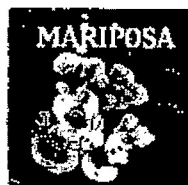


MARIPOSA  
VOL. II, #4  
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DESIGN: K. STOKKINK  
PUBL. QUARTERLY  
EDITORIAL ADDRESS:  
260 ALDEN RD.  
HAYWARD, CA 94541



THE CALOCHORTUS  
SOCIETY NEWSLETTER

APRIL, 1991

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## \* \* \* DUES NOTICE \* \* \*

MEMBERSHIP FEES ARE DUE BY JULY, THE START OF A NEW PUBLISHING YEAR. This will be the only notice. Rates will remain the same this year, 1/2, \$3./year U.S.: \$5./year foreign (Int. Money Order recommended.)

☆ We hope you like our new look. It was designed by my wife, Karin.

### I. *Calochortus* Germination Tests, 3rd Installment: Watering.

(This is the third in a series which will give the results of various germination and growing tests conducted in Alameda Co., Ca. commencing in autumn 1989 (for details see MARIPOSA II.1). The results should not be treated as conclusive, but only as a guideline.)

This test was conducted in order to determine the optimum watering schedule for various representative *Calochortus* spp. Is there an optimum amount of water to apply? Do rates of water affect growth? How much water is too much, or too little? What is the relation between native conditions (desert, coast, etc) and watering rates?

The test was conducted in Livermore, Ca. which is in USDA zone 9. Jim Robinett believes it may have had an effect on the outcome as well. As Livermore is relatively dry and sunny, more water may have been needed than normal in order to keep the seeds evenly moist, and the seedlings in vigorous growth. Livermore normally gets from 10-15"/year of rainfall; the 1989-1990 season was dry. Apart from questions of what is "normal", it may well be that the relatively drier, sunnier growing conditions in Livermore required somewhat more water. While the seeds were watered at the same rate, evaporation in a drier, sunnier climate may be greater than in a humid or overcast locale. Growers should bear this in mind.

Each sp. was grown in three different pots with an identical medium (2/3 organic matter, modified from Baccus' mix: a water retentive mix). Seeds were buried 1/4". Each sp. was watered once a week in one pot, once every two weeks in a second pot\*, and twice a week in a third pot. Normal rainfall was counted as one watering, i.e. a storm which resulted in one inch accumulation more or less. Each pot received an identical amount of water at other times, one inch per watering. The water was applied at one time, but, in order to prevent the seedlings from being deluged, they were sprinkled in succession until one inch total was applied. (\*Twice a month proved too little to even germinate the seeds, much less grow them. Thus the twice a month batch was watered once a week after an initial period in order to germinate the seeds. They were then watered bimonthly in accordance with the test requirements).

For this study we used eight spp. with fairly wide ranges, and representing all three sections and six subsections. They also come from areas differing greatly in growing conditions, from wet to dry, from cold to mild, and from low to high altitude. The spp. are: (Sect. *Calochortus*) *C. albus* (*Pulchellii*), *C. tolmiei* (*Eleganti*), *C. uniflorus* (*Nudi*); (Sect. *Mariposa*) *C. catalinae* and *C. venustus* (*Venusti*), *C. macrocarpus* (*Macrocarpi*), *C. gunnisoni* (*Gunnisoniani*), and (Sect. *Cyclobothra*) *C. weedii* (*weediani*). The watering schedule was formulated from the average rainfall of all eight spp. during their growing season, plus a test for double the average and half the average. (Our thanks to C. Baccus and J. & G. Robinett for the seed.)

For most spp., the once a week watering schedule proved best. Only a few seedlings survived the twice a month schedule (except in the case of *C macrocarpus*\*). Again, only a few survived the twice a week schedule (and none of *C macrocarpus*). The best results were clearly obtained with the once week schedule for all spp. except *C macrocarpus*. Yet at least two seedlings of each of the other spp. survived in the bimonthly and biweekly tests. This points to a range in how much water each sp. can tolerate.

In the wild, each sp. may encounter changing conditions from year to year and also over longer periods of time. As some of the seeds of each sp.\* survived the relatively wet and dry watering schedules, they could also adapt to changing environmental conditions.

