237; Wats. & Coult. in Gray, Man. Ed. 6: 376; Coult. Cont. U. S. Nat. Herb. **2**: 301.

P. lanceolata pumila Rydberg, in MS. in several herbaria.

P. cinerascens Hitchcock, Spring Fl. Manhattan, 32. 1894. Not *P. Pensylvanica cinerascens* Dunal.†

P. Pennsylvanica Gray, Hall's Pl. no. 501.

Perennial from a slender rootstock, ½–1 m. high; stem obscurely angled; leaves thick, generally broadly ovate, acute at both ends and somewhat rhomboid, the lower often obtuse and obovate, generally much larger than in the preceding; blade 5–10 cm. long, entire or seldom sinuate, on petioles, 2–3 cm. long strigose with many-branched hairs, especially so on the lower surface; peduncles 1–2 cm. long, in fruit reflexed and 3–5 cm. long; calyx densely hirsute, not stellate, lobes triangular, generally a little shorter than the tube; corolla yellow with brown center, 1½–2 cm. in diameter; fruiting calyx generally more elongated than in the preceding, 4–5 cm. long, oblong-ovoid, a little sunken at the base, indistinctly 10-angled.

P. pumila is related to the preceding species and may be but a variety thereof, but as the stouter habit, the larger and more acute leaves, the longer and denser pubescence of the stem and the forked pubescence of the leaves are characters that nearly always go together, I have given it, doubtfully, a specific rank. Seeing only the broad-leaved forms, nobody would hesitate to do so, but the narrower leaved forms, as for instance the type specimens of Nuttall, can scarcely be distinguished from the broad-leaved ones of *P. lanceolata*, except by the forked pubescence. This character distinguishes also the more luxuriant forms with

*Some with a few branched hairs.

† DC. Prod. 13: Part 1, 435. 1852.

rhomboidal leaves from *P. heterophylla ambigua* which they somewhat resemble. *P. pumila* approaches *P. mollis cinerascens* only in the fact that the hairs are branched.

P. pumila belongs to the plain region west of Mississippi and ranges from Missouri to Colorado and Texas.

Missouri: B. F. Bush, no. 1028, 1888; no. 8, 1882; no. 264c 1893; no. 264A; no. 339, 1894; S. Weller, 1887.

Kansas: C. G.. Pringle, 1885; J. H. Oyster, 1886; Mary Waugh, 1893; W. C. Stevens*; J. H. Carruth, 1879.

Arkansas: Nuttall (type); Engelmann, no. 153, 1875.

Indian Territory: G. D. Butler (broad-leaved)* 1877; no. 6, 1877, and no. 84; B. F. B.; Ed. Palmer, no. 213, 1868.

Colorado: Beardslee.

Texas: Reverchon, no. 681, 1879; Lindheimer, no. 94; E. Hall, no. 501, 1872; Drummond, no. 239, 1835.

20. **Physalis Virginiana** Mill. Gard. Dict. Ed. 8: no. 4; Fig. Pl. 138. *pl. 206. f. 1;* Walp. Rep. **3**: 26.

P. lanceolata † Roem. & Sch. Syst. Veg. **4**: 673; Torr. Fl. N. and M. U. S. 233; Comp. Fl. U. S. 111; Nicollet, Rep. 156; Beck, Bot. 158; Ed. 2: 255; Wood, Class Book, Ed. **41**: 447 (1855); 579 (1863); Don, Gard. Dict. **4**: 448; Walp. Rep. **3**: 26; Gray, Proc. Am. Acad. **10**: 66; Syn. Fl. 2: part 1, 236; Chapman, Fl. So. St. 350 (in part?); Coult. Man. Rocky Mts. 270; Cont. U. S. Nat. Herb. **2**: 301; Wats. and Coult. in Gray, Man. Ed. 6: 376, mainly.

P. Pennsylvanica Gray, Man. Ed. 5: 382 (1867); Spreng. Syst. Veg. **1**: 697 (in part); Torr. Fl. N. and M. U. S. 234‡; Comp. 110‡; Darlington, Fl. Cest. 27 (1826)‡; Beck, Bot. 258‡; Eat. Man. Ed. 2: 358‡; Ed. 3: 390; Eat. & Wright, N. Am. Bot. 357; Wood, Bot. & Flor. 263 (1873).‡

P. viscosa Pennsylvanica Wood, Class Book 299 (1845); 441 (1855).

Perennial; rootstock thick and somewhat fleshy; stem ½–1 m. high, erect, dichotomously branched, somewhat angular, more or

*Approaches *P. heterophylla ambigua* in the form of the leaves, pubescence in some specimens somewhat stellate.

† Some of these references include also the true *P. lanceolata* Michx.

‡ These references belong questionably to this species.

less strigose-hairy with flat hairs, sometimes somewhat glandular, or in some forms nearly glabrous; leaves ovate-lanceolate, tapering to both ends, 3–6 cm. long, generally more or less sinuately dentate, often yellowish green; peduncles 1–2 cm. long, generally erect, in fruit curved, but scarcely reflexed; calyx strigose, hirsute, or at least puberulent, lobes triangular or broadly lanceolate, nearly equalling the tube; corolla sulphur-yellow with purplish spots, 1½–2½ cm. in diameter; anthers yellow; fruiting calyx pyramidal-ovoid, 5-angled and sunken at the base; berry reddish.

P. Virginiana is, next to *P. heterophylla*, the most common of our species. It grows in rich soil and frequents open places, such as fields, roadsides, borders of woods. Specimens from about 100 localities have been examined, which show that it is common from Michigan and Minnesota to Colorado and Louisiana. Besides I have seen specimens from the following states:

New York: Dr. N. L. Britton.

South Carolina: Wm. Canby.

Florida: Chapman.

Georgia: Le Conte.

Manitoba: E. Bourgeau, 1859.

Like *P. heterophylla*, it is very variable. The original form described and figured by Miller is more densely hairy, with longer hairs, sometimes even somewhat glutinous, and with broad and more deeply sinuate-toothed leaves. It is comparatively rare and probably had not been seen by Gray, when he applied the name *P. Virginiana* to *P. heterophylla* Nees. The following specimens of this form are in our herbaria:

Illinois: Vasey.

Michigan: C. F. Wheeler, 1890.

Minnesota: Dr. Jarvis; J. H. Sandberg, no. 975, 1891.

Iowa: Hitchcock, 1889; J. A. Rolfs, 1891.

Tennessee: Gattinger, 1886; Scribner, 1890.

Missouri: L. H. Pammel.

Kansas: J. E. Bodin.

Wisconsin: S. N. Watson.

The common, less hairy form has more indistinctly toothed leaves. The usual color of the plant is more or less yellowish green. The Florida specimens are more slender and have thinner leaves, and are in some cases hard to distinguish from forms of

P. arenicola. In the upper Mississippi Valley, a dark verdigris-green form, with small thickish sinuately lobed, nearly smooth and shining leaves and short and wide fruiting calyx, is sometimes found. It is represented by the following specimens:

Illinois: W. S. Moffatt, 1893.

Wisconsin: E. A. Mearns, 1890.

Minnesota: G. B. Aiton, 1890.

There is also a form near *P. Virginiana*, the position of which is uncertain. It is temporarily placed here as a variety:

Physalis Virginiana intermedia n. v.

Leaf very thin and subentire, gradually tapering in to a winged petiole; pubescence in the young plant somewhat viscid.

This is a very peculiar plant, in pubescence and flower resembling forms of *P. heterophylla*, in the form of the leaves recalling *P. lanceolata*, but in their texture *P. Carpenteri.* The general habit and fruiting calyx are those of *P. Virginiana* which it comes nearest. The following specimens are preserved in the herbaria;

Southern States: S. B. Buckley (type).

Alabama: S. B. Buckley.

Texas: Lindheimer, 1828.

Indiana: N. L. Britton.

21. **Physalis arenicola** Kearney, Bull. Torr. Bot. Club, 21: 485. 1894.

Stems 2–4 dm., slender, much branched, striate, from a slender creeping rootstock; plant light green; pubescence mostly of simple hairs, but sometimes a little glandular, in age scarcely any, except on the veins of the calyx; leaves usually small, blade 1½–6 cm. long, but sometimes up to 8 cm., ovate, cordate, truncate or cuneate at the base, irregularly angulate-dentate, pubescence, if any, along the veins, which are generally prominent and conspicuously reticulated; peduncles slender; calyx-lobes triangular-lanceolate, equalling the tube; corolla 1½–2 cm. in diam., light yellow; anthers yellow; fruiting calyx 3 cm. long, narrowly ovoid or rather oblong-pyramidal or nearly cylindric, conspicuously reticulated; berry light yellow.

It much resembles certain forms of the preceding species, but is generally more slender, light green, but not yellowish. As the name indicates, it grows in sandy soil, and seems to be limited to Florida. The following specimens have been examined:

Florida: G. V. Nash, no. 1170, 1894 (type); B. F. Seeds, 1886; Bacon; Mary C. Reynolds, 1877; Chapman;* Fredholm no. 65, 1893; Curtiss, no. 2210, in part.† H. J. Webber, no. 125.

22. **Physalis ciliosa** n. sp.

Perennial from a slender creeping rootstock, upright, branched, 2–3 dm. high; stem terete, scarcely striate, together with the pedicels and calyces ciliate with long and white jointed hairs; leaves 4–7 cm. long, ovate, truncate or slightly cordate at the base, subentire or with a few coarse teeth, sparsely hairy on the veins, long-petioled, thin and not conspicuously veiny; peduncles very slender; calyx turbinate, resembling that of *P. arenicola;* corolla funnelform-campanulate, apparently without dark markings; fruiting calyx ovoid-pyramidal, sunken at the base.

