A Revision of the Genus Calochortus

BY

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SECTION II. Mariposa.

Flowers open-campanulate; gland usually densely hairy; capsule and pedicels erect.

**Group 1. Oregon Mariposas.**

Type of Group *C. nitidus*.

Capsule as in Section I, but erect; leaf (as in Section I) long and glossy, not channeled. Oregon and northeast.

*Petals with an indigo blotch in the center.*

Flowers large, white to lavender ................. 17. *C. nitidus.*

**Petals not spotted in the middle; flowers lilac, smaller than in the preceding.*

Flowers strongly arched and barred with yellow........ 18. *C. greenei.*
Flowers less arched; stem bracted midway........ 19. *C. pavonaceus.*
Similar to last; stem not often bracted midway. 20. *C. longibarbatus.*
Flowers white, densely hairy above gland........ 21. *C. howellii.*

**Group 2. Rocky Mountain Mariposa.**

Type of Group *C. gunnisoni.*

Gland transverse and narrow; leaf usually as in Section I. East of the Rocky Mountains................. 22. *C. gunnisoni.*

**Group 3. Weed's Mariposa.**

Type of Group *C. weedii.*

Petals covered with slender hairs; capsule narrowly oblong, with thick, obtusely angled cells; radical leaf as in Section I, solitary, long, shining, and not channeled; bulb heavily contorted with coarse black fiber.

Flowers orange or rarely pink or white............. 23. *C. weedii.*
Flowers purple... 23a. *C. weedii var. purpureascens* (*C. plummerae*).
Petals brownish, short, truncate, not equaling sepals.

23b. *C. weedii var. vestus.*
23c. *C. weedii var. obspinosus.*

**Group 4. Golden Bowl Mariposas.**

Type of Group *C. clavatus.*

Petals yellow, lower half covered with clavate hairs; radical leaves linear and deeply channeled.

Stem stiffly zigzag.......................... 24. *C. clavatus.*
Stem not zigzag. Doubtfully placed in this group, but has no clavate hairs... 25. *C. concolor*, sp. nov. (*C. luteus var. concolor*).
Group 5.

Type of Group *C. kennedyi*.

Petals nearly naked; gland round, small, and densely hairy with matted hairs; leaves ashy blue, linear, deeply channeled. Desert plants.

**Psc. vermillon or orange**. 26. *C. kennedyi*.
Flowers clear yellow; petals densely hairy below; capsule narrowly oblong. 27. *C. aureus*.

Group 6. BUTTERFLY TULIPS.

Type of Group *C. venustus*.

Petals slightly hairy below, usually oculated and brilliantly colored; gland prominent, round or lunate; leaves linear, channeled. California.

Flowers yellow; petals not oculated; gland lunate; capsule attenuate from a broad base; plant dwarfed. 28. *C. lutens*.

**Flowers yellow or lemon, otherwise same as in var. oculatus.** 28a. *C. lutens var. citrinus*.

**Flowers white, yellow or lilac; petals occluded, gland lunate.** 28b. *C. lutens var. oculatus*.

**Flowers lilac or white; gland narrow, doubly lunate.** 29. *C. vesta*.

**Flowers white, cream, lilac, purple, red or pink; petals oculated, in some varieties with a red blotch above eye; gland round; capsule linear.** 30. *C. venustus*.

30a. *C. venustus var. roseus*.
30b. *C. venustus var. eldorado*.
30c. *C. venustus var. purpurascens*.
30d. *C. venustus var. sulphureus*.

Group 7. LILAC MARIFOSAS.

Type of Group *C. splendens*.

Petals white, lilac, or purplish, not oculated, more or less hairy; gland small, round, and densely hairy; leaves linear, channeled.

Flowers lilac-purple; petals hairy on lower third. 31. *C. splendens*.

**Flowers lilac to salmon, short yellow hairs on lower third of petal; plants low and slender.** 31a. *C. splendens var. montanus*.

**Flowers large; petals pale lilac with cobwebby hairs on middle third.** 31b. *C. splendens var. major*.

Much larger and stronger than type; hairy on lower third of petal.

31c. *C. splendens var. rubra*.

