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×*CHIRANTHOFREMONTIA*, AN INTERGENERIC HYBRID OF
CHIRANTHODENDRON PENTADACTYLON AND
FREMONTODENDRON 'PACIFIC SUNSET'

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ABSTRACT

×*Chiranthofremontia lenzii*, an intergeneric hybrid between *Chiranthodendron pentadactylon* and *Fremontodendron* 'Pacific Sunset' (Sterculiaceae: Fremontodendreae), was made artificially and is described as a hybrid genus. It shows distinctive intermediacy in floral (particularly androecial) characteristics between the parental taxa.

Key words: Sterculiaceae, *Chiranthodendron*, *Fremontodendron*, plant systematics.

INTRODUCTION

In June 1981, Austin Griffiths successfully completed a cross between the distinctive Mexican hand tree *Chiranthodendron pentadactylon* Larreátegui (male parent) and a cultivated California Flannelbush or Fremontia *Fremontodendron* 'Pacific Sunset' (female parent), which is in turn of hybrid origin between *Fremontodendron californicum* (Torr.) Cov. and *F. mexicanum* A. Davids. The artificial hybrid, completed only after many attempts, is here described as a hybrid genus ×*Chiranthofremontia*.

RESULTS AND DISCUSSION

×*Chiranthofremontia lenzii* Henrickson, gen. et sp. nov. Fig. 1E–I

A *Fremontodendron* differt foliis majoribus, periantho magis late cupuliformi, androecio irregulari floris in facie abaxiali antherae producente, tubo filamentorum superiorum rima abaxiali, antheris thecis longioribus, et antherarum connectivis extensis caudatis; a *Chiranthodendron* differt foliis minoribus magis profunde lobatis, periantho ochroleuco vel flavi-aurantiaco, androecio tubo basali brevioris, et antherarum filamentis separatis.

Rhomboid shrubs 3.5 m tall, 2 m wide (at 5 years age) with 1–3 basal stems, stiff, ascending branches and full, open foliage; young stems 3–5 mm in diameter, densely light brown stellate-tomentose, the stellate hairs sessile and forming the understory vestiture, or stalked and with 20–32 translucent or red-tipped radii 0.2–0.3(–1) mm long extending from a thickened central trichome axis; older stems with vestiture turning dull brown, tardily glabrate, the underlying stems maroon-brown. Leaves alternate, borne on cylindrical petioles (2.2–)4–6.5(–8) cm long; stipules thick-lanceolate, 5–9 mm long, stellate-tomentose; leaf blades orbicular to suborbicular in outline, horizontally oriented, palmately 5–7-veined and 5–7-lobed, (4.4–)6.5–10(–11.7) cm long, (4.3–)6.2–9.5(–10.5) cm wide with the smallest leaves borne at the base of a season's increment, the leaf lobes acute to obtuse, apiculate at the tips, irregularly and shallowly toothed at the vein endings