In habit it most resembles *P. heterophylla ambigua*, but differs in being much more slender, in the thin leaves, in the longer and finer hairs and in the corolla, calyx and peduncles, which are those of *P. arenicola.* It might have been included in the following group, but it lacks the short dense pubescence, which is characteristic to the species belonging there. The following are the specimens found in our herbaria.

Florida: Chapman (in Herb. J. Donnell Smith, Harvard University, Columbia College, and A. W. Chapman, type); Curtiss, no. 27, in part.

Tennessee: Gattinger (in Herb. of J. Donnell Smith and Wm. M. Canby).

Georgia: Darby (?), Wm. M. Canby, 1869. (?)

VI. *Heterophyllae:* Perennials from a slender rootstock or stout caudex; pubescence dense, not stellate, short, more or less viscid or glandular (except in *P. Peruviana*), often mixed with long flat jointed hairs; fruiting calyx more or less distinctly 5-angled and, except in the last species, more or less sunken at the base; leaves from oval or rhombic to reniform.

23. **Physalis Peruviana** L. Sp. Pl. Ed. 2, 1670. 1763. Willd. Sp. Pl. 1: 1022; Nees, Linnaea, 6: 464; Don, Gard. Dict. 4: 449; Walp. Rep. 3: 24; Dunal in DC. Prod. 13: part 1, 440; Roxb. Fl. Ind. Or. Ed. 2, 1: 563; Gray, Syn. Fl. 2: part 1, 233; Roem. & Sch. Syst. Veg. 4: 674.

P. esculenta Salisb. Prod. 132. 1796. Willd. Act. Nat. Cur. Berol. 4: 197; Roem. & Sch. Syst. 4: 674.

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* Between this and *P. Virginiana.*

† Specimens with very large nearly smooth leaves, but the form and pubescence of the calyx show that it belongs here. Probably an overgrown individual.

P. tomentosa Medic. Act. Theod. Pal. 4: 184. 1780.

P. pubescens R. Br. Prod. Fl. Nov. Hall, 1: 447. 1810. Spreng. Syst. 1: 698.

P. tuberosa Zuccagn.; Sav. Roem. Coll. 130. 1809. Obs. Cent. 43.

P. edulis Sims, Bot. Mag. *pl. 1068.* 1807. Cyr. Balb. Cat. Hort. Tour. 58. 1813.

Alkekengi pubescens Moench, Meth. 473. 1774.

Herschella edulis Bowdich, Excurs. Mader, 159. 1825.

Perennial from a creeping rootstock, tall, erect, densely pubescent, but the hairs short; stem angled; leaves large, ovate-cordate with a distinct long acumination, 5–15 cm. long, 4–10 cm. wide, subentire or sinuately few-toothed; petioles 2–4 cm. long; calyx villous; lobes lanceolate, acuminate, as long as the tube; corolla about 2 cm. in diameter; anthers generally violet; berry viscid, yellow.

A native of South America. It is cultivated for its fruit in all warm and temperate regions and often escapes.

Michigan: L. H. Bailey, no. 5. 1887.

New Jersey: I. C. Martindale, 1879 (ballast).

Physalis Peruviana latifolia (Lam.) Dunal in DC. Prod. 13: part 1, 440. 1852.

P. latifolia Lam. Ill. 2: 29. 1793. Roem. & Sch. Syst. Veg. 4: 676.

P. Barbadensis Lam. Enc. Meth. 2: 102. 1786.

Leaves larger, rounded, cordate; base more decidedly cordate than in the species, stem stouter.

Also cultivated and escaped. The only specimens seen in our herbaria are from Golden Gate Park, Calif., collected by F. O. Vincent (Herb. Calif. Acad. Sci.).

24. **Physalis heterophylla** Nees, Linnaea, 6: 463. 1831. Don, Gard. Dict. 4: 449; Walp. Rep. 3: 24; Dunal in DC. Prod. 13: Part 1, 439.

(?) *P. viscosa* Jacq. Hort Vind. 2: *pl. 136.* 1772. Not L.

P. viscosa Pursh, Fl. Am. Sept. 157. 1814. Torr. Fl. N. & M. U. S. 233; Comp. 110; Fl. N. Y. 103; Beck, Bot. 257; Ed. 2, 255; Darl. Fl. Cest. 27, 1826; 138, 1837; Eat. Man. Ed. 2, 358; Ed. 3, 390; Ed. 5, 328; Ed. 6, 262; Eat. & Wr. N. A. Bot. 356; Gray, Man. 354; Ed. 2, 340; Ed. 5, 382; Wood, Class-Book

447, 1855; 579, 1863; Bot. & Flor. 263, 1873; Noll, Fl. Pa. 282; Chapman, Fl. So. St. 350; Porter & Coulter, Syn. Fl. Colo. 110; Holzinger, Cont. U. S. Nat. Herb. **1**: 170. Not L.

P. nutans Walt. acc. to Nees, Linnaea, **6**: 463; Don, Gard. Dict. **4**: 451; Walp. Rep. **3**: 27; Roem. & Sch. Syst. **4**: 681. Not Gmelin.

P. Pennsylvanica Willd. acc. Nees. Linnaea, **6**: 463. 1831. Hook. Fl. Bor. Am. **2**: 90. 1834. Not L.

P. Virginica Gray, Proc. Am. Acad. **10**: 65. 1874.

P. Virginiana Gray, Syn. Fl. **2**: part 1, 235. 1878. Coult. Man. Rocky Mts. 270; Cont. U. S. Nat. Herb. **2**: 300; Wats. & Coult. in Gray, Man. Ed. 6, 375. Not Mill.

Perennial from a slender creeping rootstock, ½–1 m. tall, at first erect, later generally decumbent and spreading, viscid and glandular, and villous with long spreading jointed flat hairs; leaves large, blade generally over 5 cm., generally broadly cordate, often acute but very rarely with an acumination, thick, more or less sinuately toothed, or sometimes subentire; calyx long-villous; lobes triangular, generally shorter than the tube; corolla 1½–2 cm. in diameter; anthers generally yellow; berry yellow.

P. heterophylla grows most commonly in rich soil, especially where the surface has been disturbed in some way, as for instance in fields, on road banks and rubbish heaps. Its range is from New Brunswick and Saskatchewan to Colorado, Texas and Florida, but it is most common in the Upper Mississippi Valley. A few specimens have also been collected in California. Specimens from over 100 localities have been examined. These show that it is nearly impossible to characterize any good varieties, as the species is very variable and the different forms grade into each other.

In shaded places, as, for instance, among bushes, it often becomes upright, nearly smooth, scarcely at all viscid, and with large and thin leaves. The author has described it as var. *umbrosa*,* but it scarcely deserves a varietal rank. A few of the specimens represented by this form are:

Nebraska: P. A. Rydberg, no. 1398, 1893; Smith & Pound No. 78, 1892; Le Roy; Hayden, no. 242, in part, 1854.

Illinois: H. F. Jaeger.

Iowa: Hitchcock, 1889.

Texas: Bigelow (Wipple's Exp.).

*Cont. U. S. Nat. Herb. **3**: 172. 1895.

In sandy soil, especially on the sandhills within the region of the Great Plains, it becomes low, upright, with thick leaves, and exceedingly villous, with grayish hairs. This form somewhat resembles the next variety, but is lower and generally has yellow anthers. A few of the specimens are:

Nebraska: P. A. Rydberg, no. 1287 and no. 1808, 1895; C. E. Bessey, 1887; H. Webber, 1889; Smith & Pound, no. 50, 1892.

Colorado: Parry.

Missouri: B. F. Bush, no. 9, 1892.

Iowa: Parry.

Manitoba: Bourgeau, no. 1, 1857–8.

Physalis heterophylla ambigua (Gray).

P. Virginica ambigua Gray, Proc. Am. Acad. **10**: 65. 1874.

P. Virginiana ambigua Gray, Syn. Fl. **2**: part 1, 235.

P. ambigua Britton, Mem. Torr. Bot. Club, **5**: 287. 1895.

? *P. obscura* Torr. Fl. N. & M. U. S. 233. 1824. Comp. 110.

? *P. nyctaginea* Dunal in DC. Prod **13**: part 1, 440. 1852.*

Tall and generally upright, very long-villous, scarcely at all viscid; flowers generally larger, anthers generally purplish, leaves usually dark green and of a firm texture, more or less acuminate at the apex, often subentire, and pubescent mainly on the veins of the lower surface; but in the type specimens and those cited with an asterisk, the leaves are thinner, of a lighter color, and sinuately toothed.

The position of this variety is very uncertain. It may be a good species, but it may also be simply a form of *P. heterophylla*, which itself is made up of many different forms. The variety *ambigua* seems to belong principally to the eastern and central States.

The following specimens have been examined:

Vermont: *A. J. Grout, 94.

Rhode Island: W. W. Bailey, 1880.

New York: Schweinitz (labelled *P. obscura*).

Ohio: A. E. Ricksecker, 1894; C. Wilkinson, 7826, 1892; H. C. Cowles, 1891.

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*The author has labelled several herbarium specimens *P. heterophylla nyctaginea* (Dunal) n. v., as it probably is *P. obscura* Torr., on which Dunal based *P. nyctaginea*, but it is better to adopt a newer but certain name instead of an older but very uncertain one.

