



C. splendens

MARIPOSA

the newsletter of the *CALOCHORTUS SOCIETY* – ISSN 1543-6934
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Send Seeds for the Seed Exchange

A “bout” with hypothyroidism has limited my traveling this year. In June I was enough better to collect *C. monophyllus* and several forms of *C. tolmiei* from northern California and southern Oregon foothills; but any seed contributions readers are able to make for the “Seed Exchange” will be greatly welcomed. If seed has been wild-collected, please provide collection date, county of origin, and approximate altitude.

A More Detailed Summary of Patterson’s Thesis – Printed Separately...

...was the choice of the majority of readers; no one voted to have it “dominate” this volume. A 28-page version is now available. It includes six of Patterson’s cladogram figures, as well as appendix tables which compare Patterson’s results with Ownbey’s classification scheme on a species-by-species basis, and a list of the county of origin of each species examined. Several of you asked for some background information on “traditional” taxonomy, so that also has been added; and the “Editor’s comments” section has been expanded. The price is \$5 domestic; and US\$ 8 foreign (via air mail). Those who have already paid for it will receive it shortly.

More on the Possible “New” *Calochortus* ...

Several people reported they either this year visited the site of the mariposa in the Greenhorn Mountains mentioned in the last issue, or else were already familiar with it. Member Jeanette Sainz called to tell me she first saw these plants in May 1991, then again in 1995 and 1998. She judges that it is either a “bizarre” form of *C. superbis* (other bizarre forms of that species can be found not far away, for example, northeast of Porterville); or else a *C. superbis* X *luteus* hybrid, given the variability in the flowers (a characteristic of hybrid populations). Member Ed Rustvold visited the site the last weekend of April this year. He saw many more blooming, over a wider area, than last year and confirms there is considerably more variability in glands, coloration, markings, and flower size than he had found before. Member Brad Carter reported he also encountered several populations of a similar mariposa along Highway 155 (which crosses the Greenhorns east of Delano, less than 15 air-miles north of original site), and again it was quite variable. All three sent pictures; and I put two of Ed’s on page 6 as good examples of the variability. Note the large area of yellow on the petals, the golden crescent-shaped gland, and the lack of any dark “eye-spot” in the flower on the left (though pollinators are present) – while on the right, in the close-up of the petal claw of a different flower, the yellow is limited to the area immediately around the large dark “eye-spot”, and the gland is orange and nearly straight. Plans to check chromosome counts and DNA will go forward.

Species of the Issue – *Calochortus splendens* – and *C. davidsonianus* ?

“Plowing through” this long and complicated article will require some patience. (It is also requiring an extra page for this issue – allowing us the “bonus” of the extra color pictures as well.) My apologies to the readers – but this species has been the subject of many disputes !

Background and description – *Calochortus splendens* was apparently first published as a named taxon in 1834, by the great, self-educated British botanist George Bentham (whose work included important contributions to the Royal Gardens at Kew), in the *Transactions of the Horticultural Society of London*, Series II, Vol. 1, p. 411 (Plate 15, Figure 1). However, I find that in botanical publications, the original announcement of this species is sometimes attributed to Bentham (as in the “new” *Jepson Manual: Higher Plants of California*, published in 1993); sometimes to the equally important Scottish explorer and cataloguer David Douglas – whose name graces the Douglas fir, as well as *Iris douglasiana* and a great many other western plants (as in Jepson’s original *Manual of the Flowering Plants of California*, published in 1925); and sometimes as “Douglas *ex* Bentham” (as in *A California Flora and Supplement* by Philip A. Munz, published in 1959 and 1968). Unfortunately, I have not been able to track down a copy of Bentham’s 1834 piece, nor to determine what publication or herbarium specimen, of what date, has been attributed to Douglas; so I am unable to unravel this apparent inconsistency.