**Flowers white; gland ill defined; plants more slender than last. Colorado Desert.** 32. *C. palmeri*.

**Flowers white or lilac with dark maroon spot at base of petal; capsule oblong. Resembles *C. splendens*.** 33. *C. catalinae*.

**Flowers smoky white; stems stout and umbellate.** 34. *C. invenustus*.

**Flowers similar to last; petals deeply pitted.** 35. *C. excavatus*.
Flowers purple; sepals obtuse; stem flexuous and weak, almost creeping: 36. *C. flexuosus*.

**Group 8. Green Banded Mariposa.**

Type of Group *C. macrocarpus*.

Petals purplish lilac, with a greenish line down the back, obovate-acuminate.

Stems stout and rigid; leaves linear and deeply channeled. Northeastern California to eastern Washington and southern Idaho. 38. *C. macrocarpus*.

**Group 9. Sego Lilies.**

Type of Group *C. nuttallii*.

Petals white, lilac, yellow, or pink; gland round; stem prominently bulbiferous at base, umbellate.

Flowers as described above. Stout desert plants of the Great Basin and eastwardly. 39. *C. nuttallii*.

Flowers smaller, usually white; anthers sagittate. Slender Alpine plants. Sierra Nevada. 40. *C. leichtlinii*.

**Description of Species.**

*Calochortus.*

Perianth deciduous, of six distinct, more or less concave segments, the three outer (sepals) greenish and more or less sepaloid, the inner (petals) mostly broadly cuneate-obovate, usually with a conspicuous glandular pit near the base, and variously colored. Stamen six, on the base of the segments, included; anthers linear to oblong, basifixed, dehiscent laterally. Ovary sessile, triquetrous and three-celled, many ovuled; stigmas scissile, recurved, persistent; capsule elliptical to lanceolate, membranous, three-angled or three-winged, mostly septicidally dehiscent; seeds numerous, two rows in each cell, somewhat flattened, with a thin membranous white or brownish, often loose, testa. Stems usually flexuous and branching from membranous or but fibrous-coated corns; leaves few, linear-lanceolate, radical and cauline, the latter alternate and clasping; all with many nerves and transversive veinlets. Flowers one to twenty, showy, terminal, paniculate or umbellate.

The above generic description is in greater part that of Sereno Watson as given in the "Botany of California."

The genus is confined to western America, from Nebraska to the Pacific Ocean, and from northern Mexico to British America.

**Section I. Eucalochortus.**

Flowers or fruit more or less nodding; petals strongly incurved or arched, with a broad, transversely crested or more or less hairy pit above the base;
sepals naked, rarely spotted; capsule elliptical or broadly oblong, deeply triquetrous and septicidal, the thin compressed lobes acute or winged; seeds ascending, close and pitted, the testa mostly brownish.

Group I. Globe Tulips.

Flowers subglobose, nodding. Woodland plants; California.

1. Calochortus albus Doug.

_Calochortus albus_ Douglas in litt.

Stem stout, glaucous, usually branching, a foot or two high; radical leaves a foot or two long, 8-12 lines wide, lanceolate-acuminate; bracts large and foliaceous, 1-5 inches long, 4-8 lines wide; sepals shorter than petals, ovate-acuminate, greenish white; petals pure white, purplish at base, ovate-orbicular, acutish, 12-15 lines long, with scattering long silky hairs above the gland; gland lunate, shallow, with four transverse imbricated scales, fringed with close short yellow or white glandular hairs; anthers oblong-obtuse, mucronate; ovary attenuate above; capsule 1 or 2 inches long, 6-12 lines broad, abruptly short-beaked; seeds brown, pitted.

The original specimens are in all probability from Monterey, as Douglas visited there, where the species is plentiful.

_C. albus_ is found in the Coast Range of California, from San Francisco Bay south to San Diego County, and in the Sierra Nevada Mountains, from Butte County south to San Diego County.

There is quite a difference between the plants of the Coast Range and those of the Sierra Nevada. The flowers of the former are darker in color, often tinged with rose, and with petals thicker, more strongly inarched. The petals never open out sufficiently to show the inside of the flower, which after being in bloom a few days is half opened. _Calochortus amœnus_ Greene is really a color form of this Sierran form of _Calochortus albus_; but owing to the fact that the original locality of _C. albus_ is unknown, the writer hesitates to erect either the form from the Coast Range or that from the Sierra Nevada into a new species.

