THE GENUS ESCHSCHOLZIA IN THE SOUTH COAST RANGES OF CALIFORNIA

WALLACE R. ERNST

Six species of *Eschscholzia* occur in the South Coast Ranges, a mountainous complex extending southeast from San Francisco Bay to the Transverse Ranges that begin in Santa Barbara and Ventura counties (Munz, 1959). Three virtually are restricted to this region and three have wide range of distribution extending beyond the boundary of the state. The primary purpose of this paper is to clarify the identity of *E. hypecoides*. The other species are discussed briefly from the narrow viewpoint of their occurrence in this region. I am grateful to those who have assisted me in the preparation of this paper, among them Sir George Taylor, Director of the Royal Botanical Gardens, Kew, for the privilege of borrowing three types critical to this discussion, and also M. A. Canoso, Emily Reed, Velva E. Rudd, Isabelle Tavares, John H. Thomas, and Ernest C. Twisselmann.

Eschscholzia hypecoides was one of four species of the genus described by Bentham (1834) from plants collected in California by David Douglas. This one was distinguished by its branched leafy stems and resemblance to *Hypecoum grandiflorum* Benth., a fumariaceous herb of the Mediterranean region. Douglas's records of the gathering of the plants were lost but his itinerary in California probably was confined to the Coast Ranges (Jepson, 1933; McKelvey, 1955).

Plants of *Eschscholzia* with branched leafy shoots are common in the Coast Ranges but the species usually attributed to this region normally bear no very close resemblance to *Hypecoum,* the genus to which Bentham alluded in naming *E. hypecoides*. It seemed possible to me that some peculiar aspects common to both were not covered in the formal description of *E. hypecoides* and that these might be of assistance in rediscovering *E. hypecoides* since it is not recognized in the region from which described.

To test this hypothesis I examined the specimens of *Eschcscholzia* in 20 herbaria (A, ARIZ, CAS, DS, GH, LA, MO, ND, NY, OBI, ORE, OSC, POM, RSA, SBBG, SBC, SBM, SD, UC, US). The distribution of those which, by stretch of imagination, might resemble *Hypecoum* is plotted on the map (fig. 1). Almost all, bearing collective resemblance to one another and restricted in origin to the South Coast Ranges, were found in the covers with *E. lemmonii*. These specimens clearly are conspecific with the holotype of *E. hypecoides* (fig. 2). In the modern literature, however, they can be identified only as *E. lemmonii* and the name *E. hypecoides* is found in synonomy only under *E. caespitosa* (or as *E. caespitosa* var. *hypecoides*).

Several characteristics of *E. hypecoides* are notable. The cotyledons are linear spatulate and undivided. The plants are annual, usually con-

