NOTES ON MONARDA: THE SUBGENUS CHEILYCTIS.

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The present paper records the results of a study begun in 1923 at the Missouri Botanical Garden and continued from time to time both in this country and abroad since that year. A subsequent paper will deal with the Section *Eumonarda.* The study is based especially upon the material in the herbaria of the United States National Herbarium, the Philadelphia Academy of Natural Sciences, the New York Botanical Garden, the Gray Herbarium, the Missouri Botanical Garden, the Field Museum, and the University of Texas. In addition, types and other historical material were consulted at the Linnean Herbarium, the British Museum, the Jardin des Plantes at Paris, the Berlin Botanic Garden, the Royal Botanic Gardens at Kew, and the Delessert and Boissier Herbaria in Geneva. To the directors of these institutions and to their associates the author makes grateful acknowledgment.

Monarda Sect. Cheilyctis Raf. Med. Fl. 2: 64, 1830.

Cheilyctis Raf. Journ. Phys. 89: 99, 1819.

Monarda sect. *Coryanthus* Nutt. Trans. Am. Phila. Soc. 5: 186, 1834.

Perennial or annual herbs of erect habit and intermediate size, usually puberulent, less often pubescent, frequently virgate, more often branching in the upper axils, less often at the base; leaves prevailingly oblong or elliptical, rarely linear, for the most part 3–5 cm. long, on petioles usually less than the width of the blade; flowers crowded into axillary glomerules which are subtended by an involucre of bracts; bracts mostly entire, either ovate, tending to rotund, or elliptical or oblong or lanceolate, ascending or strongly reflexed, either puberulent and canescent upon the upper surface, or glabrate, usually acuminate, their margins more or less ciliate; calyces tubular, 13–15-veined, the mouth somewhat oblique, the teeth deltoid or narrowly deltoid to subulate or aristate, the base always deltoid; corolla tube longer than the lips, slender, abruptly expanded in the upper part to a funnel-shaped throat, hairy within and on the palate, the upper lip galeate, notched, strongly arched over the lower, the lower lip usually shorter but appearing longer by reason of the ample throat, three-lobed, the middle lobe longest; stamens seated in the throat, included in the galea or somewhat exserted, the filaments glabrous or hispidulous, the anthers attached at the side of the connective; style hispidulous, shortly exserted, the posterior lobe shorter.

The section *Cheilyctis* is readily separable into two series which I have named *Foliosae* and *Aristatae.* It is evident even

upon casual study that these series are closely allied and indubitably of common ancestry. While some members from each series are known to occur together, I have seen no evidence of hybridization between the two series.

Speciation has progressed further in *Aristatae* than in *Foliosae* and the segregates are more clearly defined geographically. It is significant that the former occupies a more broken terrain where isolation has had greater opportunity to play a part. It is further significant that the least differentiated elements within it, namely *M. pectinata* and *M. clinopodioides,* occupy the least differentiated territory. I am of the opinion that this section allies *Monarda* to *Glechon,* a Brazilian genus.

As previously,[1] I have employed the category subspecies to designate an emergent or incipient species, that is, a complex of one or more biotypes which has a characteristic regional distribution but which merges geographically and morphologically with allied subspecies in such a way as to render specific recognition uncertain or impracticable. These subspecies are probably ecotypes in the sense of Türesson.

Key to the Species

1. Calyx teeth prevailingly deltoid, their breadth usually half their length or more.
    2. Leaves rarely as narrow as 3 mm. ..... 1. *M. punctata*
    2. Leaves 1–3 mm. wide, canescent with minute hairs ..... 2. *M. fruticulosa*
1. Calyx teeth subulate or aristate, their breadth usually much less than half their length.
    2. Bracts minutely but densely puberulent upon the upper surfaces at least below the middle, either whitish or purple; margins ciliate only towards the base.
        3. Bracts subfoliar, widest near the middle or above, acuminate but not aristate, forming a foliaceous involucre.
            4. Leaves subtending the glomerules 10–20 mm. broad at the base; Mexican species ..... 3. *M. mexicana*
            4. Leaves subtending the glomerules infrequently wider than 10–12 mm.; species of the United States ..... 1. *M. punctata*
        3. Bracts oblong or lanceolate, clearly differentiated from the leaves and usually ending in a bristle.
            4. Bracts oblong, prevailingly 3–5 mm. broad or more, abruptly narrowed to a short bristle; calyx tubes mostly 8–9 mm. long, their teeth mostly 3–5 mm. long ..... 4. *M. citriodora*

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[1] Epling, C. Monograph of the Genus Monardella. Annals Mo. Bot. Gard. 12: 1–106, 1925.