along the margins and with V- or U-shaped sinuses extending about one fourth to one third to the base, the lower lobes progressively smaller, the leaf bases deeply cordate with rounded, convex inner margins, the upper leaf surface dull olive-green with the yellow primary veins impressed, sparsely stellate, the hairs with 19–25 tan to translucent radii 0.2–0.3 mm long, the lower leaf surfaces cream-tan to rusty-tan, with the primary through the fourth or fifth order of veins raised, densely stellate-tomentose throughout with the hairs sessile or short stalked with 20–32 translucent or red-tipped radii 0.2–0.4 mm long, the red-tipped radii mostly occurring on hairs borne along the veins. Flowers solitary at the nodes, opposite the leaves, borne on stellate-tomentose peduncles 8–14 mm long; bracts 3, subtending the perianth, thick, lanceolate, stipulelike; perianths (calyces) erect-ascending, open-cupped, somewhat star-shaped as seen from above, the outer surfaces deep apricot-yellow with dull orange to orange-red on the outer thickened sepal bases, more yellowish on the protected, broader, inner lobes, the inner surface yellow distally, but blushed with apricot to orange-red near the inner bases and green in the nectary areas, 4–5 cm long, deeply 5-lobed to within 8–10 mm of the base, each lobe with a well-developed midrib that curves upward then outward, the thinner margins curving toward inward near the tips, the outer three lobes thicker, more elliptical to ovate, 16–20 mm wide, acute and caudate at the tips, the inner two lobes thinner, more obovate, 19–25 mm wide, more abruptly rounded below the caudate tips, the lobes greatly thickened towards the base and each with a pronounced, thickened medial exterior keel that extends beyond the tip as a caudate appendage 5–9 mm long, and an interior nectary 6–8 mm long, 3–4 mm deep, radially sunken into the thickened base, densely stellate-tomentose where exposed in bud with hairs similar to those of the stem but less dense, the outer surface of the inner sepals that are covered in bud bearing scattered 3-rayed stellate hairs with radii 0.2–0.5 mm long, the outer lobes somewhat stellate about the tip inside otherwise the sepals glabrous inside except for stiff setae 1–1.5 mm long in and around the nectary and stalked multiseriate glands around the nectaries inside; androecium 45–49 mm long, yellow; filaments surrounding the ovary below, but separating above and bearing 5 slender, abaxial, caudate-tipped anthers distally; the basal filament tube obconic, 10–13 mm long, abruptly constricted above an expanded base, this opening abaxially for 5–7 mm below the individual 5–8-mm-long filaments; anthers introrse, 16–20 mm long, to 2 mm wide, each with a pair of somewhat contorted thecae, each separated longitudinally into two anther sacs by a membranous septum and each sac further separated by transverse membranous septa into discrete locules, the outermost anther sacs of the peripheral anthers extending further down the filament by 2–3 mm, the terminal sterile caudate appendages 3–5 mm long; pollen tricolporate, oblate, coarsely reticulate, 64 percent staining in Cotton Blue; styles 39–42 mm long, tapering, stigmatic and 5-lobed at the very tip, initially positioned behind the anthers, later elongating and extending between the anthers; ovary superior, 5-carpelled, covered by erect-ascending setae to 1.5 mm long. Fruit not maturing.

Type.—U.S.A., CALIFORNIA, Riverside Co.: Hybrid: *Fremontodendron* 'Pacific Sunset' (female) with *Chiranthodendron*, crossed in June of 1981 (plant grown in Chino, California, at the home of Austin Griffiths), 15 Jun 1985, A. Griffiths Jr. 171097 (holotype RSA, isotype CAS).

Taxonomic History of Fremontodendron and Chiranthodendron

The taxonomic history of both parental genera has been confused. The genus *Fremontodendron* Coville (Coville 1893) has long been known by the earlier published name *Fremontia* Torrey (Torrey 1853) (actually validly prepublished by Torrey in 1851 according to Stafleu and Cowan [1986]). However, Torrey's *Fremontia* is a later homonym of *Fremontia* Torrey (in Frémont 1843), which is itself a synonym of *Sarcobatus* Nees von Esenbeck (1839) of the Chenopodiaceae. Attempts have been made to conserve *Fremontia* Torr. (1853) over *Fremontia* Torr. (1851), but conservation of Torrey's later use of the name was not approved by the Nomenclature Committee of International Association of Plant Taxonomists by a narrow vote for 5 for and 6 against conservation (Pichi-Sermolli 1954). Munz (pers. comm.) misread the results of the committee's decision and erroneously used *Fremontia* Torr. (1853) in his *A California Flora* (Munz 1959). The genus was revised by Harvey in 1943; three species are recognized in the genus by the latest unpublished revision by Kelman (1983): *Fremontodendron californicum* from chaparral, pinyon-juniper woodlands to lower pine forests in California from Shasta County south to northern Baja California; *F. mexicanum* from dry chaparral and southern oak woodland in southern San Diego County and adjacent northern Baja California; and *F. decumbens* R. M. Lloyd from a limited area at high elevation in Eldorado County, California.