Be this as it may, the desert sp., *C macrocarpus*, proved to be an exception. After an initial period of once a week watering, for germination, it clearly preferred the twice a month schedule. (Less rigorous experiments in watering *C kennedyi* and other desert spp. produced the same results).

## II. The Horticultural History of *Calochortus*-6th Installment:

Rockwell, F.F., The Book of Bulbs, N.Y.: Macmillan, 1927. [This is the second part of this article, which includes the only known report about forcing *Calochortus*].

"*Soil for forcing* Many 'formulas' for special soil for bulbs have been used in literature on the subject...All you need to get perfect results is a *light, rich soil which will drain perfectly*, no matter what it is made up of. For many years I have used the following simple method of preparing my soil for bulbs: To an average garden loam, I add an equal amount of commercial humus, or peat, or, if I happen to have them both on hand, the two mixed together. To this I add sufficient sand (of any kind) so that the mixture is somewhat gritty in texture, and will crumble freely even when quite moist. While stirring these things together, I add fine bone meal or bone flour at the rate of a five-inch potful to about a bushel of soil...If *very old*, thoroughly rotted manure, such as you would get from a last spring's hotbed, is on hand, that may well be added, but it is not at all necessary. If either humus or peat are not available, hardwood leafmold rubbed through a coarse screen may be used in their place. The soil, after being mixed, should be gradually moistened, and, if necessary, turned once or twice with a spade or trowel, so that, when ready to use, it will be quite damp, but not sticky or muddy. *This is much better than to attempt to water it after the bulbs are planted*.

Earthenware pots or bulb pans should, if possible, be old ones. If dirty on the outside, they may be readily cleaned by scrubbing with sand and water. If new ones *must* be used it is quite important to give them two or three soakings in a tub of water, at intervals of a day or so, at least half a day at a time...

*Planting the Bulbs*...With most sorts of bulbs, five may be placed in an ordinary five-inch pot...To accommodate more bulbs or large bulbs, regular bulb pans are the most satisfactory to use...Fill in the prepared soil to a depth which will bring the tips of the bulbs, when placed on it, a half inch or so below the rim. Make it fairly firm by striking the bottom of the pot two or three times against the bench. Then place the bulbs, and fill in the soil about them until the soil is level with the tips of the bulbs. Label each pot as the work progresses. They are then ready to be transferred to the rooting bed outside.

## III. Conservation: The proposed California Desert Protection Act.

The fragile Mojave and Colorado Desert environments are threatened by development, grazing, recreation, and above all off-road vehicles. The latter are particularly noxious as I can personally attest. Last spring I came upon a stand of the striking *C kennedyi*. *There were fresh tire tracks from off-road motorcycles right through the middle of the stand*. Several of the plants

had had their flowers clipped off, and were thus unable to produce seed for the year. The shrubs sheltering the Calochorti (*Artemisia* spp.) had been damaged or destroyed. It seems to me that preserving this and other wildlife is far more important than the infantile urges of ignorant cyclists, who somehow get off on polluting the desert with exhaust fumes, destroying its wildlife, and ruining its topsoil.

The Cranston-Levine bill would set aside almost 4 million acres of desert as National Parks. An additional 4.4 million acres would be closed to off-road vehicles of any sort. The protected areas are home to at least four species of *Calochortus*, including many stands of *C. kennedyi*, and the rare alkali Mariposa, *C. striatus*. A great many other spp. of flora and fauna would be protected as well, to speak nothing of habitat. Members are strongly encouraged to write Representatives and Senators from their districts/states in support of the bill.

#### IV. THE GENUS *CALOCHORTUS* AND SERPENTINE--P. II. by James and Georgie Robinett

(The concluding portion of this article, the first part of which appeared in *MARIPOSA* II, 3 and discussed the ecology of bulbs in serpentine habitat. Serpentine outcrops occur widely in the California Coast Ranges, the Sierra Nevada and Cascade Ranges, and the Siskiyou-Klamath Mt. region on the California-Oregon border area. They are an important habitat for Calochorti and other native bulbs of the Pacific Coast.)