4. Bracts oblong-lanceolate, strongly reflexed at maturity, prevailingly 1.5–3 mm. broad, gradually acuminate; calyx tubes mostly 5–6 mm. long, their teeth mostly 2.5–3 mm. long ..... 5. *M. austromontana*

2. Bracts glabrous on the upper surface or essentially so, three to five or seven veins prominent, the intervenous tissue tending to be translucent; margins regularly ciliate-pectinate most of their length.

3. Calyx teeth 2.5–3 mm., rarely 4 mm. long; bracts usually with three veins prominent; corolla tube commonly 10–12 mm. long ..... 6. *M. pectinata*

3. Calyx teeth 2.5–6 mm. long, mostly 3.5–5 mm., bracts usually with 5 or 7 veins prominent; corolla tube commonly 12–14 mm. long ..... 7. *M. clinopodioides*

SUBSECTION FOLIOSAE

Calyx teeth deltoid, rarely subulate, their width infrequently less than half their length, usually more, commonly nearly equal to it.

1. Monarda punctata L. Sp. Pl. 22, 1753. Standard specimen:[2] that plant of the Linnean Herbarium labelled "flor. verticill. hort. cliff. 495."

Perennial or annual herbs, usually of sandy soil, 20–100 cm. tall or more, usually erect, shortly decumbent at the base thus forming a short rhizome, or perennial from the crown, prevailingly branched in the upper axils, the branches ascending, less often branched at the base, the branches erect, in any case pubescent, either with short curving appressed hairs with which in some forms longer, coarser hairs occur, or sometimes clothed with short spreading hairs, even becoming canescent; leaves variable, mostly 3–10 cm. long, .3–2 cm. wide, prevailingly oblong-lanceolate, frequently oblong, linear-lanceolate in one subspecies, either acute or obtuse at the apex, narrowed at the base to a petiole usually less than the breadth, their margins irregularly serrulate or subentire, the upper surfaces glabrous or pubescent with short hairs, the lower usually woolly along the midvein, in some cases throughout, even becoming canescent and subtomentose, infrequently nearly glabrous; bracts purple or yellowish-white, rarely white, subfoliar, acute or acuminate, entire, puberulent or sometimes pubescent, usually with a few cilia on the margin toward the base; calyces prevailingly 6–8 mm. long, their teeth variable on the same plant, *not often longer than the width of the calyx tube, narrowly deltoid,* acute or acuminate, infrequently as broad as long, their margins naked or ciliate, the orifice provided to some degree with similar hairs; corolla purple- or brown-punctate on the lips, commonly yellow

[2] Epling, C. Jour. Bot. (Br) 67: 3, 1929.

or yellowish, less often white, rarely pure white and unspotted, apparently rose-colored in extreme western forms, 14–25 mm. long, the lips subequal, the tube 8–14 mm. long, very slender and equal within the calyx, abruptly expanded to a funnel-form throat 2.5–6 mm. long, the palate of which is beset with blunt thick trichomes; filaments and style usually hispidulous; nutlets smooth.

While I believe that the species is in the process of fragmentation, the geographical races are contiguous and are hardly of sufficient definition to justify more than subspecific segregation. It is possible that an extended field survey, particularly after a study of floral structure and proportion, might lead to another opinion; I believe not.