New Jersey: W. W. Bailey.

Pennsylvania: P. E. Pierson, 1887; Dr. & Mrs. Britton, 1893.

West Virginia: C. F. Millspaugh.

Virginia: J. K. Small, 1892.

Georgia: A. P. Garber, 1877 and 1887.

Tennessee: Gattinger, 1882; *A. Gattinger, 1881; *Scribner, 1890.

Louisiana: A. B. Langlois, no. 1, 1880; no. 2, 1893.

Ohio: A. E. Ricksecker, 94; C. Wilkinson, no. 7826, 1892.

Indiana: A. H. Young, no. 40 (in part); 1875.

Michigan: C. F. Wheeler, 1890, *1891; *H. S. Camp, 1893; O. A. Farwell, no. 623, 1889; C. A. Davis, 1890; L. H. Bailey, 1885.

Iowa: F. R., 578; A. S. Hitchcock, 1886, 1887; B. Fink, no. 281, 1894; *Hitchcock, 1889; *P. H. Rolfs, 1890, *1891; *H. E. Crosby, 1888.

Wiconsin: *Lapham, *L. H. Pammel, 1887, *1891.

Missouri: Blankinship, 1889; D. Krause; *B. F. Bush, 1882.

Arkansas: A. E. Heacox, 1889.

25. **Physalis comata** Rydb. Bull. Torr. Bot. Club, 22: 306. 1895.

Perennial, erect, about 0.5 meter high; pubescence fine and short, that on the calyx, peduncles and upper branches mixed with long white flat jointed hairs; like *P. heterophylla* Nees (*P. Virginiana* Gray, not L.), but leaves smaller, blade not over 0.5 decimeter long, rounded, ovate, scarcely at all cordate at the base, about 5 centimeters long, thin, somewhat repand-dentate or nearly entire; petioles as long as the leaves; peduncles as long as the fruiting calyx or longer; corolla greenish yellow, with brown center, 1 ¼–2 cm. in diameter; fruiting calyx as in *P. hederaefolia* Gray, but of thinner texture, 3–4 cm. long, rounded ovoid, somewhat 10-angled, scarcely sunken at the base.

The validity of this as a species may be doubted. It is intermediate between *P. heterophylla* and *P. hederaefolia* and might be placed as a variety of either with about equal reason. It, perhaps, most resembles the latter, but differs in the thinner texture of the leaves and the fruiting calyx, in the larger flowers, and in the long white hairs.

The following localities are recorded:

Nebraska: P. A. Rydberg, no. 269, 1891 (type); nos. 271 and 270, 1891.

Kansas: E. Bartholomew, no. 2, 1892; E. A. Popenoe, 1875.

Texas: G. Jermy, no. 618, 1890.

Colorado: Vasey, no. 462, 1868 (poor specimen of this species?).

A few specimens (Rydberg, nos. 270 and 271, especially the latter) are more grayish puberulent, have smaller flowers, and more rhomboid leaves, which are somewhat decurrent on the petioles and more oblique at the base. They are similar to specimens in the Harvard Herbarium received from Jardin des Plantes, Paris, and labelled *P. chenopodifolia.* I therefore took this form for *P. chenopodifolia* Lam. Although that species is also grayish pubescent, it is distinct from my plant, as can be seen from the original description. *P. chenopodifolia* stands in the same relation to *P. Peruviana* as the present form does to *P. heterophylla.*

26. **Physalis hederaefolia** Gray, Proc. Am. Acad. **10**: 65. 1874. Syn. Fl. **2**: part 1, 235; Coulter, Cont. U.S. Nat. Herb. **2**: 300.

P. Alkekengi var. *digitalifolia* Torr. Bot. Mex. Bound. 153. 1858, not Dunal.*

P. mollis Torr. l. c., in part.

P. digitalifolia Britton, Mem. Torr. Bot. Club, **5**: 288. 1895.

P. Palmeri Gray, Syn. Fl. **2**: part 1, 235. 1888.

Erect and branched, rarely decumbent, 3–5 cm. high, from a thick perennial base, finely viscid-pubescent or villous; hairs generally short; leaves in the typical form broadly cordate or subreniform, coarsely and angulately sinuately toothed, more or less 3–5-ribbed, about 3–5 cm. in diameter; peduncles generally short, but in one form (*P. Palmeri* Gray), a little longer than the fruiting calyx; calyx finely viscid-pubescent; corolla about 1½ cm. wide; fruiting calyx ovoid, 5–10 angled, pubescent, 2–3 cm. long.

P. hederaefolia grows on rocky hills or high dry plains. It ranges from southern Colorado and southern California to Mexico. The following specimens are in the herbaria:

Colorado: Greene, 1880; Geo. Vasey (Powell's Exp.) no. 462, 1868.

Texas: Dr. V. Havard, no. 168 and 169, 1881; C. Wright, no. 528, 1849; J. Reverchon, no. 1340, 1882; Mrs. Thomson, no. 220, 1872; Bigelow in Mex. Bound. Surv. 1857; Schott in Mex. Bound. Surv.†

*DC. Prod. **13**: Part 1, 438. 1852.

†Approaching *P. comata* in hairiness.

New Mexico: Thurber, 1851; Wright, no. 1597 and no. 1600, 1851–2; E. L. Greene, no. 31, 1877, 1880 and 1887; Vasey, 1881; H. H. Rusby, no. 310, 1881; E. A. Mearns, no. 121, 1892.

Arizona: Coues & Palmer, no. 165, 1865.

Southern California: Dr. Greggs, 191.

Mexico: Gregg, nos. 439, C. C. Parry, 11, 1878.

Mex. Bound. Surv. nos. 1024 and 1023.

A form with shorter and denser pubescence and more decumbent habit is var. *puberula* Gray. It is only represented by the following specimens:

Texas: Wright no. 528, in part (type); Buckley; V. Havard, nos. 170 and 171, 1881.

Another form with slightly longer peduncles and more acutish leaves, which are scarcely cordate at the base, is *P. Palmeri* Gray, l. c. It forms a transition to *P. Fendleri cordifolia.* The only specimens representing this form are:

New Mexico: H. H. Rusby, no. 756, 1881.

Arizona and California: E. Palmer, no. 430, 1876; (type of *P. Palmeri* Gray).

Mexico. C. G. Pringle, no. 15, 1885; Gregg.

In my opinion they scarcely deserve varietal rank.

27. **Physalis rotundata.**

P. hederaefolia Holzinger, Cont. U. S. Nat. Herb. 1: 212. 1892.

Diffuse and spreading, much (generally dichotomously, zigzag) branched, from a perennial rootstock, densely and finely viscid-pubescent, generally more glandular than the preceding; leaves nearly orbicular with more or less cordate base, 2–4 cm. in diameter, with much smaller teeth than in *P. hederaefolia:* petioles short, more or less winged; peduncles short, in fruit scarcely more than half the length of the calyx; corolla 1½ cm. in diameter, greenish yellow with brownish center; fruiting calyx ovoid, scarcely angled, not sunken at the base.

It is very near the preceding species and perhaps only a variety thereof, but as it has a distribution distinct from that of *P. hederaefolia*, the ranges overlapping only little, it seems advisable to treat it separately. It can always be distinguished by its spreading habit, its smaller more rounded and less toothed leaves, and its more glandular pubescence. The following specimens are in our herbaria:

South Dakota: Williams, 1891 (type).

Nebraska: Webber, 1889; Woods & Saunders, no. 2182, 1893.

Kansas: C. L. Shear, no. 221, 1894; M. A. Carleton, no. 237 and 518, 1891. Kellerman, 1886; Fremont Exp. (?).

Colorado: L. F. Ward, 1881; Fendler, no. 679, 1847. H. N. Patterson, 1892.

New Nexico: E. L. Greene, 1880; Fendler, no. 679, 1847.

Texas: Havard, no. 169½, 1881.

28. **Physalis muriculata** Greene, Bull. Calif. Acad. **1**: part 4, 209. 1885.

Perennial from a stout woody tap-root, glandular pubescent, branched from the caudex, 1–3 dm. high; leaves 1–3 cm. long, on petioles of the same length, oblong to ovate-cordate, pubescent and muricate; peduncles erect, 2–3 cm. long, in fruit curved, 3–5 cm. long, generally as long as or longer than the subtending leaves; calyx pubescent with short hairs; lobes lanceolate, shorter than the tube; corolla hairy on the outside, greenish yellow with brownish throat; fruiting calyx rounded ovoid, distinctly 16-angled, reticulate, puberulent, not sunken at the base.

C. C. Parry's plant, which is the only one collected within the United States, differs from the typical specimens, in the shorter peduncles, the ovate more crenate leaves, and more glandular pubescence. It is, perhaps, distinct, but sufficient material is lacking. *P. muriculata* is very nearly related to *P. Greenei,* from which it differs principally in being a perennial. It connects the perennial Heterophyllae group with the annual Leptophyllae.

Lower California: Ed. Palmer, no. 682, 1889. E. L. Greene, 1885.

California: (River Side) C. C. Parry, 1882.

VII. *Stellatae.* Perennials from a slender (except in *P. Fendleri*) creeping rootstock; pubescence more or less stellate, at least on the margin of the calyx; fruiting calyx only slightly angled and seldom sunken at the base; lobes connivent. All the species grow in sandy soil and most of them near the coast. They intergrade more or less.