Examples of *Calochortus*-serpentine associations come readily to mind. The mariposa *C. vestae* has been tentatively classified as a serpentine endemic; it rarely occurs on any but serpentine soils, and then only very close to serpentine, where the soil may be "tainted" with ultramafics. The Sierra form of *C. albus* grows most thickly on serpentine soil banks, although it may also be found off serpentine. The odd *C. tiburonensis* is definitely a serpentine endemic, found only amid a single serpentine outcrop in Marin County, California. The star tulip *C. uniflorus* grows both on and off serpentine, but is most common on serpentine clays.

One of the peculiarities of serpentine is that it sometimes supports populations of a species which are extraordinarily isolated geographically from their ordinary range. The Calochorti provide examples here, as well. *Calochortus splendens* grows -- sometimes quite thickly -- on serpentine in Lake County, California, more than 100 miles from its nearest neighbors.

Obviously, all this applies to other West Coast native bulbs, many of which are found in common association with Calochorti. A good serpentine "semi-barren" can be a rich find for the bulb fancier, who may return every few weeks to enjoy erythroniums, fritillaries, alliums, members of the *Brodiaea* group, and even native lilies as well as early and late Calochorti blooming in succession. Interestingly, many of the same points may be applied equally to volcanic soils and semi-barrens, which for somewhat different reasons present a hostile habitat for ordinarily vigorous annuals.

If it is true that some or many of the Calochorti appear commonly, most commonly, or even exclusively on serpentine, what then are the horticultural implications? Must we import bags of serpentine soils to enjoy these lovelies in our gardens? At first we assumed this was so, and we hauled home many bags full of what we might politely call "Lake County crud" for sowing seeds we had collected there. But soon the urge to experiment appeared, and before long we discovered that even the so-called "serpentine endemics" were not only content but in fact GREW BETTER in a "good seedling mix" Jim had developed. They do best with plenty of water -- which means they also do best in a very well draining mix -- to make up for the loss of serpentine's extra moisture retention. But in nonserpentine soils, with lots of nutrients and no toxins to defend against, they grow with great vigor and often reach blooming size sooner than

in their "natural" serpentine soils.

## REFERENCES

Arthur R. Kruckeberg, *California Serpentine: Flora, Vegetation, Geology, Soils, Management Problems* Berkeley: UC Press, 1984.

P.J. Wyllie, ed., *Ultramafics and Related Rocks* New York: Wiley, 1967.

## V. Species this Issue: *C. macrocarpus*, the sagebrush Mariposa.

Range: From central Washington state across Idaho to Montana in the east, and from British Columbia, Canada south to northeast California and northeast Nevada. One of the largest ranges of any *Calochortus* species.

Botany: Prof. Marion Ownbey's *A Monograph of the Genus Calochortus* is by far the most comprehensive and thoroughgoing work on the subject available. It is an excellent work in many respects, and has endured as the definitive botanical study on the subject for over fifty years. Without it, we amateurs and no few professionals would be lost. Nevertheless, it is not perfect. It might seem presumptuous of an amateur to question an item in so erudite and massive a study. Yet we cannot accept his separation of *C. macrocarpus* from the other *Venusti* into its own subsection. Prof. Ownbey does not go into any detail about his reasons for separating this one sp. from the other *Venusti*. He states merely that, "it has no close allies." Cytologically, however, it is identical to the other *Venusti*, with a haploid chromosome count of seven. It can only be on morphological grounds, then, that it is separated.

We would argue that there is no one character of *C. macrocarpus* which is not matched by another sp. in section *Mariposa*, subsection *Venusti*. Many botanists have claimed that its unusually long sepals, which exceed the petals in length, are a regular feature of the sp. Yet both in the field and in the photo in Taylor's *Guide to Bulbs* of the sp. one encounters flowers with smaller sepals. The famous green stripe on the outer side of the petal is matched by *C. bruneanus*, as is the proclivity to grow in or near sagebrush (*Artemisia* spp.). Even part of their ranges overlap. (Admittedly, when Ownbey wrote the monograph, *C. bruneanus* was thought to be a variety of *C. nuttallii*, and has since been separated on primarily cytological grounds. The point is that its taxonomic status is now uncertain; it may not be a *Venusti*, and thus features it shares with *C. macrocarpus* would not have connected the latter to the *Venusti* at the time Ownbey wrote). Its purple color is matched by several spp. of *Venusti*, while its anther character should not of itself separate the sp. if Ownbey is to be consistent in specific differentiation. In sum, we would submit that the species properly belongs in Sect. *Mariposa*, but does not merit its own subsection. It should be placed with the other *Venusti*.