Key to the Subspecies

1. Leaves pubescent over the entire lower surface or nearly so; stems pubescent with short often spreading hairs; corolla tube 9–12 mm., prevailingly 10–11 mm. long, the throat 3.5–4 mm. long; plants of the Middle West, rare in Texas ..... 1b. subsp. *villicaulis*
1. Leaves glabrate or puberulent throughout on the lower surface or, if pubescent, the pubescence confined largely to the middle of the leaf; stems puberulent with small curving hairs which are mostly appressed, rarely bearing longer coarser hairs in addition.
   2. Corolla 17–25 mm. long, mostly 22–24 mm. long, the tube mostly 12 mm. long or more; plants of the Atlantic and Gulf seaboards 1a. subsp. *typica*
   2. Corolla 14–20 mm. long, mostly 15–18 mm. long, the tube usually less than 12 mm.
      3. Plants prevailingly perennial, 50–100 cm. tall, rarely less, branching in the upper axils; calyx teeth narrowly deltoid, often acuminate, sometimes subulate; Texan plants ..... 1c. subsp. *Stanfieldii*
      3. Plants annual, 20–50 cm. tall, branching at the base; calyx teeth typically broadly deltoid, often obtuse; range from Kansas to Oklahoma and Texas and southwest ..... 1d. subsp. *occidentalis*

1a. Monarda punctata subsp. **typica** nom. nov. Based upon the standard specimen of the species which is conspecific with and similar to *Biltmore Herb. 653a* collected near Chimney Rock, N. C.

M. lutea Michx. Fl. Bor. Am. 1: 16, 1803. Based upon a specimen collected by Michaux now in the herbarium of the Jardin des Plantes, Paris.

Perennial (very rarely annual), sometimes forming a subshrub in the extreme southern portion of its range; stems puberulent with short recurved hairs and *frequently sprinkled with longer*

stiffish hairs; leaves prevailingly 3–5 cm. long, 8–15 mm. wide along the Atlantic and Gulf seaboards, increasing to 8–10 cm. in southwestern Arkansas and adjacent Texas, *sparingly pubescent beneath,* rarely incanescent along the midvein, sometimes nearly glabrous, the margins tending to be entire; bracts commonly purple; corolla yellow with purple spots, very rarely white and unspotted, 17–25 mm. long, *commonly 22–24 mm.,* the tube 11–14 mm., prevailingly 11–12 mm. long, the throat *4–6 mm.* long.

Ranges from New Jersey south to Florida thence west to Louisiana, Arkansas and eastern Texas. Along the seaboard, the leaves are prevailingly 3–5 cm. long; a form in central and southwestern Arkansas has leaves 6–8 cm. long or more and passes into subsp. *villicaulis.* The form with longer trichomes occurs throughout this range, but appears to be more abundant in the south. Specimens from Pelican Key and Corpus Christi, Texas, are very hairy and suggest a more robust plant woody at the base. Forms in the vicinity of Dallas and Fort Worth, Texas, suggest transitions to subsp. *Stanfieldii.* Forms from New Jersey suggest transitions to subsp. *villicaulis.* As a rule the leaves of subsp. *typica* become less pubescent in the southern part of its range.

1b. MONARDA PUNCTATA subsp. **villicaulis** (Pennell) comb. nov. Based upon *M. punctata* var. *villicaulis* Pennell (Bull. Torr. Bot. Club 46: 186, 1919), which is based upon a specimen collected by Pennell (no. 6412) in Indiana (Lake Co.) near Clarke; the type is in the herbarium of the New York Botanical Garden.

M. punctata var. *lasiodonta* Gray, Syn. Fl. N. Am. 2^1: 375, 1886. Based upon a specimen collected in Texas by Drummond; the type is in the Gray Herbarium. This variety was based primarily upon Drummond's two specimens, but there were included fragmentary specimens of Hall (subsp. *Stanfieldii*), Woodhouse (subsp. *occidentalis*), and Wislizenus (subsp. *occidentalis*).

M. lasiodonta Small, Fl. S. E. United States 1038, 1337, 1903. Based upon the above named variety.

Perennial herbs mostly of sandy places, their stems usually 50–60 cm. tall, often branched from the base, more or less densely pubescent with short, often spreading hairs; leaves commonly 4–6 cm. long, *pubescent over the whole of the lower surface,* densely so along the midrib, sometimes canescent and subtomentose, the blades thicker than the typical subspecies and with petioles which are usually shorter than the breadth of the blade; bracts yellowish rather than purple; calyx mostly 7–8 mm. long, the teeth commonly ciliate; corolla yellow, spotted with purple, prevailingly *17–18 mm. long,* the tube 9–12 mm., mostly *10–11 mm. long,* the throat 3.5–4 mm. long.