Several variations of the form of the Coast Range have been described, some as species and some as varieties; but I fail to discover any characters by which they may readily be recognized.
2. Calochortus amœnus Greene.


Similar to _C. albus_, but lower and more slender; petals a rosy pink with the gland rose-purple, scarcely at all arched, and opening in full bloom.

Found in the higher foot-hill region of Fresno and Tulare counties, California.

"Mountains east of Visalia, California."

3. Calochortus pulchellus Doug.

_Calochopterus pulchellus_ Douglas in litt.

Stem stout, glaucous, usually branching, 8 to 16 inches high; radical leaves a foot long, 6 to 12 lines wide, lanceolate-acuminate; bracts large and foliaceous, 2 to 3 inches long on the same plant, 4 to 6 lines wide; sepals shorter than petals, ovate-acuminate, yellow tinged with brown on the back; petals canary-yellow, ovate with the base cuneate, obtuse at apex, 9–12 lines long, with scattering long silky hairs above the gland, and bordered with short stiff hairs; gland deep, protruding outwardly, bordered with stiff hairs which cross each other; anthers oblong-obtuse; ovary elliptical to elliptical-ovaricular, abruptly short-beaked.

The original specimens of this species were collected by Douglas prior to 1835. The exact locality is not given; but the only place in which the species has since been found is in the Mount Diablo region, a section which was easily accessible at the time of Douglas' visit to California, and often visited by his Mexican-Californian hosts.

Although in a region much visited by botanists since then, no specimens were to be found in any of the herbariums of this State up to the year 1897, when _C. pulchellus_ was collected by Miss Alice Eastwood of the California Academy of Sciences.

The very name _Calochortus pulchellus_ had been appropriated by another yellow-flowered species of the same group, which is described and named below as _C. amabilis_, and which is clearly a distinct species.

Following are the original descriptions of the species copied from the Botanical Register:
Cyclobothra pulchella.—"Umbellis 2-3 floris, pedunculis bracteis brevioribus, floribus globosis, petalis ovatis obtusis serrulato-fimbriatis foveâ valde excavâtâ extus callosâ, sepalis ovato-lanceolatis acuminatis vix brevioribus."


4. Calochortus amabilis, sp. nov.

Stems stout, usually branching in pairs, 8 to 12 inches high, glaucous; radical leaves to inches long, 4 to 6 lines wide, lanceolate-acuminate, tinged with purple; bracts large and foliaceous, 2 to 3 inches long, 4 to 6 lines wide; sepals shorter than petals, ovate, shortly cuneate at base, sharply acuminate or even mucronate at apex, yellow tinged with brown on the back; petals clear yellow, ovate, with a short claw, obtuse at apex, naked but margined with a close row of short stiff hairs, very strongly inarched so that the tips of the petals overlap each other much like a child's pin-wheel; gland very deep, projecting upwards and outwards like a knob, lined with short stiff hairs which cross each other; anthers oblong-obtuse; ovary elliptical, short-beaked.

C. amabilis is found on the hills along the north side of San Francisco Bay, from the redwood belt to the Sacramento foot-hills, as far north as Burnt Ranch, Trinity County, California.

The species has been distributed in large numbers among the flower-growers of the world as Calochortus pulchellus, which it resembles in habit and size. The latter is more closely allied to C. albus, having the same globular flower and petals silky-haired within. It is also of a much lighter shade of yellow, and never could be confused with C. amabilis by anyone who had seen both.

Group 2. Star Tulips.

Flowers campanulate, erect or ascending; capsule nodding (except in No. 13); stem low and flexuous (in 14, 15, 16, stout and erect); not bulbiferous or very seldom so.

*Petals covered with hairs, and with a transverse scale covering upper part of the gland. Woodland plants.


Stems several-flowered, very flexuous, branching, dividing into pairs 7 inches high; radical leaf linear-lanceolate, shining, 4 lines wide, exceeding stem; bracts ovate-lanceolate, long, acuminate, 2 to 4 inches long, 3 to 5 lines wide; sepals 8 to 10 lines long, narrowly ovate, mucronate; petals yellow, with a yellow claw, naked, obovate, rounded above, a little longer than sepals, the upper portion of the gland covered by a narrow crescentic scale which is densely bordered above with short yellow hairs, some of which are clavate; anthers lanceolate-acute, capsule nodding, nearly orbicular, 6 to 9 lines long.

