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MARIPOSA

THE *CALOCHORTUS* SOCIETY NEWSLETTER

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I. Announcements

* The 1993 *Calochortus* season was mixed despite or perhaps because of heavy rains in California and the rest of the West. The parts of the area which had not seen significant rain in years were all of a sudden in bloom. Species which had long laid waiting for rain were up in profusion, especially east of the Sierras, notably *C. bruneaunis*, *C. nuttallii*, *C. macrocarpus* and other desert and semi-desert spp. Yet parts of Southern California which were also wet in 1992 did not see as significant blooms this year as last. *Calochortus* literature has mentioned this tendency of the genus to bloom one year and less so the next, or even to not bloom at all in very wet years, e.g. in Schmidt. Why this should be so is a puzzle, as it would seem to us that wetter years should consistently produce more blooms. Whether it is from competition from other plants in wet years, or a need to rest, or some other factor is unknown. It is not confined to any one spp.; *C. venustus*, for example, was in bloom in some areas which had also bloomed last year, and not in others. In other words, even within a single sp. there are stands which will bloom more frequently than others. Within the same section, some bloom in very wet years, while others don't. *C. nuttallii* was up in great profusion in sections of Utah and Arizona in which nearby stands of *C. aureus* were practically devoid of blooms. Again, *C. flexuosus* in this same area was extremely abundant in 1991, a relatively dry year, but rare this year which was wet. Records will be kept of this tendency, in the hope that the pattern can be figured out.

In any case, it was good to see flowering in areas in which there had been few significant blooms in years, such as Eastern California and Western Nevada.

II. Trips.

[Sorry, but we didn't have space for this section, this issue. It will return with October's newsletter.--Ed.]

III. Germination Tests--12th Installment: Watering

[Continuing our series of articles on various horticultural tests conducted from 1989-1992 on Calochorti, this test on watering is among the more important. The results will be published next issue-Ed.]

This test was set up to examine watering schedules and their effect on *Calochortus* growth. Does watering have any effect on germination of seedlings, on their rates of growth, optimum growth, etc.? The species tested included members from all sections and a wide diversity of habitats. These included *C. albus*, *C. talmiei*, *C. uniflorus*, *C. catalinae*, *C. venustus*, *C. macrocarpus* and *C. weedii* Less formal tests were conducted on *C. kennedyi* and various Mexican Cyclobothras, as well. Thus the tests included both shade growing spp. and those used to sunnier exposure; winter, spring and summer growers; coastal, mountain, and inland spp.; sp. from relatively wet and also from dry areas; as well as relatively tender and hardy spp. For each sp., a pot was used to grow seed with three different watering schedules. These included a twice a week watering schedule, a once a week schedule and finally a twice a month schedule. An equal amount of seed and an identical mix was used for each pot, for a total of twenty-one pots.

A problem in the form of rainfall of uneven amounts was treated by counting each rainfall as one watering, so long as it constituted a total equal to that of the watering for the period. Thus a standard of one inch depth of water for each watering was used. This standard is not arbitrary; it is in accord with accepted horticultural practice and recommendations as well as a rough average of the rainfall received by the test spp. under indigenous conditions. Every effort was made to keep out excessive rain by covering the pots, as

necessary, if more rain than needed came during the period. The pots were not watered during the dormant period. As much attention as possible was given to giving each sp. conditions like those of their native range, except those requisite to the test, and given the intrinsic problems of growing species out of their native range and conditions. In particular, *C. macrocarpus* was cold stratified at first to induce germination (see MARIPOSA II, 2 and II, 3 for this procedure.)