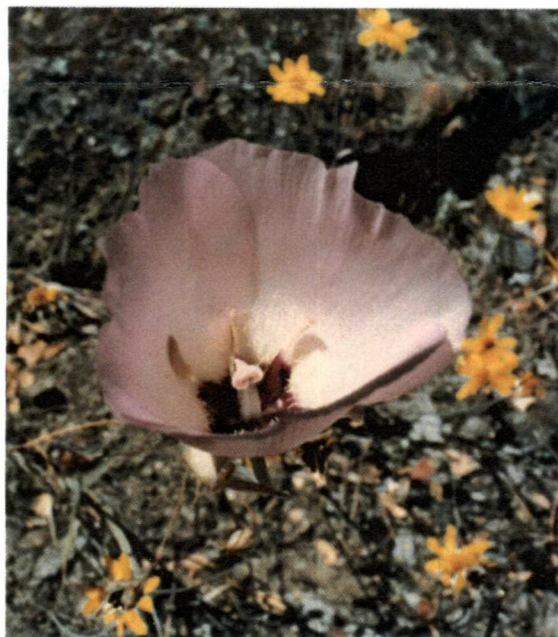
The earliest report of *C. splendens* I have access to is in Alphonso Wood’s list of the *Calochortus* in the *Proceedings of the Academy of the Natural Sciences of Philadelphia* (June 1868, p. 12) – where, curiously, the attribution is to “Bentham” with a question mark ! However, Wood’s piece presents serious problems of its own, because the description of the flowers includes reference to “a brown-yellow eye in the middle” [of the petal] – a characteristic utterly unknown in *C. splendens*. Wood adds that the plant is found in “Santa Clara, &c., not rare.” He continues with remarks that give us a clue about the reason for the inaccurate description: “Flowers as large as in [*C. venustus*]...Perhaps it runs into that species.” When we add this to his equally problematic description of *C. venustus* in the same list – “...greenish outside, a purple eye bordered with yellow inside;...straw-white, variegated,...a purple crescent bordered with yellow near the middle...” – a description much more like *C. superbus* than *C. venustus* – we can begin to suspect that his “*C. splendens*” may have been in fact the plant we know as the northern form of *C. argillosus*, which is fairly common in Santa Clara county. In comparison, in his unpublished treatise on *Calochortus*, Vic Girard noted that *C. splendens* was collected only once in Santa Clara county, “near Llagas Creek”, in June 1909, by Dudley. Llagas Creek runs south-southeast from the Morgan Hill area, which is in the southeastern part of the county, parallel to Highway 101 and less than a quarter mile west of it (see below, “The Issue of Range”). This area once had numerous populations of the northern form of *C. argillosus*, although today many have been wiped out by agricultural, commercial, and residential development.

The confusion in the description of *C. splendens* was somewhat cleared up by the 1874 publication of J. B. Baker’s list of the *Calochortus* in *The Journal of the Linnean Society*, Vol. 14, pp. 309-10 – with attribution to a manuscript by Douglas preceding reference to Bentham’s 1834 publication (which may explain why I am unable to find any published reference for Douglas). Baker’s description is entirely in Latin, and while I am hardly a Latin scholar, I can manage a rough translation: “Petals lilac...of a uniform color throughout with an occasional reddish blotch, the lower third with purplish hairs scattered sparsely around a bearded pit.” This description comes considerably closer to *C. splendens*, although the small spots usually found below and occasionally above the gland (Baker’s “bearded pit”) are more purplish than reddish, and the hairs tend to be white, cream, or pale lavender.

Next, in 1900 (in an article co-signed by Carl Purdy) L. H. Bailey (*The Standard Cyclopedia of Horticulture*, pp. 634-35) attributed the plant to Douglas and named four separate varieties, primarily distinguished by petal color and markings and location, as follows:

- (1) var. *atroviolaceus* – deep purple with a dark spot on the claw – San Diego county
- (2) var. *major* – clear lilac, paler below – Monterey county
- (3) var. *montanus* – lilac to salmon-pink – high mountains of Southern California
- (4) var. *rubra* – reddish lilac, pink, or purple – Lake county

Calochortus splendens –



– Photographs by Jim Robinett

In 1901, Purdy expanded on these four descriptions in his separately published "A Revision of the Genus *Calochortus*" (*Proceedings of the California Academy of Sciences*, Third Series. Botany. Vol. II, No. 4, pp. 143-44). He added that the variety from the "high mountains of Southern California," his *C. splendens* var. *montanus*, "has been mistaken for *C. palmeri*" and noted that it was found in "wet springy spots... [and] wet meadows" (a characteristic of the plant we now know as *C. palmeri* var. *munzii*) while the "other three forms always grow in dry, rocky soil." It is useful here to remember that the turn of the century was probably the height of the practice of botanical "splitting" (as opposed to "lumping"), when only plants with the most consistent appearance from population to population were given a single name. Purdy also lists three named varieties of *C. luteus* and four named varieties of *C. venustus*, for example.