Found in the lower Yellow-Pine belt of the Sierra Nevada, from Mariposa to Butte counties.

"California."

The description is drawn from rather an extreme specimen. The plants are often very slender, simple, and but three to four inches in height. The flowers vary but little. In some sections flowers with the claw dark red or nearly black are common (_C. wallaceii_ Hort.).


Resembles the preceding; stem usually branching, very slender and flexuous, 3-10 inches high, with from a few to ten flowers; leaves glaucous, much exceeding stem, 2-6 lines wide; bracts lanceolate, narrow, 10 lines or more long; sepals ovate-lanceolate, acute or acuminate; petals a little longer, broadly ovate, acute; gland covered above with a narrow transverse scale, immediately above the scale densely hairy, the entire surface thickly bearded with long, erect, white or bluish hairs; anthers lanceolate-acuminate, 2-3 lines long; capsule oblong-elliptic.

This is the type which is found in the Coast Range, from San Francisco Bay, at least as far north as Trinity County, California, and western Oregon.

"California."

6a. _C. maweanus_ var. _major_, var. nov. This variety is twice as large as the type, from which it differs in its much stronger habit and lighter color.
Grows in the Yellow-Pine belt, Butte County, California.

6b. *C. maweannus* var. *roseus*, var. nov. The flowers of var. *roseus* are tinged with rose; the bulb is distinctive, having a smooth, mahogany-colored coat.

Its habitat is western Oregon.


In general resembling a small specimen of *C. maweannus*. The plants are very slender; leaves and bracts narrower, pedicels more slender; flowers almost always in an umbel, petals more rhombic in outline, claw more slender, scale broader and fringed, the remainder of petal densely covered with long slender silky hairs; anthers oblong-obtuse; capsule orbicular, not beaked, 6 lines long.

Specimens of this species show but little variation.

“California (in the Sierra Nevada, Placer to Plumas counties).”


Scape very slender, 4-8 inches high; leaves lanceolate-acuminate, narrow, exceeding scape; flowers one to four in umbel, bracts one-half length of pedicels, acuminate from a base 2 lines wide; sepals ovate-acute, greenish white without, lighter within, purplish at base; sepals obovate-obtuse, whitish or tinged slightly with green, with purple spot on claw, covered thickly with rather short soft hairs, which are white on upper and purple on lower portion, excepting that the margin and a band around upper portion of petal is naked; scale narrow, ascending, and deeply fringed, covering about one-third the width of claw; anthers long, acuminate; capsule elliptical, rounded at each end.

The type specimens were collected by the Lewis and Clark expedition on the headwaters of the Kooskoosky in Idaho (?). The writer was never able to obtain specimens of this species until just as the present paper was going to press, when flowers which are unquestionably the true *C. elegans* were received from a collector in western Idaho, near Spokane. As the original description of the species is very brief, the fuller description, as given above, was drawn
from these specimens. There is much difference in general appearance between the species and var. nanus, and in my opinion the variety will eventually follow the other forms which were originally included under C. elegans, and be given specific rank. For the present, however, it is left under the varietal name. No more definite locality than western Idaho can be given for the type.

Some Californian specimens have been referred to C. elegans but the writer has never seen any which come under the species and does not believe that either the type or any of its variations are found in California. The Californian plants referred to as C. elegans are C. nudus.

8a. C. elegans var. nanus Wood. (Proc. Phil. Acad., 1868, p. 168.) Dwarf and very slender, leaves very narrow; petals more hairy and ciliate, often acute or even acuminate.—C. iyallii Baker, Journ. Linn. Soc. (Bot.), Vol. XIV, 1875, p. 305.

"High hills, Yreka [California]. Also on Mt. Hood [Oregon]."

The description is that of Watson in the Botany of California.

The variety is known to the writer as it grows on Mt. Hood and on Mt. Adams. Watson evidently had small specimens, as under favorable conditions it is quite as strong as any of the preceding. The color is a delicate cream.