Chiranthodendron pentadactylon has also had a confused taxonomic history. The species was first described in a rather long discourse on "Descripciones de Plantas" by Joseph Dionisio Larreátegui (1795), a Mexican botanist-physician, at the Royal Garden in Mexico whose director, at the time, was Don Vicente Cervántes. In the article he states the name of the genus was taken from that used by Sessé in his expedition to New Spain (México). Portions of this article were later republished by Cervántes in *Anales de Ciencias Naturales* in Spain in 1803, under the sponsorship of the director of the Madrid Botanical Garden, Antonio Jose Cavanilles. However, in this article, Cavanilles notes that he is giving the plant the name *Chirostemon* rather than *Chiranthodendron* at the request of Cervántes. Larreátegui's 1795 article was later translated, in part, by M. Lescallier and published, in French as "Description botanique du *Chiranthodendron* . . ." in Paris in 1805 (Larreátegui 1805) and again published in German in 1807 (Stafleu and Cowan 1979). Cervántes in his 1803 paper noted that Jacquin (1763) had listed the common name used for the plant by Hernández in his *Historia de México* as a synonym for his *Helicteres apetala* Jacq. (Sterculiaceae), which Cervántes later changed to *Cheirostemon apetalum* in Roemer's "Collectanea" in 1806. Later, Humboldt and Bonpland (1808) described the same species in their "Plantae aequinoctiales" as *Cheirostemon platanoides* Humboldt & Bonpland. *Chiranthodendron* was corrected in Bentham and Hooker's *Genera Plantarum* (1862) to *Cheirostemon*, which he considered an orthographic change as the name is taken from Greek *Xeir-anthos-dendron*, meaning hand-flower-tree. Their orthographic change is not accepted here following Article 73.1 of the International Code of Botanical Nomenclature (Greuter et al. 1988), which deals with the retention of original spellings of names except in cases of typographic or orthographic error. When the Greek *Cheir* is transferred to Latin, the "ei" should be changed to "i" as "ei" is foreign to Latin (Dan Nicholson, pers. comm.). The