29. **Physalis mollis** Nutt. Trans. Am. Phil. Soc. (II.) **5**: 194. 1834. Gray, Proc. Am. Acad. **10**: 66; Syn. Fl. **2**: part 1, 236; Coulter, Cont. U. S. Nat. Herb. **1**: 300. Wats. Proc. Am. Acad. **18**: 126.

P. tomentosa Dunal in DC. Prod. **13**: part 1, 436. 1852. Not Medic.,* nor Walt.†

Perennial from a creeping rootstock, 3–6 cm. high, densely whitish or grayish tomentose with stellate pubescence; leaves rounded cordate or the upper broadly ovate, coarsely sinuately toothed; peduncles 2–4 cm. long, in fruit 4–6 cm. and reflexed; calyx densely stellate, lobes triangular, generally a little shorter than the tube; corolla 1.5–2 cm. in diameter, bright yellow with a purplish center, more or less stellate on the outside; anthers yellow or tinged with purple; fruiting calyx 3–5 cm. long, ovoid, acuminate, slightly 5-angled and a little sunken at the base.

P. mollis, in its most typical form, as for instance the type specimens of Nuttall and E. Hall, no. 500, is well distinguished by its leaves, which are cordate, coarsely angulate-toothed, very densely white-stellate and of a firm texture. Often, however, the pubescence is less dense and the broad teeth of the leaves less distinct and it passes into the first variety. A. A. Heller's no. 1453, from Texas, has the broad leaves, the large dentation characteristic of *P. mollis*, but in the thinness of the leaves, the pubescence and general habit, resembles more the South American, *i. e.*, the typical, form of *P. viscosa*. It must be regarded as a form intermediate between the two.

P. mollis ranges from Arkansas to Mexico. It grows in thickets and along streams, but rarely near the coast where its place is taken by *P. viscosa*. The following specimens have been examined:

Arkansas: Nuttall, 1834 (type); Bigelow, 1853; J. G., no. 304 and 326; F. L. Harvey, no. 1, 1881; H. E. Hasse, 1886.

Texas: Drummond, nos. 205 and 241; Schott; Geo. Thurber, no. 43, 1850; E. Hall, no. 500, 1872; F. W. Thuron, no. 16, 1890; Crawford, no. 44, 1892. (A. A. Heller, no. 1453, 1894.)‡

Mexico: Gregg, no. 27, 1848–9; no. (1+)§; Bourgeau, no. 112 (in part) 1865–6; J. G. Schaffner, no. 700, 1876†; Edw. Palmer, no. 948, 1880.

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*Act. Acad. Theod. **4**: 184. *pl. 4.* 1780.

†Fl. Car. 99. 1788.

‡See above.

§ Approaching var. *cinerascens.*

Physalis mollis cinerascens (Dunal) Gray, Proc. Am. Acad. **10**: 66. 1874. Syn. Fl. **2**: part 1, 236; Wats. Proc. Am. Acad. **18**: 126; Coult., Cont. U. S. Nat. Herb. **2**: 301.

P. Pennsylvanica cinerascens Dunal in DC. Prod. **13**: part 1, 435. 1852.

Greener, less pubescent; leaves rounded ovate and less toothed, sometimes nearly entire; peduncles generally shorter and fruit somewhat smaller.

Thin leaved specimens approach much the broader leaved forms of *P. viscosa*, into which it may pass. It is much more common than the typical *P. mollis*, and extends farther north, to Oklahoma Territory, and west to California. The following specimens have been examined:

Indian Territory: Palmer, no. 212, 1868.

Oklahoma Territory: M. A. Carleton, no. 169, 1891.

Texas: Lindheimer, 1848; C. Wright, no. 52; Schott, 1852; Drummond, 175; E. Hall, no. 502, 1872; Reverchon, 1874; (Curtiss, no. 2210*), 1880; no. 679, 1882; Jermey, no. 174; Dr. Havard, no. 171, 172, 173, 175, 1881; Sutton & Hays.

California: Dr. Greggs, 1847*; Edwards, 1847; Edw. Palmer, 1875.

Mexico: Berlandier, No. 886 and 2316, 1830; Coulter, no. 1222; Wislizenus, no. 285, 1847; Mueller, 1855; A. Dugés, no. 412; J. S. Schaffner, 1876; C. C. Parry, 1878; Parry & Palmer, no. 641 and 648, 1878; Edw. Palmer, no. 949, 1880; Pringle, no. 148, 1891.

Physalis mollis parvifolia n. v.

Stems from a thicker caudex, slender, diffusely branched; leaves small, 1–2 cm. long, rounded or cordate, obtusely repand-dentate; fruiting calyx small, only 2 cm. or less long.

It resembles a diminutive form of the preceding variety, but differs, besides in size, by the thick caudex and the more angular leaves. It is perhaps the *P. Jacquini* of Dunal, but not the original one of Link. All specimens seen are from:

Texas: Drummond, no. 190, 1835; Lindheimer, 1842 (type); E. Hall, no. 502 (in part), 1872; Edw. Palmer, no. 2103, 1879; Girard, no. 135, 1880; (?) Mary Croft, 1880.†

*Thin leaved form intermediate between this and *P. viscosa.*

† Some of these specimens are nearly glabrous and with more cordate and subentire leaves and connect this variety with *P. crassifolia cardiophylla.*

30. **Physalis viscosa** L. Sp. Pl. 183. 1753. Ed. 2, 261; Willd. Sp. Pl. **1**: 1021; Michx. Fl. Bor. Am. **1**: 149; Spreng. Syst. Veg. **1**: 697; Walp. Rep. **3**: 23; Nees, Linnaea, **6**: 457; Don, Gard. Dict. **4**: 448; Sendtn. in Mart. Fl. Bras. **10**: 129; Gray, Proc. Am. Acad. **10**: 66, 1874; Syn. Fl. **2**: part 1, 236; Dunal in DC. Prod. **13**: part 1, 434; Roem. & Sch. Syst. Veg. **4**: 672; Wats. & Coult. in Gray, Man. Ed. 6, 376; Coult. Cont. U. S. Nat. Herb. **2**: 301.

P. Pennsylvanica L. Sp. Pl. Ed. 2, 1670. 1763. Willd. Sp. Pl. **1**: 1021; Lam. Enc. Meth. **2**: 100; Mart. & Gal. Bull. Brux. (V) **12**: no. 2; Walp. Rep. **3**: 24; Roem. & Sch. Syst. Veg. **4**: 673; Ell. Bot. S. C. & Ga. **1**: 278.

P. tomentosa Walt. Fl. Car. 99. 1788. Not Medic.* Darby, Bot. So. St. 451.

P. Walteri Nutt. Journ. Acad. Phil. **7**: 112. 1834. Don, Gard. Dict. **4**: 448; Walp. Rep. **3**: 26; Eat. & Wr. N. A. Bot. 357.

P. nutans J. F. Gmelin Syst. **2**: part 1, 382.

Alkekengi fissum Moench, Meth. **2**: 472. 1794.

Perennial from a slender creeping rootstock, slender, creeping, cinereous with a dense stellate pubescence or in age rarely glabrate; leaves elliptic, oval or ovate, obtuse, thinnish, entire or undulate, in the typical South American form often cordate at the base, but rarely so in our plant; peduncles 1–2 cm. long; calyx stellate, lobes triangular, generally shorter than the tube; corolla greenish yellow with a darker center, 1.5–2 cm. in diameter; fruiting calyx 2–3 cm. long, rounded ovoid, scarcely sunken at the base; berry orange or yellow.

P. viscosa grows on the sea beaches or in sand near the coast. Its range extends from Virginia (?) to the Argentine Republic. The South American specimens generally have rather thinner and broader leaves, which are often somewhat sinuate. Specimens collected by A. A. Heller in Texas, no. 1453, 1894, are intermediate between the southern form and *P. mollis*. Narrower leaved forms pass into the variety.

North Carolina: Curtis.

Georgia: Curtis.

Florida: Wm. M. Canby, 1869 and 1889; Edw. Palmer, no. 375, 1874; Curtiss, no. 2210, 1879; no. 4847, 1894; J. Don-

*Act. Acad. Theod. **4**: 184. *pl. 4.* 1780.

nell Smith, no. 416, 1884; Simpson, no. 563, 1892 (in part); Miss Lathrop, 1894; H. J. Webber, no. 69, 1894.

Texas: (A. A. Heller, no. 1453, 1894?).

California: Dr. Greggs, no. 643.

Mexico: Parry & Palmer, no. 648, 1878.

Bolivia: Miguel Bang, 969, 1891.

Paraguay: Morong, no. 1532, 1888–90; H. Parker.

7 **Physalis viscosa maritima** (Curtis).

P. Pennsylvanica Dunal in DC. Prod. **13**: part 1, 435. 1852. Not Linn.

? *P. lanceolata* Ell. Bot. S. C. & Ga. **1**: 278. 1817. Darl. Fl. Cest. 139. Darby, Fl. So. St. 451; Wood, Class Book, 299, 1845; 447, 1855. Not Michx.

P. pubescens Eng. & Gray, Bost. Journ. Nat. Hist. **5**: 227. 1845. Not Linn.

P. maritima Curtis, Am. Jour. Sci. (II.) **1**: 407. 1849. Bot. Zeit. **8**: 530; Walp. Ann. **3**: 155.

? *P. Jacquini* Link, Enum. Hort. Ber. **1**: 180, ex. Nees.