Typically developed in sand dunes around the southern end of Lake Michigan, occurring also in the Mississippi and Ohio River Valleys, apparently on sand-bars or in sandy waste places. Some forms verge closely to subsp. *typica.* Occasional plants occur also in Oklahoma.

1c. MONARDA PUNCTATA subsp. **Stanfieldii** (Small) comb. nov. Based upon *M. Stanfieldii* Small, Fl. S. E. United States, ed. 1, 1038, 1903, which was based upon a fragmentary specimen collected by Stanfield near San Marcos, Texas, in 1897; type now in the herbarium of the New York Botanical Garden.

M. punctata var. *immaculata* Penn. Bull. Torr. Bot. Club 46: 187, 1919. Based upon a specimen collected by Pennell (no. 5494) in Texas (Victoria Co.) near Aloe; the type is in the herbarium of the New York Botanical Garden.

Perennial (or annual ?) herbs mostly 50–100 cm. tall, their stems cinereous-puberulent with recurved hairs; leaves glabrate on the upper surface, *puberulent or glabrous beneath,* 4–6 cm. long, usually sharply serrate, the petioles commonly ciliate at the base; calyx teeth *narrowly* deltoid, sometimes approaching subulate, very acute or acuminate, more or less ciliate; corolla yellowish or white but usually spotted, 15–20 mm. long, variable in size, the lips usually shorter in proportion to the length of the slender tube than in the other subspecies, the upper lip more markedly curved, the tube 9–12 mm. long, the throat 2.5–3.5 mm. long.

Ranges from the northeastern corner of Texas southwestward to the Rio Grande. Forms near Dallas and Fort Worth suggest intermediate forms with subsp. *typica.* May be distinguished from subsp. *occidentalis* chiefly by the habit. *M. punctata* var. *immaculata* is a form 30–45 cm. tall with linear-lanceolate leaves 3–4 mm. broad which is found in a small area within the range of subsp. *Stanfieldii.* It is known from only a few specimens and I believe will prove to be only a depauperate form of that subspecies.

1d. MONARDA PUNCTATA subsp. **occidentalis** subsp. nov. Based upon a specimen collected in Oklahoma in sandy places near Alva by Stevens (no. 3072); the type is in the herbarium of the New York Botanical Garden; an isotype is in the Gray Herbarium.

Plantae annuae altitudine 20–50 cm. plerumque e basi ramosae, cinereo-puberulae; foliis plerumque 3–4 cm. longis, paginis ambobus tenuiter puberulis vel glabris; bracteis flavidis vel etiam albis, rarius purpureis; calyce vulgo 6 mm. longo, dentibus maximam partem deltoideis et valde ciliatis, pilis argenteis, ita glomerulis maturis compactis nitentibus; corollis flavidis vel albis (? vel purpureis) plerumque maculatis 14–20 mm. longis, vulgo 15–16 mm.; tubis 8–11 mm. longis, vulgo 8–9 mm.; faucibus 2.5–3.5 mm. longis.

Ranges from central Kansas southward through western Oklahoma to central Texas. Occasional plants also occur in Missouri near Kansas City, in the Organ Mts. and at San Lorenzo, New Mexico, and in Chihuahua. The New Mexican and Mexican forms appear to have rose-purple corollas spotted with deeper purple. They are too little known.

2. **Monarda fruticulosa** sp. nov. per specim. in Texas prope Peña Station a Havard lectum constituta est; typum in herb. Smithson. vidi.