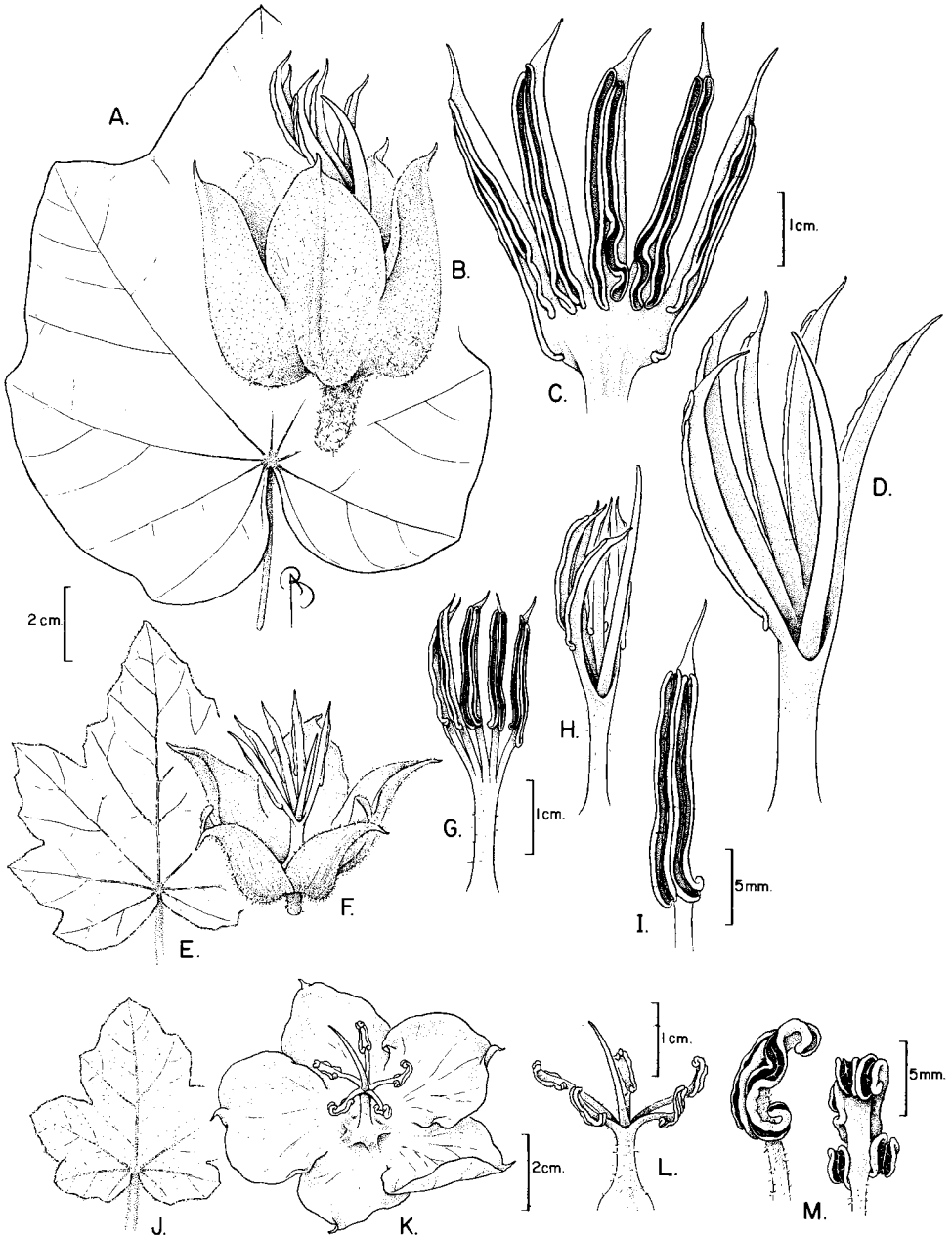


Fig. 1. Comparative structure of *Chiranthodendron pentadactylon*, \times *Chiranthofremontia lenzii*, and *Fremontodendron* 'Pacific Sunset.' A–D. *Chiranthodendron pentadactylon*. —A. Leaf, note shallow lobing, large size. —B. Flower showing cup-shaped, thickened perianth, asymmetrical androecium and style. After anthers open, style protrudes between anthers. —C. Abaxial view of androecium showing caudate connective tips, elongate anther sacs that lack internal septa, note that the outermost anther sacs continue further down united filament margins, and that all filaments are fused throughout. —D. Androecium and style, adaxial view. (All from cultivated material in Santa Barbara, California.) —E–I. \times *Chiranthofremontia lenzii*. —E. Leaf. —F. Flower showing overall cupped shape, androecium, and style. —G. Abaxial view of androecium showing caudate tips of connective, elongate anther sacs with

species has been variously known as *Cheirostemon platanoides*, as accepted in Index Kewensis (Hooker and Jackson 1895), *Chiranthodendron plantanoides* (Humboldt & Bonpland) Baillon (1872), but the name provided by Larreátegui in 1795, *Chiranthodendron pentadactylon* clearly has priority.

Larreátegui (1795) and others report that, at the time of its various descriptions, the species was known only near the city of Toluca, in the state of México where but a single tree existed, which was venerated by the local Indians who considered it the only tree of its kind in the world. This same tree was visited by many botanists including Sessé and Mociño, Cervantes, and Humboldt and Bonpland. Later, in 1801, large populations were discovered in Guatemala and later elsewhere. The species is now known as often abundant in wet mixed oak-pine, deciduous, and occasionally elfin forests in mountains mostly between 1700 and 3000 m elevation in México in the states of México, Morelos, Michoacán, Guerrero, Oaxaca, and Chiapas, but is more common in Guatemala where it is often the dominant tree on wet montane slopes and has trunks 90(–120) ft tall and 3–7 ft in diameter (Standley and Steyermark 1949; Toledo 1975). In nature it flowers from February to May (later in cultivation). Common names include Mano de león, Mano de Mico, Arbol de las manitas, and in Nahuatl Mapasúchil, Macpalxóchitl, and Machpalxochiquáhuil meaning hand-flower. Vogel (1969) considers the flowers to be bat pollinated, but presents no field data to back his statements, while Toledo (1975) documents visitations to the flowers by various perching birds and considers these to be the major pollinators of the species.