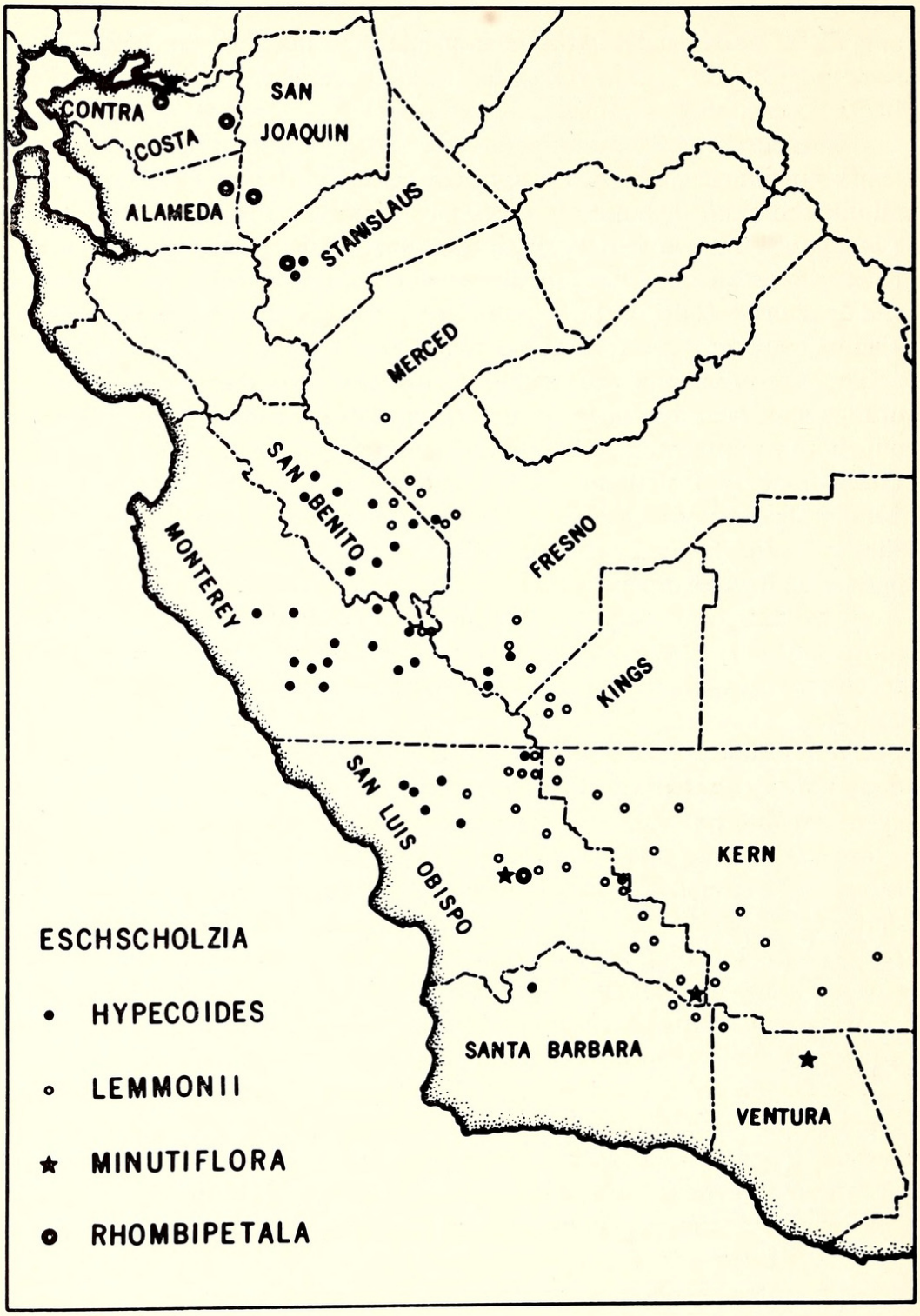

FIG. 1. South Coast Ranges region of California showing counties and the distribution of four species of *Eschscholzia*.

spicuously glaucous and pubescent with short, unicellular hairs. The amount of pubescence, variable from plant to plant in the same colony, sometimes nearly is uniform, or confined to the sepals, the petioles, or the fruits; occasionally the plants are glabrate.

The earliest few flowers often are borne on rather long, sometimes leafless peduncles originating from the center of the caespitose plants. In all but the most depauperate specimens, there usually are several flowers (or young fruits) borne on relatively short pedicels inserted on determinate inflorescence shoots. The leaves on these shoots frequently are opposite on short petioles and the immature buds, at first clustered and almost always nodding, appear sessile among the small leaves.

The petals usually are bright yellow and frequently show a diffuse orange spot near the base; in a few instances they are orange throughout. The receptacle, relatively to the corolla, is characteristically small (table 1). Flowering plants have been collected from early March through June on clay, diatomaceous earth, granite, gravel, serpentine, and white shale at altitudes of 700 (rarely 200) to 3900 ft. The habitat usually is open slopes or disturbed areas near woodland or chaparral associations from western Stanislaus Co. in the north to Santa Barbara Co. in the south (fig. 1). The gametic chromosome number is six (Ernst, 1959); reconfirmed in *Ernst 539, 538, 762,* DS) and the pollen have five or six colpae.

The specimens from Monterey (especially in the Arroyo Seco) and San Benito counties most nearly match the holotype. The plants often occur on outcrops of white strata (the clay, diatomaceous earth, and white shale noted above) which seem sparsely colonized by other vegetation. The frequency of pubescence, the branching habit often with opposite leaves, the nodding clustered buds, the small size of the receptacles, and the frequent association with the white strata of the South Coast Ranges distinguish *E. hypecoides.*

At three localities I observed *E. hypecoides* and *E. californica* within a few feet. The populations of *E. hypecoides,* confined to the white strata in two instances, seemed normal. The nearby colonies of *E. californica* consisted of an inordinate number of depauperate plants and became typical (in stature of plants and prominence of receptacle rims) at some distance from the *E. hypecoides* and away from the white strata. If these species are hybridizing, it would seem that only the morphology of *E. californica* is being affected.