P. viscosa Jacquini Don, Gard. Dict. **4**: 448. 1838.

P. viscosa spathulaefolia Gray Proc. Am. Acad. **10**: 66. (In part), 1874. Syn. Fl. **2**: part 1, 236; Coult. Cont. U. S. Nat. Herb. **2**: 301; Wats. Proc. Am. Acad. **18**: 126. Not *P. Pennsylvanica spathulaefolia* Torr.*

Leaves spatulate to oblong, gradually tapering into the petiole, often thickish and of a firm texture.

This was included by Gray in *P. viscosa spathulaefolia*, but differs from the original *P. Pennsylvanica spathulaefolia* Torr., or *P. Elliotti*, in the texture of the leaves, the dense pubescence and the form of the calyx, which in the latter resembles an inverted truncate cone. Sea coasts from North Carolina to Texas.

North Carolina: Dr. Havard, 1880; G. McCarthy, no. 179, 1883.

Florida: Canby, 1869; Edw. Palmer, no. 37, 1874; Curtiss, 1875; J. H. Simpson, no. 563,* 1892 (in part); G. V. Nash, no. 198 and 1049, 1894;† Miss McFarland; A. A. Baldwin, 1893.‡

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*Bot. Mex. Bound. 153. 1859.

†Approaching *P. viscosa.*

‡A thin-leaved form.

Texas: Lindheimer, no. 136, 1842–43 (type of *P. maritima* Curtis); Drummond, nos. I and 57, 1853; Edw. Palmer, no. 945, 1879.

31. **Physalis Fendleri** Gray, Proc. Am. Acad. **10**: 66. 1874. Syn. Fl. **2**: part 1, 236; Coulter, Man. Rocky Mts., 270.

P. mollis Torr. Bot. Mex. Bound. 153. (In part.) 1859. Not Nutt.

Perennial from a deep fleshy rootstock, 3–6 dm. high, much branched, finely puberulent, often somewhat stellate, especially on the calyx; leaves small, 1–4 cm. long, deltoid, ovate-lanceolate or somewhat cordate, more or less deeply sinuately toothed, acute; peduncles shorter than the petioles, 5–10, or sometimes 20 mm. long lobes of the calyx triangular, about the length of the tube; corolla yellow with a brown center, about 1 cm. in diameter; fruiting calyx rounded ovoid, obscurely angled, 2–3 cm. in diameter; berry yellow.

On dry plains and in rocky places, from southern Colorado and Arizona to Mexico. The following specimens have been examined:

Colorado: T. S. Brandegee, 1871 and 1877; Engelmann, 1874; Crandall, 1892; Miss A. Eastwood, 1892.

New Mexico: Fendler, no. 683, 1847 (mainly, type); Thurber, no. 224, 1851; Wright, no. 1599, 1851–2; Bigelow (Mex. Bound. Surv.), nos. 1 and 2, 1857; C. C. Parry, 1867; Rusby, no. 756.

Arizona: H. H. Rusby, 1883; J. G. Lemmon, no. 2849, 1882; 1893; M. E. Jones, no. 6059, 1894.

Mexico: Schaffner, no. 698, 1876; Parry and Palmer, no. 642, 1878; Edw. Palmer, no. 94, 1889.

Physalis Fendleri cordifolia Gray, Syn. Fl. **2**: part 1, 395 (in the first edition, 1878; but not in the second).

Leaves much larger, more cordate and less deeply sinuately toothed.

More hairy specimens approach on one hand *P. mollis* and on the other *P. hederaefolia Palmeri* and the smoother ones *P. crassifolia cardiophylla*. The variety *cordifolia* extends a little further northwest than the true *P. Fendleri*.

Colorado: Brandegee, 1873; E. L. Greene; C. E. Bessey, 1886.

Utah: Edw. Palmer, nos. 363 and 369, 1877 (type).

Arizona: Edw. Palmer, no. 363; M. E. Jones, no. 6059, 1894.

New Mexico: Fendler, nos. 678 and 683 (in part), 1847; Geo. R. Vasey.

California: J. G. Cooper, 1860–61.

Mexico: C. C. Parry, 1878.

32. **Physalis fuscomaculata** De Rouville; DC. Prod. **13**: part 1, 437. 1852.

Perennial, decumbent or ascending, greener than the rest of the stellate species; stems terete with decurrent ridges, a little pruinose-stellate; leaves small, 2–4 cm. long, ovate, somewhat oblique at the base, entire or repand, the upper often opposite; peduncles 1–3 cm. long, longer than the petioles and in fruit often as long as the leaves; calyx pruinose, a little stellate, on the margins stellate-ciliate; lobes triangular, shorter than the tube; corolla yellow with a dark spot; fruiting calyx subglobose, 10-angled, somewhat sunken at the base.

P. fuscomaculata has been regarded as a form of *P. viscosa*, which it comes nearest, but it differs in the pubescence and in its more branched habit and greener hue. It has somewhat the same relation to *P. viscosa* as *P. Fendleri*, or rather the var. *cordifolia*, has to *P. mollis*. It is a native of South America and, as far as I know, has been collected but once within the United States, viz., by C. Mohr, no. 27, in 1891, at Mobile, Ala., where it was growing among ballast. Mr. Mohr's specimens resemble perfectly specimens distributed by Cosson. These are from France, where the plant is introduced into the botanic gardens.

33. **Physalis Elliotti** Kunze in Linnaea, **20**: 33. 1847. Walp. Ann. **1**: 529; Dunal in DC. Prod. **13**: part 1, 439.

? *P. lanceolata* Ell. Bot. S. C. and Ga. **1**: 278. 1817.

P. Pennsylvanica spathulaefolia Torr. Bot. Mex. Bound. Surv. 152. 1859.

P. viscosa spathulaefolia Gray, Proc. Am. Acad. **10**: 66, and Syn. Fl. **2**: part 1, 335 (in part). Coult. Cont. U. S. Nat. Herb. **2**: 301, in part.

Rootstock slender and creeping; plant often perfectly smooth, except the margins of the calyx-lobes, rarely sparingly stellate when young; leaves very thin and veiny, oblong, spatulate, broadly oblanceolate or in luxuriant specimens (as, for instance, one in J. Donnell Smith's herbarium) broadly oval, entire or wavy, decurrent into a winged petiole; peduncles 2–3 cm. long, slender, erect, but in fruit reflexed and often 5 cm. long; calyx generally smooth, except the margin, which is stellate;* lobes triangular; corolla 1½–2 cm. in diameter, yellow with dark centre; fruiting calyx generally a little shorter than in the next species.

Specimens of this have been labelled *P. lanceolata* or *P. viscosa spathulaefolia*. The form of the calyx, which is nearly perfectly glabrous except on the margin, places this nearest to *P. angustifolia* into which it grades. The leaves often resemble in form those of *P. viscosa maritima*, from which they differ in texture and pubescence. The stellate species grade more or less into each other and it is difficult to draw the lines between them, but as far as this is concerned, the nearest relationship is with *P. angustifolia*, and if not regarded as a species it should be placed as a variety of that plant rather than of *P. viscosa*. The following specimens have been examined:

Florida: A. P. Garber, 1876; J. H. Simpson, 1889; Chapman, 1887; Rugel, 1843 (type); Dr. Hulse; Dr. Leavenworth; J. Donnell Smith, 1880†; A. P. Garber (in U. S. Nat. Herb.), 1876‡; Blodgett (in Columbia Coll. Herb.)§; Edw. Palmer, 376, 1874.

Texas: Schott, no. 30, 1853 (type of *P. Pennsylvanica* var. *spathulaefolia* Torr.).

34. **Physalis angustifolia** Nutt. Journ. Acad. Phil. 7: 113. 1834. Don, Gard. Dict. 4: 448; Walp. Rep. 3: 27; Gray, Proc. Am. Acad. 10: 67; Syn. Fl. 2: part 1, 236; Dunal in DC. Prod. 13: part 1, 451; Eat. & Wr. N. A. Bot. 357; Wood, Bot. & Flor. 263; Chapman, Fl. So. St. 350.

Rootstock slender, long and creeping; stem diffuse and branched, angled. Plants often perfectly smooth, except on the margins of the calyx-lobes, rarely sparsely stellate all over when young; leaves linear or linear-oblanceolate, tapering into the petiole, entire, thickish; veins, except the mid-rib, generally obsolete; peduncles 2–3 cm. long, filiform, generally erect, in fruit 4–5 cm. long and reflexed; calyx smooth, except the stellate ciliate margins of the rounded triangular lobes; corolla about 2 cm. in diameter, yellow with purple centre, anthers yellow; fruiting calyx

*This does not agree with Kunze's description, which gives it as hairy. The specimens in the Torrey Herbarium are in fruit, but there is no indication of hairiness except the stellate margin.

† Very broad-leaved forms.

‡ Broad-leaved form approaching *P. viscosa maritima*.

§ Form connecting it with *P. angustifolia*.

small, $1\frac{1}{2}$–2 cm., ovate, obscurely angled and scarcely sunken at the base.

P. angustifolia grows on the beach or in sand near the coast. It ranges from Florida to Louisiana, but is most common on the Florida "keys."

Florida: Curtiss, no. 175, 1880, no. 2212; Chapman, no. 672, etc.; Bennett; Simpson, no. 249, 1891; Rafinesque (labelled *Onistis nutans* Raf.), no. 895, 1816–36; N. A. Ware (Nuttall's type).

Mississippi: S. M. Tracy, 1891.