Characteristics of Chiranthodendron and Fremontodendron

As noted above *Chiranthodendron* (Fig. 1A–D) is a large forest tree. Its leaves are broadly ovate to suborbicular, slightly lobed and of large size (15–31 cm long, 15–27 cm wide with petioles 8–17 cm long). The leaves are initially stellate tomentose on both surfaces but later are mostly glabrate and green above, retaining a dense buff-tan to rusty stellate tomentum beneath. Leaf and stem vestiture is similar overall to that of the hybrid and *Fremontodendron*, except that the central axis of the stellate hairs is longer, and the longer-stalked hairs are thus more dendritic in shape. Flowers of *Chiranthodendron* are axillary, produced opposite the terminal stem leaves. The flower stalks are thick, to 2 cm long, and bear 3 thick, lanceolate bracts 7–13 mm long. The flowers have cupular calyces 35 to 50 mm long that are thick, dark maroon-red in color and externally covered with a dull close tomentum (Fig. 1B). The 5 sepals are separate to within about 13–15 mm of the base, and each ovate to oblong-ovate, erect sepal is greatly thickened

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some internal septa, note the outermost anther sacs are slightly longer at the base, also note the free filament tips.—H. Androecium and style, adaxial view.—I. Single anther. (All from clones of the type grown at Rancho Santa Ana Botanic Garden.)—J–M. *Fremontodendron* 'Pacific Sunset.'—J. Leaf, note small size and deep lobing.—K. Flower, showing open nature of perianth with spreading sepals, and radial symmetry of androecium.—L. Androecium with style, note radial symmetry and free filament tips, lack of caudate connective tips.—M. Anthers after pollen loss, showing internal longitudinal and transverse septa in anther sacs, note lack of caudate connective tips. (All from cultivated material at Rancho Santa Ana Botanic Garden.) (Magnifications as indicated, all corresponding features drawn to scale. Drawn by Bobbi Angell. All flower material drawn from liquid-preserved material.)

and strongly keeled medially and basally, and the keel terminates as a caudate tip while the inner basal surface bears a deeply cut radially oriented, greenish nectary that contains large amounts of a thickened nectar. The stamens (Fig. 1C, D) are much longer than in the hybrid, measuring 62–80 mm in total length, are more exserted and dull maroon-red in color. The basal continuous filament tube is 25–35 mm long and splits along the adaxial side 9–14 mm below the sessile anthers; distinct anther filaments are not present as in the hybrid and *Fremontodendron*. The anthers are erect-ascending, like fingers of a hand, and each anther bears two thecae 19–29 mm long with the thecae being separated into two anther sacs by a thin septum; the anther sacs lack transverse crosswalls (Fig. 1C). The outermost anther sacs of the peripheral anthers extend 3–7 mm below the inner anther sacs. The caudate sterile connective tips extend some 13–21 mm above the anthers. Styles again are long exserted, to 4 cm long. Fruit are oblong-ovate, tan tomentose, strongly 5-angled, woody, capsules 10–15 cm long and 3–5 cm wide. The seeds are obovate, lustrous black, with a globose, orange, basal aril.