Authors subsequent to Purdy – Abrams (1923, attribution to "Douglas; Bentham"); Jepson (1925, attribution to Douglas); Ownbey (1940, attribution to "Douglas ex Bentham"); Hoover (1944, attribution to Douglas); Munz (1959, attribution to "Douglas ex Bentham"); and finally the "new" *Jepson Manual* (1993, attribution to Bentham) – all offer fairly simple and fairly similar descriptions of the plant, and resist any urge to identify named varieties. I'll quote from Ownbey's classic ("A Monograph of the Genus *Calochortus*," *Annals of the Missouri Botanical Garden*, Vol. 27, No. 4, November 1940, p. 461):

...flowers erect, campanulate, lavender, often with a purple spot near the base of each sepal and sometimes with a similar spot on each petal above the gland; sepals shorter than the petals; ...[petals] usually rounded...sparsely invested below the middle with slender, more or less flexuous hairs; gland not depressed, naked or usually densely covered with...much-branched ("fungoid") processes...

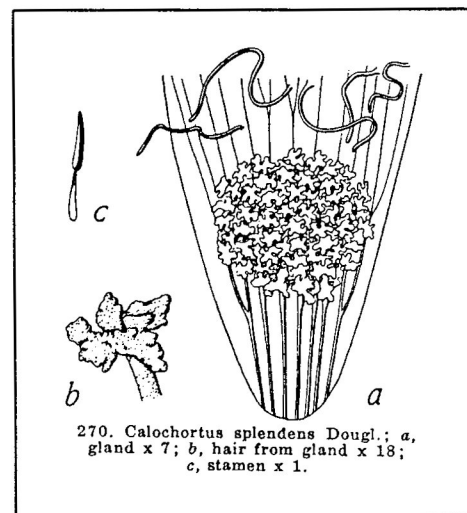
For comparison, here is the description from Jepson's original *Manual of the Flowering Plants of California* (1925, p. 233):

Stem erect, 1 to 2 ft. high; sepals with a small purplish black spot at the base; petals fan-shaped, clear lilac with long scattered hairs on the lower third or fourth; petals 1-1/8 to 1-3/4 in. long; gland small, round or oval, situated very low on the base of the petal or sometimes absent; gland surface covered with broad hairs whose expanded fungoid ["sponge-like"–*Ed.*] stellate ["star-like"–*Ed.*] tips form a dense mass; capsule narrowly linear, 1-1/2 to 2 in. long.

In Jepson's original *Manual* there is a "close-up" drawing of the claw of the petal showing the gland and a few long hairs above, as well as an even more magnified rendition of the "fungoid stellate" tips of the gland hairs, which I've reproduced below. Frank Callahan comments that when magnified, these gland-hair tips look almost like "little cauliflowers".

If the reader been able to wade through all these complexities of attribution and description with me, I regret to say that we are not yet done with the problems surrounding *C. splendens*.

The Issue of "*C. davidsonianus*" – In Vol. I of his *Illustrated Flora of the Pacific States*, published in 1923, Abrams presented on p. 441 a proposed new species, *C. davidsonianus*, which he had collected in 1903 on "grassy slopes between the Onofre Mountains and the sea, San Diego county." The table on page 5 is copied from Abrams, summarizing the differences he saw between *C. splendens* and *C. davidsonianus* (with corrections for a couple of obvious typographical errors, when "mm" for millimeters should have been "cm" for centimeters, and "cm" for centimeters should have been "dm" for decimeters; the numbers given are entirely his).