Herbae perennes altitudine 30–40 cm., videtur in basi suffruticosae habitu fruticuli utrimque ramosae cortice discedente *ramulis pilis minutis appressis canescentibus;* foliis *linearibus fasciculatis 1–1.3 cm. longis,* 1–3 mm. latis, integris vel sparse dentatis, acutis, in basi angustatis subsessilibus; glomerulis 1.5–2 cm. diametro bracteis ovatis vel ellipticis interdum subrotundis integris abrupte acuminatis ad basim ciliatis canescentibus rarius purpurascentibus; calycibus 5–7 mm. longis puberulis, dentibus anguste deltoideis vel subulatis acutis 1 mm. longis villosis; corollis lutescentibus videtur immaculatis 10–16 mm. longis, tubis 8.5–10 mm. longis, faucibus anguste infundibuliformibus intus pubescentibus; antheris vix exsertis; stylo et filamentis hispidulis.

Distribution: Texas: Duval Co.: Peña Sta., 21, VIII, 1888, *Pringle;* Peña Sta., 1889, *Nealley 386;* Peña Sta., IX, 1884, *Havard,* type; between Hebronville and Alice, 21, VI, 1925, *Tharp 3713;* Torrecillas, 24, V, 1904, *Griffiths 6422.*

SUBSECTION ARISTATAE

Calyx teeth subulate to aristate.

Speciation within this series has proceeded further than in the first and the segregates have much more weight. The degree of variation within the species here recognized and the degree to which they occasionally approximate one or the other of their allies suggest that speciation is incomplete. Nevertheless, since they are isolated for the greater part and since most of the plants examined fall readily into the categories here described, I have preferred to consider them as species. As far as one may ascertain from preserved material there is no single criterion used as a means of segregation which is not found to some degree in one or the other of the allies. Nevertheless, a form of one geographical region is never duplicated in another region. The intermediates are not necessarily intermediate geographically.

3. **Monarda mexicana** sp. nov. per specim. in Mexico prov. Durango a Garcia (no. 399) lectum constituta est; typum in herb. Smithson. vidi.

Herba ut videtur annua altitudine 35–40 cm., caulibus superne pubescentibus; foliorum laminis mediis lanceolatis 4–6 cm.

longis, 10–12 mm. latis acutis vel acuminatis, in basi ad petiolos 5–6 mm. longos rotundato-angustatis, margine subintegra, paginis ambobus viridibus glabris, supremis majoribus sessilibus patentim acuminatis; verticillastris in foliorum supremorum axillis dispositis bracteis *subfoliosis subrotundis* acuminatis involucratis superne infra medium purpureo-puberulis subtentis; calycum tubis 6.5–7 mm. longis 15-venis glabris, dentibus subulatis acutissimis 1.5 mm. longis villosis; corollarum albarum rubropunctatarum tubis 10–11 mm. longis, intus pubescentibus, faucibus infundibuliformibus 3.5–4 mm. longis, labia superiore circa 10 mm. longa arcuata, inferiore subaequilonga; staminibus breviter exsertis; stylo hispidulo.

Known only from the State of Durango; type, *Garcia 399*. While the corolla and genitalia are those of *Cheilyctis*, the habit of its foliage and bracts and the habit of the calyx teeth strongly suggest *Eumonarda*,

4. Monarda citriodora Cerv. ex Lagasca, Gen. et Sp. Nov. 2, 1816. Based upon a garden specimen reared from seeds sent two years previously by Cervantes; the type or authentic material may be at Madrid. I have based my nomenclature upon two plants distributed by Pavon, one preserved in the Boissier Herbarium at Geneva, the other in the British Museum. I have seen no other Pavon specimens of *Monarda* and believe it highly probable that these represent authentic material. The same view was held by Asa Gray who thus annotated the specimen in the Boissier Herbarium. The specimens are nearly identical and are similar to specimens collected at Monterrey, Nuevo Leon. It seems much more probable that at that date plants from Monterrey rather than from the little known interior should have found their way to Spain.

M. tenuiaristata Small, Fl. S. E. United States 1038, 1903. Based upon *M. citriodora* var. *tenuiaristata* Gray, a name not properly published; authentic specimens collected by Lindheimer (no. 497) are in the Gray Herbarium; Lindheimer no. 153 and a garden specimen are in the Torrey Herbarium.