Louisiana: Ingalls, 1835; A. B. Langlois, no. 109, 1895.

Alabama: C. Mohr, 1868.

VIII. *Versicolores:* Perennials from a stout root; fruiting calyx decidedly 10-angled, reticulate, open, lobes short, not connivent; flowers yellowish with a dark center, in age turning bluish; leaves not fleshy.

35. **Physalis versicolor** Rydberg, Bull. Torr. Bot. Club, **22**: 307. 1895.

Finely pubescent, in age glabrate; stem from a stout perennial root, much branched, at first erect but later spreading, slender, obtusely angled; lower leaves reniform-cordate, the upper ovate, all more or less oblique at the base, sinuately toothed, 2–4 cm. long, on slender petioles which are generally a little longer than the blade; peduncles slender, about the length of the petioles; calyx-lobes triangular-ovate, shorter than the tube; flowers about 1 cm. wide, yellow or drab with brown spots in the center, turning bluish in drying; fruiting calyx thin, ovoid-cylindrical, reticulate, decidedly 10-angled, 2.5–3.5 cm. long, generally open at the mouth.

The specimens collected within the United States are more erect, and have larger leaves and fruiting calyces than the Mexican. Rare within the United States.

New Mexico: C. Wright, 1851(Mo. Bot. Gard. Herb.).

Arizona: Treadwell, 1879 (Cal. Acad. Sci.).

Mexico, Guaymas: Ed. Palmer, 621 and 622*, 1887.

Physalis versicolor microphylla Rydberg, Bull. Torr. Bot. Club, **22**: 307. 1895.

Like the species, but leaves only about 1 cm. long, deltoid, coarsely toothed; peduncles about twice the length of the leaves; fruiting calyx nearly spherical, 1.5 cm. long, tinged with purple.

Mexico, Guaymas: Ed. Palmer, no. 94, 1887 (herbaria of J. Donnell Smith, Columbia College, Professor Greene, etc.).

* No. 622 is not typical.

IX. *Crassifoliae:* Low branched perennials, from a stout caudex; fruiting calyx reticulate, open, lobes not connivent; flowers yellow, seldom with a dark center; leaves more or less fleshy.

36. **Physalis crassifolia** Benth. Bot. Sulph. 40. 1844. Walp. Rep. **6**: 574; Dunal in DC. Prod. **13**: part 1, 443; Gray, Proc. Am. Acad. **10**: 66; Syn. Fl. **2**: part 1, 235; Bot. Calif. **1**: 541; Vasey & Rose, Cont. U. S. Nat. Herb. **1**: 74 and **1**: 133; Coville, Cont. U. S. Nat. Herb. **4**: 167.

P. cardiophylla Newberry, Bot. Ives. Exp. 23. 1860.

Stems spreading from a perennial caudex, much branched; branches often spreading, minutely puberulent; leaves small, blade about 2 cm., ovate, deltoid or cordate, oblique at base, often repand, more or less fleshy, on petioles of the same length; peduncles about as long as the leaves; calyx-lobes short, triangular; corolla 1½–2 cm. in diameter; fruiting calyx 2–3 cm. long, 5–10-angled, reticulate and generally open at the mouth, sometimes tinged with purple, much resembling that of *P. versicolor.*

It grows in dry regions from Texas to California and Mexico. Specimens examined:

Texas: Wright, 1848.

Arizona: E. Palmer, no. 431, 1876; E. S. Clark, 1886; Engelmann, 1880; Lemmon, no. 483, 1881.

California: Vasey, 1880; C. R. Orcutt, no. 2192, 1890; 1894; 1889; Coville & Funston, nos. 214 and 976, 1891; S. B. & W. F. Parish, no. 16, 1882; S. B. Parish, 1894; no. 3144, 1894; Dr. A. Davidson, 1893; Parry & Lemmon, no. 286, 1876; C. C. Parry, 1875; 1881; 1882 (unusually pubescent.)

Lower California: C. R. Orcutt, 1886; Ed. Palmer, no. 76*, 1890; D. E. Bryant, 1888.

Barrier Island: Newberry in Ives Exped.

Physalis crassifolia cardiophylla (Torr.) Gray, Syn. Fl. **2**: part 1, 235. 1878.

P. cardiophylla Torr. Bot. Mex. Bound. Surv. 153. 1859.

P. pubescens Wats. Bot. King's Exp. **5**: 274. 1871.

Leaves larger, 3–5 cm. long, thinner and more decidedly cordate, plant generally more upright and sometimes more hairy, approching *P. Fendleri cordifolia*, but grades into the species. Coville & Funston's no. 976, has the leaves of this variety but the general habit of *crassifolia.*

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* With oval leaves and larger calyx.

The following are the specimens examined:

Utah: S. Watson (King's Exp.), no. 940, 1869 (labelled *P. pubescens*).

Nevada: P. W. Davis, 1880.

Arizona: Ed. Palmer, 1276; Wheeler, 1871.

California: Maj. Thomas, nos. 1, 2; Coville & Funston, no. 976; 1891; Bigelow in Whipple's Exp., 1854; G. R. Vasey, 1881; C. C. Parry; M. E. Jones, no. 3854, 1884; Schott, no. 2, 1855; S. B. Parish, 1880; Ed. Palmer, 1869.

Lower California: Ed. Palmer, 1869.

Mex. Bound. Surv., Schott, no. 1025.

Mexico: C. E. Lloyd, no. 434, 1894.

37. **Physalis hastata** n. sp.

(?) *P. crassifolia* Brandegee, Proc. Cal. Acad. (II) 2: 190. 1889.

P. glabra Brandegee, Proc. Cal. Acad. (II) 2: 190. 1889. : 156. 1890. Zoe, 1: 272. 1890.

Like the last, but more slender, perfectly smooth, branching nearly at right angles; leaves lanceolate, oblique at the base, often more or less hastate, 3–5 cm. long, longer than the petioles; peduncles generally longer than the petioles, but shorter than the leaves; fruiting calyx more ovate and shorter, otherwise as in *P. crassifolia.*

I have not seen the type specimens of *P. glabra* Benth.* Specimens collected by L. J. Xantus (no. 85, 1860) at Cape Lucas, Lower California, the type locality of *P. glabra* Benth., differ from *P. hastata* in the fruiting calyx, which is much smaller, scarcely reticulate and has connivent calyx lobes. All these characters agree with Bentham's description.

Mexico. Lower California: T. S. Brandegee, no. 422, 1890 (at Todos Santos, which is not far from the U. S. boundary).

§ 2. Microphysalis.

Perennials from a stout caudex, hirsutely glandular pubescent; fruiting calyx small, not angled, scarcely ribbed, open, its lobes not connivent, as long as the tube or longer. (One species approaches *Athenaea* in the structure of the calyx.)

* Bot. Sulph. 39. 1844.

38. Physalis microphysa Gray, Proc. Am. Acad. **21**: 402. 1886.

Stem 2–4 cm. high, from a perennial root, branched; leaves small, ovate or cordate, repand-crenate; peduncles very short; calyx about 4 mm. long; lobes lanceolate, in fruit even often longer than the tube; corolla about 1 cm. in diameter; fruiting calyx only about 1 cm. long, open at the mouth.

It has not as yet been collected within the United States.

Mexico. Chihuahua: C. G. Pringle, nos. 116, 317, 1885.

§ 3. MEGISTA.

Flowers whitish, limb more distinctly 5-lobed; plant tall, hirsute or glabrate.

39. Physalis Alkekengi L. Sp. Pl. 183. 1753. Ed. 2, 262; Willd. Sp. Pl. **1**: 1022; Don, Gard. Dict. **4**: 448; Gmelin, Syst. **2**: part 1, 381; Spreng. Syst. Veg. **1**: 697; Dunal in DC. Prod. **13**: part 1, 438; Walp. Rep. **3**: 23; Gray, Syn. Fl. **2**: part 1, 233; Eat. Man. Ed. **2**, 359; Ed. 3, 390; Roem. & Sch. Syst. Veg. **4**: 673; Wood, Class Book, 447, 1855; 579, 1863; Bot. & Flor. 263.

P. Halicacabum Crantz, Inst. **2**: 370. 1766. Scop. Fl. Car. Ed. 2, 160. 1872.

Megista maxima Tourr. in Ann. Soc. Linn. Lyon (II.) **17**: 115. 1869.

Alkekengi officinarum Moench, Meth. Suppl. 177.

Tall, ½–1 m., strict, from a creeping rootstock; leaves broadly deltoid, acute at both ends, repand or angularly toothed; peduncles about 5–10 mm., erect, in fruit reflexed; fruiting calyx obtusely 5-angled, retuse at base, often colored red; berry red.

It is a native of Europe and Asia; often cultivated for its fruit and sometimes escaped from cultivation, as for example:

New Jersey: Conrad.

Pennsylvania: I. Martindale, 1866; 1886.

Delaware: A. Commons, no. 2213, 1885.

3. Quincula Raf.

QUINCULA Raf. Atl. Journ. 145. 1832.

A low and diffuse, sparsely scurfy-granuliferous herb from a stout perennial root. Leaves from sinuate to pinnatifid, somewhat fleshy. Peduncles most commonly in pairs from the axils of the leaves, sometimes solitary or in fascicles of 3–5. Calyx campanulate, 5-toothed, in fruit inflated, sharply 5-angular and reticulate, enclosing the fruit; lobes connivent; corolla flat, rotate, pentagonal in outline, veiny, violet or purplish; anthers opening by a longitudinal slit. Seeds comparatively few, kidney-shaped, somewhat flattened, with thick margin, rugose-tuberculate.