from Jepson, *A Manual...*, p. 234

Trait	<i>C. splendens</i>	<i>C. davidsonianus</i>
Stem	Branching, 4-6 dm high (12 - 18 inches)	Simple or usually branched, 3-6 dm high (9 - 18 inches)
Petal length	30-50 mm (1.2 - 2 inches)	25-45 mm (1 - 1.8 inches)
Petal hairs	Sparsely hairy with long tangled hairs from the middle of the petal to just above the gland	Sparsely hairy over the lower third of the petal with yellowish somewhat tangled hairs
Anthers	Narrowly linear-lanceolate, acute, lilac to blue, 8-10 mm long, equaling the dilated filaments	Oblong, obtuse, purple, 4-6 mm long, shorter than the dilated deep purple filaments
Capsule	2-6 cm long	5-6 cm long, 5-6 mm wide
Habitat	Dry gravelly hills, usually in chaparral	Grassy or chaparral-covered hillsides
Range	Santa Clara county to San Luis Obispo county	Santa Barbara county to San Diego county

In all respects other than those listed above, Abrams' description of the two plants was the same; and the differences cited appear to be fairly minor. Size differences – with *C. davidsonianus* slightly smaller than *C. splendens* (except the capsules) – might be accounted for by the ever-drier climate as we go south from Santa Clara county to San Diego county. The difference in the anthers is harder to explain. Anther color can certainly vary within a single species (and not uncommonly does so), but that alone does not justify separation and elevation as a distinct taxon. The differing shape of the anthers, and the altered relationship of anther length to filament length, however, does lend some weight to separating the two.

More telling still is the contrast in the chromosome counts for the two – a difference unknown to Abrams. The cytological studies reported for *Calochortus* by Marion Cave (*Chromosomes of the California LILIACEAE*, 1970) established that the plants collected in the San Onofre Mountains in San Diego county, identified as *C. davidsonianus*, were tetraploids ($2N=28$), while those tested from all other locations were diploid ($2N=14$); these chromosome counts were later confirmed by Ownbey himself, even though he had dismissed the possibility that *C. davidsonianus* was a valid taxon in his 1940 *Monograph*:

Specimens of this species [i.e., *C. splendens*–Ed.] from Santa Barbara county and southward have fewer, shorter hairs on the face of the petals, but do not appear to differ constantly in any other way [but see my descriptions below under “**Field notes**”–Ed.]. This element has been described as *C. davidsonianus*, but its single quantitative difference seems hardly of taxonomic significance.

This, of course, ignores Abrams' summary of the differences in the anthers. In any event, Ownbey may have later changed his mind about *C. davidsonianus*, an inference which might be drawn from his 1943 article (co-authored with J. M. Beal), “Cytological Studies in Relation to the Classification of the Genus *Calochortus*. III,” *Botanical Gazette*, Vol. 104, No. 4, p. 553:

Thus it appears that the cytological difference [that is, tetraploidy -vs.- diploidy–Ed.] between *C. davidsonianus* and *C. splendens* is more striking than the morphological difference. Whether or not *C. davidsonianus* should be considered a full species or merely a tetraploid variety of *C. splendens* need not be decided at the present time. It is sufficient to point out that the two are morphologically, cytologically, and geographically distinguishable [emphasis added–Ed.].