M. dispersa Small, Fl. S. E. United States 1038, 1903. Based upon a specimen collected in Missouri near Eagle Rock by Bush (no. 122); type in the herbarium of the New York Botanical Garden.

M. aristata Nutt. Trans. Am. Phil. Soc. 5: 186, 1837. Based upon a specimen collected in "Arkansa" by Nuttall; the type is in the British Museum; probable isotypes are in the herbaria of the New York Botanical Garden, the Academy of Natural Sciences of Philadelphia and the Gray Herbarium; while volume 5 referred to bears the date of 1837, that portion containing Nuttall's paper, which was read in 1834, was actually distributed prior to 1836.

Erect annual herbs 15–90 cm. tall, commonly 40–60 cm.,

their stems commonly solitary or a few from a woody base, often virgate, frequently branched in the upper axils and forming a corymbose inflorescence, less often branched throughout, puberulent with minute appressed hairs; leaves narrowly elliptical or nearly linear to oblong or even oblanceolate, prevailingly 4–6 cm. long, 8–12 mm. wide, acute or obtuse, tapering at the base to a petiole 3–10 mm. long, their margins serrate or subentire, both surfaces glabrate, sparingly puberulent; heads 2.5–5 cm. broad, tending to be crowded, their bracts *spreading,* numerous, *forming a bowl-shaped involucre,* typically oblong, *3–6 mm. broad,* abruptly narrowed to a slender awn, green on the lower surface, three parallel veins usually prominent, *minutely but densely puberulent on the upper surface and whitish or purple,* entire or rarely denticulate near the apex, usually ciliate near the base; calyx tubes 8–11 mm. long, mostly *8–9 mm.,* finely puberulent, their teeth aristate, 2–8 mm. long, *commonly 3–5 mm.,* usually bearing a few bristle-like hairs in the upper parts; corolla white, lavender or rose color, usually unspotted, or the throat yellowish and flecked with red, 15–28 mm. long, the lips subequal, the tube 10–18 mm. long, pubescent within, somewhat less than twice the length of the upper lip, abruptly widened to the ample broadly funnel-form throat which is pubescent in the palate, 3.5–8 mm. long, the upper lip incised 1.5–2 mm.; stamens included, glabrous, the style glabrous or hispidulous.

Ranges from central Kansas southward through Oklahoma and Texas to Monterrey, Nuevo Leon, Saltillo, Coahuila, and Chihuahua, often in association with limestone. Its occurrence in Illinois, Tennessee, Missouri (except the extreme southwestern corner), Alabama, Georgia, and Florida is probably adventive. Its range is mostly below 2,000 feet elevation. Save for the variation in stature and size of the flowers, the species is fairly uniform. The bracts vary somewhat to elliptical and thus suggest *M. pectinata,* or to lanceolate and thus suggest *M. austromontana,* but are not reflexed. Some forms suggest mixture with *M. pectinata.* It frequently occurs in company with *M. punctata* subsp. *Stanfieldii. M. dispersa* is a large flowered form.

5. **Monarda austromontana** sp. nov. per specim. in Mexico in Chihuahua in umbrosis montis prope Cusihuiriachic La Bufa dicti a Pringle (no. 1355) lectum constituta est; typum in herb. Smithson.; isotypos in herb. horti bot. Nov. Eborac., et Field. Mus. vidi.

Herba annua gracilis erecta altitudine 15–80 cm., plerumque 30–50 cm., caulibus virgatis vel saepius e basi ramosis, pilis minutis appressis puberulis; foliorum laminis anguste ellipticis interdum oblongis, maximam partem 3–5 cm. longis, 8–12 mm. latis, rarius 1.5 cm. latis, in apice acutis vel obtusis, in basi ad petiolos 3–15 mm. longos angustatis, marginibus subserratis