In contrast, *Fremontodendron* (Fig. 1J–M) is a lower, much-branched shrub of chaparral, pinyon-juniper to yellow pine, and oak woodland habitats in California from Shasta County south to northern Baja California, Mexico, and east into Arizona. The palmately lobed and veined leaves are much smaller [15–40(–74) mm long, 8–40(–70) mm wide, with petioles 5–30(–70) mm long], and they may be deeply palmately lobed or nearly entire. They are initially stellate tomentose throughout, but become green and glabrate above while usually retaining some tomentum beneath. The flowers are similar to those of the hybrid in their yellow, often tinged with reddish-orange, color, but they are thinner in texture and much more open, more saucer-shaped at anthesis. The most distinctive difference is that in *Fremontodendron* the androecium is radially symmetrical (Fig. 1K, L), the anthers are borne on separate, radiating filaments above the filament tube, and the connectives external to the anther sacs terminate at the tip of the anthers and do not continue as caudate claws. These structures are also much smaller than in either the hybrid or *Chiranthodendron*. In *Fremontodendron* the anther tubes range from 5 to 7.5 mm in length, the free filaments 3.5–5 mm in length and the anthers from 4 to 10 mm in length. As in the hybrid, the anther thecae are separated internally into two anther sacs and these are further transversely separated by membranous crosswalls (Fig. 1M).

The hybrid (Fig. 1E–I) combines the characteristics of the two genera. It combines the more branched habit, yellowish flower color, and separate filaments of *Fremontodendron* with the thicker, more cup-shaped perianth and the longer, abaxially oriented, long-clawed anthers of *Chiranthodendron*. In addition, the surface on and around the internal perianth nectaries is covered with long setae similar to those found in some species of *Fremontodendron*. In contrast, the hybrid is intermediate in leaf size, leaf lobing, and vestiture between the two parental genera.

The close relationship of *Chiranthodendron* and *Fremontodendron* has long been known, and various authors have combined the two genera, Baillon (1872) making the combination *Chiranthodendron californicum*, and Coville (1893) recognizing the family *Cheiranthodendraceae*. At present they are distinguished within the *Sterculiaceae* in the tribe *Fremontodendreae* (Airy Shaw 1965), characterized by having large flowers that lack petals, staminodia, and an androgynophore, but

have thick calyces with conspicuous internal nectaries and 5 stamens united in a basal staminal tube. A nomenclatural conspectus of the tribe is presented in appendix 1.

The hybrid genus showed only 34 percent unstained pollen in Cotton Blue, the standard stain (Radford, Dickson, Massey, and Bell 1974) for evaluating the presence of potentially functional pollen. Lenz (1954) noted that artificial hybrids of *F. californicum* and *F. mexicanum* showed high pollen stainability and produced much seed.

The nothogeneric name is derived from the two generic names using "Chirantho" (hand, anther) and "Fremont" portions of the parental generic names. The species epithet honors Dr. Lee Wayne Lenz, Director Emeritus of Rancho Santa Ana Botanic Garden, who made many native hybrids, including *Fremontodendron* 'California Glory,' 'Pacific Sunset,' and 'San Gabriel' (Lenz 1954).

The new hybrid genus has been cultivated at Rancho Santa Ana Botanic Garden for six years and the plants, somewhat underwatered, have not yet taken on a mature growth form. A maximum height of 4 m has been obtained for cultigens thus far. The plants suffered through a series of frosts between December 22 1987, and January 1 1988, during which the temperature dipped below freezing every evening with minimal recorded temperatures reaching 24 F (−4.5 C). The mature foliage survived this frost but all stem tips were killed back, resulting in reduced flowering the following year. *Chiranthodendron* is very frost sensitive and can only be cultivated in certain coastal regions in southern California such as at Santa Barbara. *Fremontodendron*, in contrast, is frost hardy and grows in areas receiving much snow.

The hybrid plants have gone under the name \times *Leelenzia ranchorum* (nom. nud.), but recent changes in the International Code of Botanical Nomenclature (Greuter et al. 1988) (Article H.6) indicate that all such hybrid generic names must be derived from the parental generic names.