9. Calochortus lobbi, sp. nov.


Stem 3 to 5 inches high, not so slender as the preceding; leaf a little exceeding stem in length, 3 to 5 lines wide, lanceolate, abruptly acute; sepals ovate-lanceolate, acute, greenish with a dark spot below, 6 to 8 lines long; petals a little longer, white tinged with green, broadly rhombic-ovate, very deeply pitted, the pit showing as a prominent knob on back of petal; scale very narrow, deeply bordered with long, feathered, hairy fringes, and concealed in the recess of pit; above the scale there is a nectar-producing gland covered by a broad band of agglutinated feathered hairs, above this band lower half of petal densely hairy with silky hairs, upper half less densely hairy; filaments subulate; anthers oblong-acuminate, ending in a hook-like cusp; capsule narrowly beaked.
So far found only on Mt. Jefferson, Oregon.

"Oregon."

The above was identified for the writer by Baker. As the other varieties which Baker mentions in his "Tulipea" have been erected into species, and this is more distinct in character than any of them, it seems proper to raise it to specific rank.

"Petals with a transverse scale closely appressed over upper portion of gland, nude or nearly so. Woodland plants; in dry soil.


Low and slender, scape 2 to 4 inches high, with a single leaf 3 to 6 inches long, 3 to 6 lines wide, light green, of even width for most of length, abruptly acute; flowers one or more, in all specimens examined in an umbel if more than one; sepals narrowly obovate, acute, shorter than petals; petals greenish white or lilac, greenish at base, obovate, somewhat acute, denticulate above, 5 to 7 lines long, the same in width, entirely nude except for a tuft of two or three short stiff hairs at each extremity of the narrow, closely appressed scale which covers the upper margin of gland; anthers blue, oblong, two-thirds the length of the subulate filaments.

Probably *C. elegans* var. *subclavatus* of Baker.

On north sides of high mountains in the pine forests of the Sierra Nevada, from Tulare to Plumas counties; in loose dry soils.

"California (in the Sierra Nevada, Yosemite Valley to Plumas County)."

The type as described from Tulare County is white, but there seem to be variations tending to lilac, and in some sections a nude petal. This is the smallest flowered of all the Calochorti.

II. *Calochortus umbellatus* Wood.


Stem low and branching, 3-15 inches high, flexuous; radical leaf exceeding stem, narrow, 3-4 lines wide; bracts foliaceous, acuminate, 1-4 lines

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long, 3-4 lines broad at base; flowers five to ten; sepals greenish white, ovate-lanceolate, acute; petals white, broadly fan-shaped, denticulated, obtuse; scale triangular, ascending, appressed on upper portion of gland, which has many short white hairs just above it, remainder of petal nude; filaments slender; anthers 1 line long, oblong-obtuse; capsule short, oblong, 6 lines wide, 8 lines long.

A native of California, found on the lower mountains and hills back of Oakland, Berkeley, and Mills Seminary, and on Mt. Tamalpais.

"Oakland, California."

The species was long confused with C. uniflorus, and was described as C. collinus by J. G. Lemmon. Professor E. L. Greene called the writer's attention to the earlier description of Wood.

C. umbellatus can be confused only with C. uniflorus, from which its lack of bulblets and the situation in which it grows, as well as its color, easily distinguish it. It varies but little.

***Petals nude or only lower portion hairy; flowers campanulate; plants growing in open wet meadows.


Stem low, flexuous, but often stout, usually branched, 4-8 inches high, with one to four bulblets below the surface; radical leaves broad, 4-6 lines wide, exceeding stem; bracts linear-lanceolate, long and conspicuous; flowers four to ten, in one to three umbels, on long flexuous pedicels 3-10 inches long; sepals ovate, lanceolate-acuminate, greenish lilac; petals cuneate, somewhat truncate, denticulate, 10-12 lines long, color lilac, often with a purple spot on each side of the scale, naked above, sparingly hairy immediately above the gland; gland shallow, not pitted, a narrow triangular scale appressed upward over upper center; filaments slender; anthers obovate-obmune, lilac, 2 lines long, one-half length of filaments; capsule elliptical.

Except in the spots on petal or sepal there are few color variations.

From Monterey, California, northward in the Coast Range to Grant's Pass, Oregon. Found in wet meadows.

C. uniflorus was originally described by Hooker and Arnott from specimens collected on the Beechy Expedition. The specimens were without doubt collected either in the