rarius subintegris, paginis ambobus glabratis, sparse puberulis rarius pilis minutis canescentibus; glomerulis *2.5–3 cm. latis,* plerumque remotis, saepius inter se 2–6 cm. distantibus, *bracteis in maturitate valde deflexis,* exterioribus quam folia plerumque longioribus, mediis saepius *2–3 mm.* latis, oblongo-lanceolatis in aristam brevem acuminato-extenuatis, *vena media solum prominula,* pagina superiore puberula vel albida vel purpurea, marginibus ciliatis integris; calycum tubis 4.5–6.5 mm. longis, *plerumque 5–6 mm. longis,* sparse puberulis saepe glabris, dentibus aristatis, 1.5–4 mm. longis, plerumque *2.5–3 mm. longis,* maximam partem pilis extensis strictis paucis ad apices ornatis; corollarum albarum rarius rosearum saepius immaculatarum tubis 9–13 mm. longis intus pubescentibus, in fauces amplos 3.5–6 mm. longos abrupte dilatatis, labia superiore incisa 1–1.5 mm.; staminibus inclusis; stylo vel glabro vel hispidulo.

Ranges from the mountains of southeastern Arizona and southwestern New Mexico at elevations of 6,000–9,000 feet, southward in the Sierra Madre into the State of Durango to the valley of the Nazos. The forms within the United States are readily distinguished from *M. citriodora* in habit of the whole and of the inflorescence. The specimens of Chihuahua and Durango approach more nearly the Mexican forms of *M. citriodora* but apparently retain the differences in flower size. As a rule they may be distinguished also by the more hairy calyces of *M. austromontana.* Further exploration may prove the desirability of uniting these species.

6. Monarda pectinata Nutt. Journ. Acad. Phila. ser. 2, 1: 182, 1847. Based upon a plant collected by Gambel "near Santa Fe," New Mexico; the probable type is at Kew; no authentic specimens were found at the British Museum. Each of the two fragments at Kew bears a characteristic Nuttall label, one being attributed to "Sta. Fee" and the other to "Upper California." It is impossible to determine to which each label pertains. Both are similar and are very like *Baker, Earle and Tracy no. 614.* I consider these specimens the types. An authentic specimen sent by Durand to Gray is in the Gray Herbarium.

M. punctata var. *humilis* Torrey in Sitgreaves, Report of an Expedition down the Zuni and Colorado Rivers, 166, 1853, based upon a specimen collected by Woodhouse on the Zuni River on the Zuni Reservation, New Mexico; the type is in the herbarium of the New York Botanical Garden.

M. Nuttallii A. Nelson, Bot. Gaz. 31: 397, 1901. Based upon specimens collected in Colorado by *Crandall, Holzinger, Ramaley 166, Baker, Earle and Tracy 614* and *Hall and Harbour 428.*

Annual herbs 10–55 cm. tall, commonly 25–40 cm., usually much branched at the base, their stems puberulent with short curved hairs; leaf-blades oblong or elliptical, sometimes wider above the middle, commonly 2–4 cm. long, serrate and appar-

ently crisped or often subentire, nearly glabrous, on petioles 3–10 mm. long; heads commonly 2–3 cm. broad, tending to become globose at maturity, their bracts ascending, elliptical-oblong, usually green, commonly 2.5–4 mm. broad, tapering at the apex to an acumination less than the width of the bract, usually entire, regularly ciliate-pectinate most of their length, puberulent on the lower surface, usually *glabrous on the upper,* with only 3 veins prominently developed, but particularly the midrib, the intervenous tissue tending to be translucent; calyx tube 5.5–8 mm. long, commonly 6–7 mm., hispidulous with short hairs scarcely wider than the ribs, their teeth very slender and very acute, commonly *2.5–3 mm., rarely 4 mm. long,* ciliate; corollas white or lavender, 13–22 mm. long, commonly 14–16 mm., their tubes 8.5–12.5 mm. long, commonly 10–12 mm., the throat broadly funnel-form, 4–5 mm. long; stamens included, glabrous; style hispidulous.

Ranges through the sandhills of Nebraska southwestward through central Colorado into northern Arizona and through New Mexico to the extreme eastern parts of Texas.[3] Some plants collected in the Texas Panhandle suggest transitions to *M. clinopodioides.* The ranges of the two species overlap in that region.

7. Monarda clinopodioides Gray, Syn. Fl. N. Am. 2: 375, 1878. Based upon specimens collected in Texas by Drummond, Wright, and Reverchon (near Dallas in June, 1874); these are in the Gray Herbarium; I consider Reverchon's specimens to be the standard.