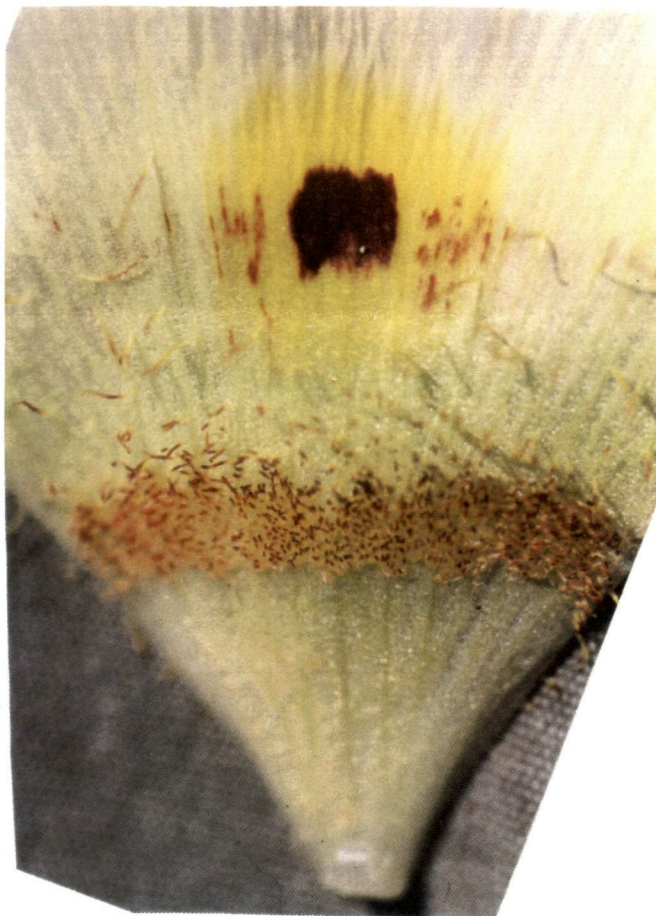
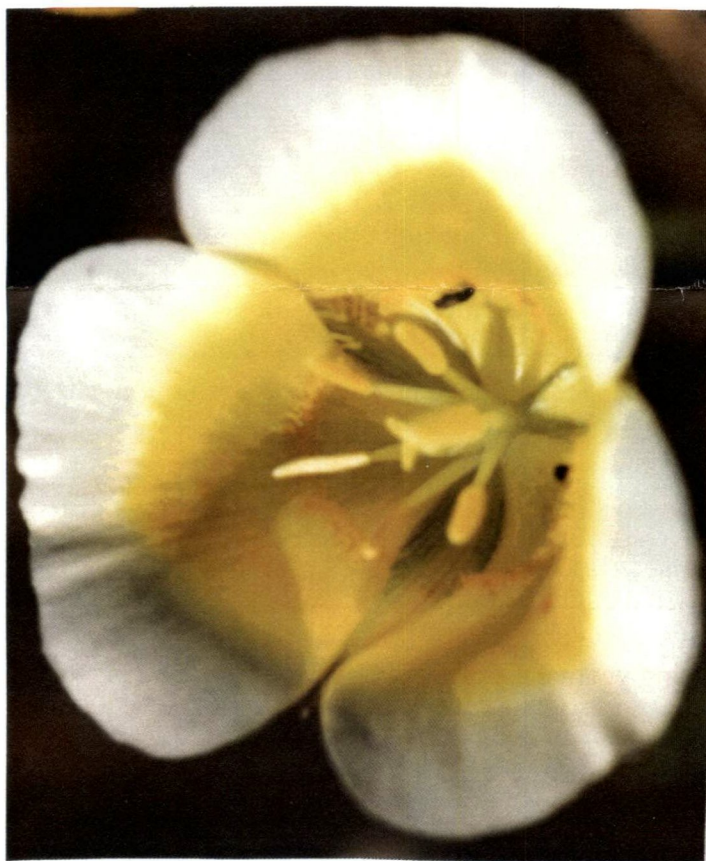
Be that as it may, no subsequent published author has seen fit to recognize *C. davidsonianus* as even a valid var. of *C. splendens*, let alone as a separate species – not Philip Munz in his *California Flora* (1959) nor in his *Supplement* (published in 1968); not the authors (Peggy Fiedler and Bryan Ness) of the article

on *Calochortus* in the “new” *Jepson Manual* (1993); and not Frank Callahan in his article, “The Genus *Calochortus*,” in the North American Rock Garden Society’s *Bulbs of North America* (2001). So we are left with an issue I can only characterize as “unsettled.”

In his unpublished writings, Vic Girard noted that the issue of diploidy -vs.- tetraploidy has been treated inconsistently within the genus. *C. uniflorus* can be found in both diploid and tetraploid populations, but no “name” is used to distinguish them (though the plants and flowers differ somewhat in size and vigor). And readers may remember from *Mariposa*, Vol. XIV, #2, that no “name” distinction is made between the diploid and the tetraploid forms of *C. leichtlinii*. On the other hand, *C. longebarbatus* var. *peckii* was created because it is a triploid version of *C. longebarbatus*, though it displays only slight morphological differences. And the tetraploid *C. aureus* was originally regarded as a separate species, then reduced to a var. of *C. nuttallii* (which is a diploid) by Ownbey in 1940; it since has been re-elevated to species status. In this last case, there are quite significant morphological differences between the two taxa.