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APPENDIX

Nomenclatural conspectus of the tribe Fremontodendreae

Sterculiaceae Barling, *Ord. Nat. Pl.* 255, 340. 1830. *nom. conserv.*; Cheiranthodendraceae Cov., *Contr. U.S. Natl. Herb.* 4:74. 1893.

Tribe Fremontodendreae Airy Shaw, *Kew Bull.* 18:271. 1965; Tribe *Fremontieae* Torr., *Smithsonian Contr. Knowl. (Pl. Fremont.)* 6:5. 1853; K. Schumann in *Engl. & Prantl, Pflanzenfam. III.* 6(2):75. 1980.

Subtribe *Fremontiinae* (as *Fremontieae*); Benth. in Benth. and Hook.f. *Gen. Pl.* 1:199. 1862.

FREMONTODENDRON Cov., *Contr. U.S. Natl. Herb.* 4:74. 1893. *Type: Fremontia californica* Torr. *Fremontia* Torr. in *Smithsonian Contr. Knowl. (Pl. Fremont.)* 6:5. t. 2. 1853 *non Fremontia* Torr. *Proc. Amer. Assoc. Adv. Sci.* 4: 190. 1851; *Rep. Expl. Exped. Rocky Mts.* 95. 1845. = *Sarcobatus* Nees in Maxim. (Chenopodiaceae). *Type: Fremontia californica* Torr.

FREMONTODENDRON CALIFORNICUM (Torr.) Cov., *Contr. U.S. Natl. Herb.* 4:47. 1893; *Fremontia californica* Torr., *Smithson. Contr. Knowl. (Pl. Fremont.)* 6:5. t. 2. 1853; *Chiranthodendron californicum* (Torr.) Baill., *Hist. Pl.* 4: 70. 1872; *Cheirostemon californicum* Martinez, *Pl. Utiles. Republ. Mexicana* 45, 1928. *nom. nud.*; *Fremontia californica* var. *typica* Harv., *Madroño* 7:105. 1943. *TYPE: U.S.A., California, Fremont's Expedition 470, 1846* (lectotype designated by Kelman: NY).

Fremontia crassifolia Eastw. Leaf. W. Bot. 1:139. 1934; *Fremontia californica* subsp. *crassifolia* (Eastw.) Abrams. Illus. Fl. Pacific States 3:114. 1915; *Fremontodendron californicum* subsp. *crassifolium* (Eastw.) J. H. Thomas. Leaf. W. Bot. 7:224. 1955. TYPE: U.S.A., California, Santa Cruz Co., hills above Big Basin State Park, 1 May 1918, *C. A. Reed s.n.* (lectotype designated by Kelman: CAS).

Fremontia napensis Eastw., Leaf. W. Bot. 1:140. 1934. *Fremontia californica* var. *napensis* (Eastw.) MacMinn, Ill. Man. Calif. Shrubs. 355. 1939; *Fremontia californica* subsp. *napensis* (Eastw.) Munz, Aliso 4:94. 1958; *Fremontodendron californicum* subsp. *napense* (Eastw.) Munz, Leaf. W. Bot. 10:119. 1964; *Fremontodendron napense* (Eastw.) Lloyd, Brittonia 17:384. 1965. TYPE: U.S.A., California, Napa Co., N. side of Mt. St. Helena, 10 May 1926, *Hobson s.n.* (lectotype designated by Kelman: CAS).

Fremontia obispoensis Eastw., Leaf. W. Bot. 1:140. 1934; *Fremontia californica* subsp. *obispoensis* (Eastw.) Munz, Aliso 4:94. 1958; *Fremontodendron californicum* subsp. *obispoense* (Eastw.) Munz, Leaf. W. Bot. 10:119. 1964. TYPE: U.S.A., California, San Luis Obispo Co., Pettitt's Canyon, *Eastwood 15159* (holotype CAS, isotype NY).

Fremontia californica var. *viridis* Harv., Madroño 7:108. 1943. TYPE: U.S.A., California, Tehama Co., between Faynes Creek and Red Bluff, *Eastwood Howell 1850* (holotype CAS, isotype NY).