M. aristata Hooker, Bot. Mag. pl. 3526, 1836. Based upon a garden specimen from seed collected in Texas by Drummond, and erroneously ascribed to *M. aristata* Nuttall, Trans. Am. Phil. Soc. 5: 186, 1937, a paper which was read in April, 1834, and actually distributed prior to Hooker's publication, although volume 5 of the Transactions bears the later date of 1837.

M. penicillata Gray, Am. Acad. 8: 369, 1873 (nomen nudum).

Annual herbs 15–50 cm. tall, commonly 30–40 cm., commonly virgate, often branched above, less often from the base, their stems puberulent with short curved hairs; leaf-blades commonly 3–5 cm. long, oblong or elliptical, sharply serrate, nearly glabrous, on petioles 5–15 mm. long; heads commonly 2.5–3 cm. broad, their bracts ascending, elliptical-oblong, the outer tending to be ovate, usually tinged with purple, commonly 3–5 mm. broad, tapering at the apex to a sharp *rigid* acumination which is often as long as the width of the bract, puberulent on the lower surface, usually *glabrous on the upper, with usually 5, sometimes 7 veins* prominently developed, the intervenous tissue tending to be

[3] Since the above was written this species has been collected in California in the New York Mountains.

translucent, regularly ciliate-pectinate most of their length; calyx tube 6–9 mm. long, commonly 7–8 mm., usually hispid with hairs similar to those on the teeth but shorter, less often hispidulous, their teeth slender, very acute, *tending to be rigid and erect,* 2.5–6.5 mm. long, *commonly 3.5–5 mm. long,* ciliate; corollas white or lavender, 13–22 mm. long, commonly 18–20 mm., their tubes 10–15 mm. long, commonly 12–14 mm., the throat broadly funnel-form, 5–6 mm. long; stamens included, glabrous, the style hispidulous.

Ranges throughout central Texas westward into the Panhandle where it comes in contact with *M. pectinata,* and northward through central Oklahoma to the extreme south central part of Kansas (Harper and Kingman counties).

University of California at Los Angeles, July, 1934.

A NEW SPECIES OF CASTILLEIA

L. F. Henderson

Castilleia Andrewsii Henderson, sp. nov. Planta 15–30 cm. alta, curvata, etiam sinuosa, infra glabra, supra pilosa, purpureofulva; folia 20–40 mm. longa, trinervata, basi integra, cetera tripartita, lobis iterum tri-partitis, interdum purpurantia; calycis lobis tubo aequis, dentatis vel partitis, lobis ultimis lanceolatis; corolla 2–3.5 cm. longa, galea tubo multo longitudine excedens; labium maxime varians, lobis interdum longis, lanceolatis, erectis, subrufis; interdum incurvis, viridibus, sed erectis.

This is one of the most peculiar Castilleias it has ever been my privilege to see. It certainly has the look of *C. rupicola* Piper, but differs radically from that species, in its peculiarly irregular leaves, in its galea always longer than the tube, but most of all in its lip. This is so variable on different specimens as to make one doubt its diagnostic value in separation of species. Sometimes the lobes are long, lanceolate, upright and of a brownish-red color; sometimes they are shorter and upright, with a yellowish color; on two shoots they were greenish, incurved at sides, but upright. Always, as far as these specimens go, they are all upright, not downwardly curved, and the central lobe is shorter than the two lateral ones. The galea is like that of many species, green-backed with scarlet edges.

I have taken pleasure in naming this unique species for its discoverer, Mr. Roy C. Andrews, who found it on Horsepasture Mt. in eastern Lane County, Oregon, at an elevation of approximately 5,000 feet (*R. C. Andrews 233,* June 19, 1934. Type in the University of Oregon Herbarium, Eugene). I have been informed by Professor Morton E. Peck, of Willamette University, Salem, Oregon, that he found, he is now sure, the same species near Detroit, Oregon, but that as far as he or I know, the species has not yet been published.

University of Oregon, October 30, 1934.