IV. The Horticultural History of *Calochortus*--15th Installment

Wood, Allen H. Jr., *Bulbs for Your Garden*, Boston: Houghton-Mifflin, 1936. From ch. on "Western Bulbs for Eastern Gardens," pp. 148-151. **[First installment.--Ed.]**

"A representative group of western cormous plants is found in the Calochorti, members of the lily family. From Colorado to the Pacific, numerous species and varieties of this genus flaunt their peculiar beauty in localities of vastly different character. They grow on mountains, in lush dripping valleys, and on sun-wracked deserts--a cosmopolitan clan! Some twenty-five forms of *Calochortus* have been successfully grown in the East. True, one meets with difficulties in establishing some of these plants, but after all that is part of the pride in ultimate accomplishment. Most of the trouble arises from two sources. Poorly drained soil is provocative of an early demise, and warm, wet autumns lull the corms into a false security which results in the growth of tender new shoots. These new growths are promptly destroyed by the first severe frost, and the corm is weakened. While this last condition may be prevented by lifting the corms after the foliage has ripened, and storing them, the task becomes onerous if any quantity is planted. In my garden I have grown calochorti in gritty, gravelly loam and depended upon marsh hay to ward off the cold. A few fail to grow each spring, but the gaps are filled the following fall with new corms. Covering the plants with temporary lights as a protection against rain after the blooming season is also helpful. Calochorti may be grown in cold frames with assured success, yet somehow I would rather take the chance of growing them in the open. When they do succeed in the rock garden or border, they are infinitely more beautiful and interesting than when confined in a cold frame. It is even worthwhile to plant anew each fall if necessary, although such an extreme is seldom required. Every season it seems that the species which do survive are rapidly accustoming themselves to their new surroundings, and are learning to adjust their vitality and resistance to the exigencies of immigration.

V. Conservation: Letter from C. Baccus

[This letter was written in reply to R. McKenzie's letter last issue on inbreeding-Ed.]

"In response to Mr. McKenzie's letter in MARIPOSA Vol. IV, #4, I am afraid that I did not fully explain to Mr. McKenzie the method that I was using to pollinate the flowers in the Nursery and may have misled him by calling it self-pollination. This is probably due to my efforts in making crosses among some species. I had been doing some crosses for a year or two and mentioned...to Wayne Roderick my concern that I was not really producing a true cross. He outlined a procedure used in lily culture for me to try. The procedure basically provided for isolation of the pistil until pollen could be applied. This is accomplished by removing the stamens and capping the pistil with an aluminum cap before the flower opens. Later, when the desired cross pollen is available it is brushed on the stigma. I used this for one year and then began utilizing it also for "selfing" [self-pollinating -ed.]. In this procedure, I collect the pollen from a specific species in a film canister and then use this to pollinate other flowers in the bed. Basically, the idea was to provide pollen from a number of flowers from a species to pollinate the other flowers in the same group or bed and preventing these flowers from selfing. Hopefully, this would provide a broader genetic base. This works fairly well, but mature plants have not been produced yet to verify results. In the case of the crossing, the results indicate that on the small scale even crossing a specific species (*venustus*) from different stands produce spindle plants. Others,

e.g. *C. venustus* x *C. vestae*, produce sterile seed. *C. clavatus* x *C. venustus* also produced spindle plants. The true, healthy crosses which have been described would have to be the result of large numbers of crosses in nature if my results are to be considered viable. I am not sure that the number of these cross-pollinations is very large since many of the plants are pollinated by other than bees, which distinguish plants and do tend to return or collect from more than one species or genus during a day. But there do not seem to be many and they are probably feeding rather than collecting food and therefore may only accidentally act as a pollinator depending on the number of available plants nearby..."

VI. Species this issue-- *Calochortus tolmiei*, Tolmie's Cat's Ears

Genus *Calochortus* Key

I. Section *Calochortus*

A. Subsection *Pulchelli*

B. Subsection *Eleganti* Stems short, rarely bulbiliferous; flowers erect, spreading, open and campanulate; petals conspicuously hairy on inner surface.