Fremontia californica var. *diegensis* Harv., Madroño 7:108. 1943. TYPE: U.S.A., California, San Diego Co., Bottom of Vallecito Canyon, Laguna Mts., *Munz 9716* (holotype POM).

Fremontia californica var. *integra* Harv., Madroño 7:108. 1943. TYPE: U.S.A., California, Tulare Co., road to Mineral King, 10 mi. from Generals Highway, 22 Jun 1933, *Lolman s.n.* (holotype POM; isotypes ARIZ, CAS, DS, LA, NY, RSA, UC).

FREMONTODENDRON DECUMBENS R. M. Lloyd, Brittonia 17:382. 1965; *Fremontodendron californicum* (Torr.) Cov. subsp. *decumbens* (Lloyd) Munz, Suppl. Calif. Fl. 11, 1968. TYPE: U.S.A., California, El Dorado Co., Pine Hill, ca. 2 mi. N. of Rescue, *Lloyd 3382* (holotype UC; isotypes CAS, DC, RSA).

FREMONTODENDRON MEXICANUM A. Davids., Bull. S. Calif. Acad. Sci. 16:50. 1917; *Fremontia mexicana* (Davids.) Macbride, Contrib. Gray Herb. 53: 14. 1918; *Fremontia californica* Torr. var. *mexicana* (Davids.) Jeps., Man. Fl. Pl. Calif. 637. 1925. TYPE: U.S.A., California, San Diego Co., "15 mi. from San Diego" (but see Harvey, 1943, p. 109), *A. Davidson 3234* (holotype LAM, at RSA).

CHIRANTHODENDRON Sessé ex Larreát., Descr. Pl. 31. 1795; Descr. Chiranth. transl. Lesc. 8. 1805. *Chirostemon* Cerv. ex Cav. in Cerv., Anal. Ci. Nat. 6: 303. 1803; *Cheiranthodendron* Benth. & Hook.f., Gen. Pl. 1:212. 1862 (orthogr. mod.) TYPE: *Chiranthodendron pentactylon* Larreát.

Cheirostemon Humb. et Bonpl., Pl. Aequinoct. 1:82. 1808; Kunth in Humb. et Bonpl. Nov. Gen. Sp. 5:302. 1822. TYPE: *Cheirostemon platanoides* Humb. et Bonpl.

- CHIRANTHODENDRON PENTADACTYLON Larreát., Desc. Pl. 31, t. 1, 1795; Desc. Chiranth. trans. Lesc. 17. 1805 TYPE: México, State of México, Toluca—location of potential type material at MA has not been determined, the illustration in Desc. Pl. could serve as a type if no other material is found.
- Cheirostemon platanoides* Humb. et Bonpl., Pl. Aequinoct. 1:82. t. 24. 1808; *Cheirostemon platanoides* Kunth in Humb. et Bonpl., Nov. Gen. Sp. 5: 303. 1822. TYPE: México, State of México, Toluca, *Humboldt Bonpland* 1787 (holotype P-Herb. Humb. Bonpl. microfiche!).
- × CHIRANTHOFREMONTIA Henrickson, Aliso 13:239. 1991.
- × CHIRANTHOFREMONTIA LENZII Henrickson, Aliso 13:239. 1991. TYPE: U.S.A., California, Chino, 15 Jun 1985, *A. Griffiths* 171097 (holotype RSA, isotype CAS).

EXCLUDED NAMES

- CHEIROSTEMON APETALUM (Jacq.) Cerv. in Roem. Collectanea 97: 1806. = *Helicteres apetalum* Jacq., (Sterculiaceae) Select. Stirp. Amer. Hist. 228. 1763.—Jacquin listed Hernández's Machpalxochi Quahuatl, Nahuatl for *Chiranthodendron pentadactylon* as a possible synonym of his *Helicteres apetalum*, causing Cervantes to make the above combination.