Interestingly, the DNA studies conducted by Tom Patterson (see *Mariposa*, Vol. XIV, #4, April 2003) included materials from both *C. splendens* and *C. davidsonianus*. Patterson’s “incomplete run” of DNA sequences from a total of 74 taxa suggested they might well be separated; in fact, *C. davidsonianus* appeared to be more closely related to *C. flexuosus* than to *C. splendens*! But remember that this analysis could not be completed, because of computer memory limitations; it is quite possible that a completed study would have produced different results. He was able to complete his analysis only by reducing the total number of taxa to 28 – a list which included *C. splendens* but not *C. davidsonianus*. Unfortunately, obtaining fresh material (as opposed to herbarium specimens) for a repeat effort might be challenging: the

Ed Rustvold’s pictures of the mariposa in the Greenhorn Mountains –



San Onofre site where *C. davidsonianus* collections have been made lies entirely within the boundaries of the Camp Pendleton Marine Corps base, and is thus not very accessible for botanical research. In any event, there is still another issue to be found with *C. splendens*.

The Issue of Range – Over the years, there have been disputes about the range of *C. splendens*; happily these have been settled. One of the issues arises from the fact that Abrams, apparently quite arbitrarily, “drew a line” between Santa Barbara and San Luis Obispo counties, then stated that everything north of that line was *C. splendens* and everything south was *C. davidsonianus* (see the table on page 5). The cytological studies reported by Cave make it quite clear that chromosome counts, at least, do not fit this claim. The six samples of *C. splendens* that were diploid ($2N=14$) came from Ventura, Riverside, and San Diego as well as from San Luis Obispo, Monterey, and Lake counties. The two tetraploid ($2N=28$) samples identified as *C. davidsonianus* both came (as previously noted) from the San Onofre Mountains in San Diego county. So far as I am aware, no tetraploid forms have been identified outside San Diego county. So Abrams’ geographic “dividing line” appears to be spurious.

The southern limit of *C. splendens* was usually given as San Diego county until Ownbey added northern Baja California in 1940; Munz added Santa Catalina Island to the west in 1959. Establishing the northern limit of the species has been more problematic over the years. In 1900, Bailey (with Purdy) wrote that *C. splendens* extended north of San Francisco Bay into Lake county. But Abrams (1923) set the northern limit as Santa Clara county, south of the Bay. Jepson (1925) said Contra Costa county, east of the north end of the Bay. Not until Ownbey (1940) was *C. splendens* once again confirmed to be north of the Bay; he cited locations not only in Lake but also in Colusa county, which is north of the Lake county limit given by Bailey and Purdy in 1900. There is no dispute about altitude; the “new” *Jepson Manual* states *C. splendens* is found “< 2800 meters” (about 9200 feet). Jim and I never saw it higher than about 5000 feet. As for *C. davidsonianus*, the San Onofres lie entirely below 2000 feet.

Field notes – Jim and I first encountered *C. splendens* in 1982, in Monterey County, south of the town of Carmel Valley, growing in grasslands with scattered trees. We could see that it was a *Calochortus*, but did not know which one, as we owned no comprehensive references at that time. We also lacked a camera, so I made detailed life-size drawings of the flower and took extensive notes. The petals were about 1-1/2 inches long, “fan-shaped,” with tiny serrations across the top. They were pale lavender inside and out, on the inner surface lightening in color toward the base to almost white, with no suggestion of purplish spots either above or below the gland. Just above the petal claw was a white, “velvety-looking” mound of what appeared to be very short hairs covering the small (less than a quarter inch) round gland. The lower three-quarters of the petals were covered with many fine white hairs about 1/4 inch long. The sepals were tightly curled back to just below the midpoint of the petals. When unrolled, they were slightly longer than the petals, a very pale lavender with a suggestion of purple striping inside and out, and a prominent crescent of dark red-purple just above the base. The pistil was pink rather than lavender, with a distinctly trilobed stigma whose tips were a deeper pink; the whole barely 1/2-inch in length. The stamens totaled about 3/4-inch in length and consisted of a narrow smooth white tubular filament supporting a narrow anther, both of about equal length. The anthers were twisted counterclockwise and were a deeper lavender with a noticeable lighter vein centrally. Later that year we bought a copy of Munz’ *A California Flora* (the most recent resource then available) and the following year confirmed that this was *C. splendens*.