The genus is represented by only one species, which has generally been included in *Physalis*, but it is so different from all the other species of that genus that it is better regarded as a distinct type. It was regarded as such by Rafinesque, but his description is faulty. As he, however, cites *Physalis lobata* Torr. as the type of the genus, his generic name must be taken up. Dr. Gray made it a section under the name of *Chamaephysalis*. *Quincula* differs from *Physalis* by the form and color of the corolla, by the different habit and by the seeds.

1. **Quincula lobata** (Torr.) Raf. Atl. Journ. 145. 1832.

Physilis lobata Torr. Ann. Lyc. N. Y. **2**: 226. 1827. Mex. Bound. 152; Rothrock, Wheeler's Exp. 208; Gray, Proc. Am. Acad. **10**: 63; Bot. Cal. **1**: 541; Syn. Fl. **2**, part 1; 233; Eat. and Wr. N. A. Bot. 357; Porter & Coulter, Syn. Fl. Colo., 110; Holz. Cont. U. S. Nat. Herb. **1**: 212; Coulter, Man. Rocky Mt. 269; Cont. U. S. Nat. Herb. **2**: 299.

P. Sabeana Buckley, Proc. Acad. Phil. **1862**: 6. 1862.

Perennial, low, spreading or prostrate, more or less scurfy-puberulent, stem obtusely angled and striate, much branched; leaves oblanceolate or spatulate to oblong, sinuately toothed or pinnatifid with rounded lobes, or rarely subentire, cuneate at the base, tapering into a margined petiole, thickish and veiny; peduncles 2–5 cm., in fruit reflexed; calyx-lobes triangular, acute, shorter than the tube; corolla purplish, 2–3 dm. in diameter; anthers yellow, tinged with purple; fruiting calyx about as wide as long, sharply 5-angled, sunken at the base.

Common on the high plains, at the base of the Rocky Mountains, extending from Kansas to California and Mexico. Specimens from about 80 localities examined.

4. Leucophysalis.

A tall erect viscid and villous annual, with entire leaves, decurrent on the petiole. Peduncles generally in fascicles of 2–4 from the axils of the leaves. Calyx campanulate, 5-lobed, at first a little inflated, but soon filled with and closely fitted to the berry, thin, neither angled nor ribbed, faintly veiny, open at the mouth, lobes exceeding the fruit. Corolla rotate, white, sometimes tinged with purple and generally ochroleucous or yellow in the center, 3–4 cm. in diameter; limb plicate. Stamens inserted near the base of the corolla; filaments long and slender, anthers oblong, opening by a longitudinal slit. Style and stigma as in *Physalis*. Seeds kidney-shaped, flattened, punctate.

Only one species, hitherto included in *Physalis*, but all the characters of the corolla, as well as most of those of the calyx, point towards *Chamaesaracha*. The fruiting calyx however exeeds the fruit, and is, according to Prof. C. F. Wheeler, somewhat inflated at first. It is, however, never angled or ribbed as in *Physalis*.

1. **Leucophysalis grandiflora** (Hook).

Physalis grandiflora Hook, Fl. Bor. Am. **2**: 90. 1834. Gray, Man. Ed. 5, 381: Proc. Am. Acad. **10**: 63; Syn. Fl. **2**: part 1, 233; Perkins, Bull. Torr. Bot. Club, **15**: 219. Wats. & Coult. in Gray, Man. Ed. 6, 375.

Erect, tall, ½–1 m. high; stem somewhat angled, striate, more or less villous; leaves large, 10–20 cm. long, broadly ovate to lanceolate-ovate, generally acute and entire, decurrent on the petiole, more or less villous and viscid, especially on the veins of the lower surface; peduncles several from each axil, short, 1½–2 cm. long, villous; calyx villous; lobes lanceolate, equalling the tube; corolla large, 3–4 cm. in diameter, rotate, white with a more or less yellowish center; filaments slender; anthers short, yellow, often tinged with purple; fruiting calyx ovoid, early filled with the berry.

From Lake Champlain and the St. Lawrence to Saskatchewan and Minnesota, according to Gray, "springing up in new clearings." Specimens examined:

Michigan: C. F. Wheeler, 1880; 1890; Sherman; Dr. Robbins, no. 181, 1863; J. W. Robbins no. 165, 1863.

Wisconsin: J. H. Sandberg, 1887; 1890.

Minnesota: J. H. Sandberg, nos. 201 and 1070, 1891; 1890; E. P. Sheldon, no. 2605, 1892; G. B. Aiton, 1891; F. F. Woods, 1889; Otto Lugger, 1891; L. H. Bailey, no. 242, 1886.

Canada: Hooker (?); Macoun no. 1417, 1873; Geo. G. Kennedy, 1892. *Ont.* Pursh; J. Macoun, 1863, J. M. Macoun, 1884.

Vermont (Providence Island, Lake Champlain): G. H. Perkins, 1888.

Saskatchewan: Bourgeau, 1857–8.

5. Chamaesaracha Gray.

CHAMAESARACHA Gray, Bot. Cal. 1: 540. 1876.

Perennials with entire to pinnatifid leaves, decurrent on the petiole; peduncles solitary, or in fascicles of 2–4 from the axils of the leaves; calyx campanulate, 5-lobed, in fruit somewhat enlarged, but not bladdery-inflated, close-fitting to the berry, thin, not angled, not ribbed, and faintly if at all veiny, open at the mouth, not exceeding the berry; corolla rotate, white or ochroleucous, often tinged with purple; limb plicate; stamens inserted near the base of the corolla; filaments long and slender; anthers oblong, opening by a longitudinal slit; style and stigma as in *Physalis*. Seeds kidney-shaped, flattened, rugose-favose or punctate.

Chamaesaracha is an exclusively North American genus, consisting of half a dozen species, all, except one, natives of Mexico and southwestern United States.

I. Plant erect; leaves entire; seeds punctate; a low canescent-strigose herb from a perennial rootstock. 1. *C. nana.*

II. Plant diffuse; leaves from crenate to pinnatifid; seeds rugose-favose.

a. Leaves broadly ovate, generally obtuse, crenate; lobes of the calyx ovate, obtuse. pubescence puberulent and viscid hirsute; berry 8–10 mm. in diameter. 2. *C. crenata.*

b. Leaves from obovate-rhombic to linear, subentire to pinnatifid; calyx-lobes triangular, generally acute; berry 5–8 mm. in diameter.

Pubescence dense, puberulent and hirsute. 3. *C. conioides.*

Pubescence sparse, puberulent or stellate, hirsute (if at all) only on the calyx. 4. *C. Coronopus.*

I. *Nanae:* Low and branching, erect, from a perennial rootstock; cinereous-strigose with entire leaves; corolla 2 cm. in diameter; calyx-lobes narrow or nearly subulate, very short; fruiting calyx hemispherical, not exceeding the berry; seeds finely punctate, thin.

1. Chamaesaracha nana Gray, Bot. Cal. 1: 540. 1876. Syn. Fl. 2: part 1, 233. 1878.

Saracha nana Gray, Proc. Am. Acad. 10: 62. 1874.

Low, less than 1 dm. high, grayish strigose, neither glandular nor viscid; leaves ovate-lanceolate to rhombic, decurrent on the long petiole, acute, undulate or entire, thickish; peduncles shorter than the petioles; calyx densely strigose and somewhat hirsute with white hairs; lobes narrowly lanceolate to nearly subulate, from a broad base, very short; corolla white or tinged with purple; berry purple (?).

This rare plant grows in the mountain regions of eastern and northern California.

California: Lemmon, no. 229, 1875; Bolander; Kellogg & Harford, no. 719, 1868–9; Geo. Engelmann, 1880; Michener & Bioletti, 1893; Mrs. Austin, 1875.

II. ***Coronopodes:*** Diffuse or spreading perennials, with more or less crenate lobed or pinnatifid leaves; calyx-lobes ovate or triangular, not longer than the tube; fruiting calyx not exceeding the berry; corolla 1–2 cm. in diameter; seeds thickish, rugose-favose.

2. **Camaesaracha crenata** n. sp.

C. Coronopus Wats. Proc. Am. Acad. **18**: 126 (in part), 1883. Not Gray.

Much branched from a perennial base, stouter than the two following; stem 2–4 dm. long, terete or slightly obtusely angled, more or less puberulent, or slightly stellate and hirsute with flat branched somewhat viscid hairs; leaves broadly ovate, obtuse, coarsely and irregularly crenate, puberulent and hirsutely ciliate on the margin and the prominent veins; blade 3–4 cm. long, decurrent on a petiole of about the same length; peduncels often in pairs, 4–6 cm. long; calyx generally more hirsute and viscid than the rest of the plant; lobes ovate, obtuse, about equalling the tube; corolla apparently smaller than in the next; berry comparatively large, 8–10 mm. in diameter, about 50-seeded.*

It is nearest related to *P. conioides*, but differs in its stouter habit, larger berries, ovate obtuse calyx-lobes, and the short and broad leaves. The following specimens have been examined:

Mexico: Edw. Palmer, no. 923, 1880 (U. S. Nat. Herb., type).

Texas: Bigelow (Mex. Bound. Sur., Rio Grande, 40 miles below San Elcearis. Specimen in the Torrey Herbarium).