1. Stems generally unbranched, capsule erect

i. petals triangular-lanceolate, white with central purple blotch ..... *C. lyallii*

2. Stems generally unbranched, capsule nodding

a. Gland rounded

ii. flowers pale yellow to white..... *C. apiculatus*

b. Gland transverse, arched upward

iii. Glandular spot on sepals, flowers pale yellow ..... *C. subalpinus*

iv. Conspicuously protruding gland, flowers white with yellow hairs above gland, red striations on petal ..... *C. coxii*

v. Conspicuously hairy-ciliate petals, usually not hairy at tip, obovate, not papillose on inner face, white to dark lavender ..... *C. coeruleus*

vi. Petals less hairy, usually not hairy at tip, obovate, papillose on inner face, white with white to very dark purple base and petal hairs at base..... *C. elegans*

vii. Petals triangular-lanceolate, greenish-white with white to purplish base and petal hairs at base ..... *C. westoni*

3. Stems often branched, petals hairs usually extend to tip, gland transverse and upwardly arched, capsule nodding

viii. Flowers yellow, often with a brown spot at the base ..... *C. monophyllus*

ix. Flowers white to purple..... *C. tolmiei*

C. Subsection *Nudi*

D. Subsection *Nitidi*

II. Section *Mariposa*

III. Section *Cyclobothra*

The common name for the species is "cat's ear" or "pussy ear." It has also been called a star tulip in the early literature, but this is to confuse the cat's ears (*Elegantes*) with the star tulips proper (*Nuttalliani*).

Range: A large range, from the north-central Coast Ranges of California in the South (roughly the Bay Area) to the Willamette Valley of Oregon to the North (almost to Portland). It occurs at low to moderate elevations, from the Coast inland to the foothills of the Cascades.

Botany: *Calochortus tolmiei* is one of the more difficult species of the genus to distinguish satisfactorily. It is clear that it is related to the other cat's ears; it is less clear what its distinguishing features are. Indeed, the great California botanist W. L. Jepson believed that *C. coeruleus*, *C. elegans*, and *C. tolmiei* were one species, with only varietal, and not specific, differences. To this group might also be added *C. subalpinus*, *C. monophyllus*, *C. weedii* and even *C. eurekensis*. The basis for this is that the shape of the gland, a major element in *Calochortus* diagnosis, is more or less identical for each. Further, the range of all the above species, with the exception of *C. weedii* and disjunct populations of *C. elegans*, overlap. While there are distinct colors in this complex, which hold consistently for certain species, color alone is not sufficient to distinguish a species: otherwise *C. venustus*, for example, would have to be divided into numerous species. Thus *C. monophyllus* is less easily distinguished from *C. tolmiei* in the light of its consistently yellow coloration (also, *C. tolmiei* and *C. monophyllus* hybridize in the wild).

The other distinguishing features do not hold consistently. The branching habit of the stem of *C. tolmiei*, which is shared with *C. monophyllus* and occasionally with some of the others, is not exhibited by all the individuals in certain stands of *C. tolmiei*. The character of having hair all the way to the top edge of the petal also does not hold consistently, and is shared by some individuals of related species, e.g. *C. coeruleus*. Only *C. lyallii* and *C. apiculatus* have clear morphological differences within this group; the rest form an inter-related complex. Whether this indicates a common ancestor, with fairly recent subspeciation is not known but may be indicated. The species may still be differentiating themselves within this complex. (The sego lilies, the *Nuttalliani* subsection of Section *Mariposa* have a similarly close relation).

Be this as it may, *C. tolmiei* can GENERALLY be distinguished from the others by range, altitude, color or morphological features. It is distinct from *C. lyallii* by virtue of its nodding capsules, from *C. apiculatus* in the shape of the gland, from *C. subalpinus* by the absence of glands on the sepals, from *C. weedii* by the shape of the petals (*C. weedii*, like *C. lyallii*, looks like a six pointed star, while the other cat's ears have a more chalice-like or goblet-like shape), and from all of these spp. by range. *C. tolmiei* generally grows at lower altitudes than *C. weedii*, *C. elegans* and *C. coeruleus* below the snow line. It is generally west of *C. coeruleus* and *C. elegans*, although all three species' ranges overlap in northern California. It blooms earlier than *C. eurekensis* in the same areas and has a consistently different coloration. Finally, *C. monophyllus* is consistently yellow, while *C. tolmiei* never is, although as we mentioned, there are hybrids between the two which are pale greenish-yellow. (It also hybridizes with *C. amabilis* in the N. Coast ranges, according to Dr. Weera). *C. tolmiei* is variable in color, and can be all white, lavender, purple, or various permutations and bicolors, e.g. white outside and lavender inside, or lavender petals and white sepals.