Over the years, we found this species in many places – further south in Monterey county, along the road to “The Indians Campground”; in the Cuyama Valley in Santa Barbara county; in Griswold Canyon in San Benito county; along Lockwood Valley Road from the intersection of Highway 33 and to the east in Ventura county; and along Highway 79 in San Diego county, to name but a few. We also saw some of its

northern populations – for example, on Walker Ridge at both the south and north ends (Walker Ridge Road more or less parallels the Lake-Colusa county line, crossing back and forth along it); and on Fouts Spring Road, less than a mile south of the Colusa-Glenn county line. The variability from population to population is quite fascinating. The populations along the road to “The Indians” grow in grasslands with scattered trees and closely resemble the plants we found in Carmel Valley. The Cuyama Valley flowers, which occur in thinly grassed flats, are larger, with color varying from light to medium lilac, purple spots at the base of the petals, and a few hairs perhaps a half-inch long scattered on the lower half of the petals. The San Diego county populations we saw (mostly in grassy areas, but occasionally in scrub) had flowers that were a bit smaller – about the size of the Carmel Valley flowers – of light lilac, with inconsistent spotting, and a larger number of 1/3-inch-long white hairs on the lower third of the petals.

There are numerous populations along the western reaches of Lockwood Valley Road. They seem to bloom inconsistently from year to year; but in 1991 a huge number were growing amid “salt scrub” at the very western end, where the road meets Highway 33. The flowers were smallish and mostly pale (some virtually white), with 3/4-inch-long white hairs sprinkled over the lower half of the petals and some petal spots; the plants themselves were quite tall; where they grew up through the scrub some reached almost three feet in height. Along Fouts Spring Road – which is the northernmost known stand of *C. splendens* – some of the plants grow on grassy verges and some in chaparral; they have quite large flowers, with color varying from medium to rich lilac, a few short white hairs, and inconsistent petal spots. The Walker Ridge plants are similar, and again grow both in grasslands and in chaparral. We never attempted to find the plant called *C. davidsonianus*, given its limited accessibility.

Risk – *C. splendens* is not even considered for listing as a rare or endangered plant by the California Native Plant Society – not very surprising, considering its many populations and its apparent preference for hot, dry, and usually sandy or gravelly locations. Were I pressed to give it a CNPS-type “R-E-D” code, I would say “0-1-1½” (**R** = “not rare”; **E** = “not very endangered”; **D** = “uncommon outside California”).

Assuming the taxon *C. davidsonianus* is valid, whether it is at risk is unclear. The latest edition (the 6th, August 2001) of the California Native Plant Society’s *Inventory of Rare and Endangered Plants* omits any mention of it, perhaps because CNPS has made an effort to follow the taxonomic practices of the “new” *Jepson Manual*, which does not recognize it; but I find that the earlier editions of the *Inventory* in my possession (4th and 5th) also do not include it. However, since (if it is separate) it is confined to Camp Pendleton, it presumably enjoys some protection from development – though it may be at risk from military maneuvers. An appropriate “R-E-D” code might be “2-2-3” (**R** = “distributed in a limited number of occurrences in California”; **E** = “fairly endangered in California”; **D** = “endemic to California”).

Cultivation – *C. splendens* has a reputation for being “difficult,” and Jim would have agreed. He planted many seeds, from many different populations, and rarely got the seedlings to last into their second year. Seed from lower elevations is unlikely to benefit from cold stratification. Most populations occur in areas of moderately limited to very limited rainfall (although the plants on Walker Ridge may receive 30 to 40 or more inches of rain a year). And all the populations we saw – north and south – occur in areas that get very hot in summer; at 8 air miles from the ocean, our Sonoma county location may have been too mild. A very gritty, well draining mix seems wise, as *C. splendens* almost always grows in sandy or gravelly soils. All watering should be stopped as soon as the seedlings start to yellow; then the pots stored in a completely dry location, protected from humidity, until winter rains return. Cultivation may be pursued best in locations not far from natural populations. I would guess that much the same approach could be used for the plant called *C. davidsonianus*.