New Mexico: C. Wright, no. 1598, 4851–2(?).†

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*Another similar species is found in Central Mexico, which has the following characters:

CHAMAESARACHA VILLOSA n. sp.

Stem slender and striate, branched, more than 4 dm. long; the whole plant villous with branching hairs, especially on the calyx and the upper part of the stem; leaves rhombic-ovate, sinuately toothed and decurrent on the petiole; corolla small, only 10 mm. in diameter; calyx-lobes triangular, acute; berry small, about 5 mm. in diameter, containing about half a dozen seeds.

Mexico, State of Coahuila: Edw. Palmer, no. 924, 1880 (U. S. Nat. Herb. and Columbia College).

†Undeveloped specimen.

3. **Chamaesaracha conioides** (Moricand) Britton, Mem. Torr. Bot. Club, **5**: 287. 1895.

Solanum conioides Moric.; Dunal, in DC. Prod. **13**: part **1**, 64. 1852.

Withania (?) *sordida* Dunal,in DC. Prod. **13**: part 1, 456. 1852, Torr. Mex. Bound. 155.

Solanum Linsecumii Buckley, in Proc. Acad. Philad. **1862**: 6. 1863.

Saracha sordida Gray, Proc. Am. Acad. **10**: 62. 1874.

Chamaesaracha sordida Gray, Bot. Cal. **1**: 540. 1876. Syn. Fl. **2**: part 1, 232; J. T. Rothrock in Wheeler's Exped. 208, 1878; Holzinger in Cont. U. S. Nat. Herb. **1**: 212: Coulter, Cont. U. S. Nat. Herb. **2**: 299.

Chamaesaracha Coronopus Wats. Proc. Am. Acad. **18**: 126, in part. 1883. Not Gray.

Much branched from a perennial base, at first upright, at length spreading, cinereous-puberulent with short branched somewhat ulate or viscid hairs, generally also viscidly hirsute or villous with long and branched hairs, especially on the calyx; leaves oblanceolate to obovate-rhombic, generally acutish and tapering into a short petiole, generally deeply lobed, but varying from subentire to pinnatifid; calyx-lobes triangular, generally acutish; corolla about 1 cm. in diameter,* white or ochroleucous, sometimes violet purplish; berry from 5–8 cm. in diameter.

C. conioides grows on dry clayey soil from southern Kansas to California and Mexico. The most common form is very hirsute, often glandular viscid, but not at all stellate. The leaves are generally spatulate or broadly oblanceolate, and more or less lobed. To this form may be referred the following specimens:

Kansas: Gurney, 1891.

Oklahoma Territory: M. A. Carleton, no. 211, 1891.

Colorado: C. S. Crandall, 1892.

Texas: Bigelow, 1851 (Mex. Bound. Surv.); Schott, no. 4–7, 1851 (Mex. Bound. Surv.); 1852; Thurber, no. 185, 1851; G. R. Vasey, 1881; J. Reverchon, no. 67 b, 1882; M. E. Jones, no.

* Specimens collected by Edw. Palmer (no. 921 and 922, 1880) in Mexico,have flowers 2–2½ cm. in diameter. These are more robust and have also larger leaves, more decidedly rhombic in outline and lobed only above the middle, resembling the more entire leaves of *Verbena officinalis*. It may be distinct,but the material seen is insufficient.

3704, 1884; Mary Croft, no. 75, 1885–6; Reverchon (Curtiss, no. 2105).

New Mexico: C. Wright, no. 533, 1849; no. 1596, 1851–2; W. B. Pease; E. L. Greene, 1877; H. H. Rusby, no. 303, 1880; Dr. E. A. Mearns, no. 119, 1892.

Arizona: C. G. Pringle, 1884.

California: C. C. Parry, no. 3, 1852 (Mex. Bound. Surv.).

Mexico: Dr. Gregg, 1847; Dr. Edwards; E. L. Greene, 1880.

This form agrees very well with the description of *Withania sordida* Dunal, but a fragment of the type (Berlandier, no. 2076) is in the Torrey Herbarium, and this belongs rather to the less hirsute and more stellate form, which approaches *C. Coronopus.* This form has also generally narrower and less lobed, sometimes subentire, leaves. It served, if I mistake not, as the types from which the descriptions of *Solanum conioides* Dunal and *S. Lin-secumii* Buckley were drawn. It is represented by the following:

Texas: C. Wright, no. 531, 1849; J. Reverchon, no. 676, 1891; V. Havard, 1883; Buckley, 1875 (*S. Linsecumii*).

Arizona: Rothrock, no. 471, 1874 (Wheeler's Exp.).

Mexico: Berlandier, no. 2076 (*Withania sordida* Dunal); E. Palmer, No. 926, 1880 (in part).

4. **Chamaesaracha Coronopus** (Dunal) Gray, Bot. Cal. **1**: 540. 1876. Syn. Fl. **2**: part 1, 232 and 436; J. T. Rothrock, Wheeler's Exp. 208; Coult. Cont. U. S. Nat. Herb. **2**: 299; Wats. Proc. Am. Acad. **18**: 126 (in part).

Solanum Coronopus Dunal in DC. Prod. **13**: part 1, 64. 1852.

Withania Coronopus Torr. Bot. Mex. Bound. Surv. 155; Porter & Coulter, Syn. Fl. Colo. 110.

Saracha Coronopus Gray, Proc. Am. Acad. **10**: 62. 1874.

(?) *Saracha acutifolia* Miers, Ann. & Mag. Nat. Hist. 1849, acc. to Gray, Bot. Cal. **1**: 540.

Branched and diffuse from a perennial base; stem obtusely angled; pubescence on the stem and leaves more or less roughish pruinose or stellate, often scarcely any; on the calyx stellate or sometimes hirsute; leaves linear or lanceolate, tapering at the base, more or less sinuately lobed, occasionally subentire, sometimes pinnatified; calyx-lobes triangular, acute; corolla white or ochroleucous, the appendages of the throat often protuberent; berry 5–8 mm. in diameter, nearly white.

C. Coronopus grows in clayey soil from Kansas to Utah, California and Mexico. It is very variable and the more hairy forms grade into the less hirsute ones of the preceding. In the typical form the pubescence is sparse or nearly none, and the lobes of the leaves are short.

Texas: Wright, no. 534, 1849; Mex. Bound. Surv. no. 1036; Bigelow, 1852 (Mex. Bound. Surv.); Lindheimer, no. 484, 1847–8; Reverchon, no. 1569; E. Hall, no. 496, 1872; Edw. Palmer, no. 920, 1880; A. A. Heller, no. 1647, 1894; Dr. V. Havard, no. 166, 1881; W. Garret, 1881.

Colorado: T. S. Brandegee, 1872.

New Mexico: Fendler, 675, 1847; C. Wright, no. 1593, 1852; M. E. Jones, no. 4147, 1884; E. L. Greene, 1880.

Arizona: Dr. E. A. Mearns, no. 214, 1884; McDougal, no. 524, 1891; Mrs. R. W. Hoyt, 1893; C. G. Pringle, 1883.

Utah: Capt. Bishop, 1872; Mrs. Thompson, no. 144, 1872.

California: W. F. Parish, 1884.

Mexico: Berlandier, no. 3023; Thurber, no. 730, 1852; Parry & Palmer, no. 653, 1878 (in part); Edw. Palmer, no. 926 (in part), 927 & 928, 1880.

The most striking of the different forms of this species is a very low (1 dm. high or less) and bushy one, more stellate-pubescent and with much smaller leaves which are pinnatifid with very narrow lobes. It is represented by the following:

Texas: C. Wright, no. 534, 1849; Bigelow, 1852 (Mex. Bound. Surv.).

New Mexico: C. Wright, no. 1594, 1851–2; Rusby, no. 302, 1880.

Mexico: Dr. Gregg; Parry & Palmer, no. 653 (in part) 1878.

6. **Oryctes** Wats.

ORYCTES Wats. Bot. King's Exp. 274. 1871.

Low, viscid-puberulent annual, with entire undulate leaves. Calyx campanulate, 5-cleft, with lobes longer than the tube, in fruit enlarged, membranaceous, but not inflated, closely fitting the fruit, neither ribbed nor angled, faintly veined. Corolla tubular with five short lobes, yellowish or purple. Stamens inserted below the middle of the tube, included, unequal, with very short anthers opening by a longitudinal slit. Fruit nearly dry, light colored. Seeds nearly orbicular, very flat, faveolate-reticulate with a thin membranaceous margin.

Oryctes consists of one species, discovered and described by Dr. Watson. The original collection lacked specimens in good fruit, and his description is a little imperfect. Good fruiting specimens have been collected by Shockley, and these show that the fruiting calyx is enlarged just as much as it is in *Chamaesaracha,* which the plant also resembles somewhat in habit, and that the seeds are wing-margined.

1. **Oryctes Nevadensis** Wats. Bot. King's Exp. 274. 1871. Gray, Syn. Fl. 2: part 1, 232.

Less than 1 dm. high, erect, branched, somewhat scurfy and viscid-pruinose, a little pilose with flat hairs; leaves ovate, obovate or lanceolate, decurrent on the petiole, entire, undulate, somewhat thickish; flowers in fascicles of 2–4 in the axils of the leaves, on short peduncles; calyx-lobes lanceolate, obtuse, shorter than the corolla; corolla tubular, about 6 mm. long, ochroleucous, blue or purplish; sinuses induplicate; berry nearly dry, light colored.

Western Nevada: Watson, no. 941, 1868 (type); Shockley, 1888.

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