Complicating the issue still further is the history of *C. tolmiei* identification, as it originally was three

distinct species, and some feel that perhaps one of these should still be recognized, at least at the varietal level (Farwig and Girard). This point will be treated in the next section.

History: *Calochortus talmiei* was described in 1841 by Hooker and Arnott, and referred at that time to a tall plant from Oregon. Later, in 1874, Baker described a smaller plant from California based on specimens gathered by Leichtlin, which was named *C. maweanus*. Both of these were recognized by subsequent botanists, viz. Watson (1879), Purdy (1901) and Abrams (1923). Furthermore, a third species was described by Eastwood in 1898 from Oregon, and named after Purdy, *C. purdyi*. It was distinguished from *C. talmiei* in that the latter lacked a membrane over the gland, and from *C. maweanus* primarily by range and size: it was larger and from Oregon, while *C. maweanus* was considered a California species.

Ownbey combined these three into one species in his standard work on *Calochortus* botany, his *Monograph*. Thus the two larger plants from Oregon, one with a gland membrane and one without, and also the smaller California plant were viewed as one species. [Ownbey also included synonyms for *C. maweanus* and *C. talmiei* under this species, including *C. glaucus*, *C. galei* and various plants misidentified as *C. coeruleus* and *C. elegans*.]

While size is not a good criterion for varietal status (*C. leichtlinii* can be as much as a foot taller at lower elevations, where it has a longer growing season, than at higher), and thus the suppression of *C. purdyi* is justified, the arguments for a varietal status for *C. maweanus* are of greater weight. The Oregon var. *talmiei* is not only consistently and significantly larger than the California plant, it is also occasionally bulbiliferous in the leaf axils and lacks the gland membrane. However, their ranges are now known to overlap. Moreover, separating the *Elegantes* is problematic already; more segregates would complicate matters even further.

Habitat: *C. talmiei* occupies several habitats in the North Coast Ranges and the foothills of the Cascades. This includes the gray pine belt around the north and northwest sides of the Sacramento valley, the nearby Manzanita type chapparal, the redwood belt ("mixed conifer forests"--but I've seen it right under redwoods, a rare habitat for *Calochortus* spp.), and even right on the Coast with Douglas Iris and other fog belt tolerant spp. It grows on both flats and slopes, including steep ones; and prefers the shade of open woods, although it will tolerate anything from deep shade to part sun. The spp. does like plenty of rain, up to forty inches (100 cm.) or more in season, at its north end. Summers are quite warm, but not stifling. Winters are brief but cold: USDA Zone 7-8. The plant must endure 0°F (about -18°C) although on the average the lows are usually only in the teens. This plant starts early, and I have seen it peeking up from the frozen earth as early as November, sending up a small shoot, but not the full leaf. It then outwaits whatever snow arrives, as well as the nightly frosts (thus it tolerates "alternate freezing and thawing" on a daily basis!) The leaf unfurls about February and the flower blooms in April to May, often before the rains have ceased. This does not seem to bother the plant much; perhaps the petal hairs protect the pollen and stigma from drops and splashes. The soils in its range vary, but are generally heavy and contain rocks.

Horticulture: This species has not done as well as one would expect under cultivation, given its immense range. One reason may be water: it likes a lot. It gets almost two inches per week in part of its range, although it tolerates less under cultivation. Another may be chilling, as the seeds from inland may need more of it to germinate. Shade is recommended except near the Coast; fertilizer works well. The species is quite hardy, and seems to do well in temperate areas. It also tolerates summer water, apparently. A rock garden is a good landscape position and the species often does better in the ground. Pests are rarely a problem. A small pot is sufficient, as the bulbs grow shallowly.