Be this as it may, this beautiful sp. bears bulbets near the base of the stem, upright seed capsules and large, flat tan seeds. Its nectary gland has been variously described as "oblong" (Watson, Purdy), "A-shaped or oval" (Jepson), "triangular-oblong, more or less sagittate" (Ownbey, Munz and Cronquist, Holmgren, et al) 'Chevron'-shaped might be more accurate (see drawing of an enlarged inner petal); I haven't seen any oval-shaped glands, but the sp. has a huge range, and some with oblong glands may well exist. The gland is also "depressed" (Munz) and surrounded by a "fringed membrane." The leaves are grayish-green and grooved. The flowers are often lavender but sometimes various shades of purple, blue, rarely pink, and pale gray. (A white form, var. *maculosis*, will be treated in a future issue of **MARIPOSA**.) There is also a band of contrasting shade or color above the gland. The petals are sometimes rounded and sometimes pointed at the apex.

History: This is still another species discovered by the famous botanical explorer, Douglas. The sp. was published by him in 1828, as *C. macrocarpus*, and has kept with this name ever since. "Macrocarpus," from the Greek, means "large fruit." This refers to the seed capsule, which can get quite long on mature plants, under favorable conditions. There have been two

described spp. which turned out upon closer examination to be *C. macrocarpus*, viz. *C. acuminatus*, and *C. cyaneus*

**Horticulture:** In the wild, *C. macrocarpus* grows in high deserts ( $\pm 4000$  ft. elevation), and is almost always found in association with sagebrush. In wetter parts of its range it grows on slopes, but in the drier parts it grows on level areas. The sage sometimes shades the *Calochortus* for part of the day, or part of the plant, but this is more or less a full sun grower. Also, the desert sun shines more frequently than elsewhere. Dry cold, its usual growing conditions, were a new one on me: it was difficult getting started with this sp., and I lost many seeds at first. The sp. endures all sorts of extremes that would kill less robust plants, including  $-30^{\circ}\text{F}$  winters with little snow cover,  $110^{\circ}\text{F}$  summers, and less than 15" rain in most years. Yet this makes it a specialized sp. fond of its usual conditions, but not of wet or mild ones.

Those in cold climates need only worry about moisture, not cold (the sp. requires at least two months at or near freezing. Dry climate growers can leave the sp. out all winter and it should do well. If the climate is wet and cold, it may be possible to grow in pure sand, for drainage, with bulb fertilizer at 5" deep. This is similar to how Mr. Boyd Kline grows this sp. (in wet SW Oregon). Alternatively, one can use the UCDavis mix (1/2 S. P. Moss, 1/2 sand), but see to it that the pot is kept on the dry side. I do the latter, by putting the pots under FRPlastic about 18" wide, but up about six feet. Just enough rain enters at an angle, from wind deflection, to keep the plants happy.

Those in mild climates will have to cold stratify the seeds, either in their pots, or in moist vermiculite, usually for six to eight weeks. In the former case, cover the medium with ice cubes, at just above freezing. In the latter case, they must be transplanted after germination. Seeds should be watered once a week until they are about 3/4-1" high and then given only one inch every two weeks (see above II) or less in areas with frequent fog or overcast. Keep in mind that this sp. survives very happily on *less than 15" of rain per year*. Large pots are advised: an alpine house is not. Bulb fertilizer works well, but not manure. Keep dry during dormancy (some rain is tolerated). Mature bulbs should be chilled dry in all climates: they require dry cold.

## **C. Macrocarpus** from

### **Intermountain Flora**

by Cronquist,  
Holmgren, *et al.*, NY:  
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Publ/ Col. U. Pr. 1977