Only a few problems should arise in identifying *E. hypecoides.* In western Stanislaus Co., the range coincides with that of *E. caespitosa,* and *E. rhombipetala* (as well as *E. californica*) and a few sheets seem difficult to determine. Some specimens collected between Coalinga and Parkfield, Fresno-Monterey county line (*K. Brandegee s.n.,* 7 sheets, UC), almost are indistinguishable from *E. minutiflora* but my observations in the field (and of the pollen) convince me that these are *E. hypecoides.*

TABLE 1. SAMPLE LENGTH × WIDTH MEASUREMENTS IN MM. (AVERAGE IN PARENTHESES) OF PRESSED SPECIMENS OF ESCHSCHOLZIA SELECTED TO SHOW RANGE OF VARIABILITY

	E. hypecoides	*E. lemmonii*	*E. caespitosa*	*E. rhombipetala*
	18–22 plants (UC)	11–25 plants (UC)	6–11 plants (DS)	1–4 plants (UC)
Calyx of mature buds	5(8.7)13 × 3(4.5)6	11(15.1)21 × 4(6.5)10	7(11.7)18 × 4(5.6)6	3(3.5)4 × 3(3.5)4
Receptacle at anthesis	1(1.8)3 × 1(1.2)2	4(5.5)9 × 2(3.1)5	1.5(2.1)3 × 1(2)3	2(2.3)3 × 1(1.7)2
Mature petals	5(11.9)16 × 4(10.1)15	15(25.2)32 × 15(23.1)29	10(19.4)38 × 10(16)25	4 × 5
Largest fruits	27(45.5)67 × 1(1.8)2	65(73)80 × 2(2.8)4	42(69)87 × 2(2.8)5	35(60.7)73 × 2(2.3)2.5
Largest receptacles	2(2.7)5 × 1(1.7)2	6(8.1)10 × 3(4.4)5	2(3.5)5 × 2(2.5)4	2(3)4 × 2(2.9)4
Height of plants	[95(211.8)400]	[90(215.5)330]	[170(291.5)300]	[55(146)230]

The range of *E. hypecoides* overlaps that of *E. lemmonii* and sometimes both occur on the same or nearby slopes. In these instances the petals of *E. hypecoides* sometimes are larger and darker in color but the receptacles remain characteristically small. The striking degree of simi-

larity between these species is emphasized by the fact that plants unmistakably equivalent to Bentham's holotype of *E. hypecoides* can be identified in contemporary floras and manuals only as *E. lemmonii*. The confusion surrounding the identify of *E. hypecoides* will be traced briefly.

FIG. 2. Holotype of *E. hypecoides* Benth. (K), collected in California by David Douglas.

The first of Bentham's four species of *Eschscholzia, E. crocea,* was published with a plate which showed this to be a form of *E. californica.* Next, and not illustrated, were *E. caespitosa, E. tenuifolia,* and *E. hypecoides.* These names are preceded chronologically only by *E. californica* Cham., the type species of the genus. The holotypes of *E. caespitosa* and *E. tenuifolia* (fig. 3) are rather young specimens that probably were collected before the first seeds matured. They cannot be matched easily with modern collections. Gray, after inspecting these holotypes reduced *E. tenuifolia* to synonomy under *E. caespitosa* and originated the combination *E. caespitosa* var. *hypecoides* (Benth.) Gray, a trinomial appearing in many treatments of the California flora since 1887. The most recent of these, and one reflecting standard practice among California botanists, is that of Munz (1959), where it is said that "The typical form of the sp[ecies, i.e., *E. caespitosa*] has scapose stems, those with leafy stems constitute the var. *hypecoides,* which is the more common form and occurs throughout the range."

In some instances, branching which gives rise to leafy inflorescence shoots may depend on the location or the degree of maturation of the plant, and perhaps on climatic conditions. The branched leafy plants separated in this way, furthermore, are not *E. hypecoides.* The generally accepted circumscription and range of *E. caespitosa,* however, are not affected by removal from synonomy (or varietal staus) of the name *E. hypecoides.* Normally these species will not be confused. The primary affinities of *E. hypecoides* are not with *E. caespitosa* or *E. tenuifolia* but are with *E. lemmonii,* a species unknown to Bentham and to Gray.

Greene examined the same holotypes in 1894. Later (1905), he separated *E. caespitosa* and *E. hypecoides* but *E. tenuifolia* disappeared and at least three new species were described which now seem indistinguishable from *E. hypecoides.* The syntypes of two, viz. *E. eximia* Greene (*T. Brandegee,* 30 March 1893, CAS *2633*) and *E. alcicornis* Greene (*T. Brandegee,* 1891, CAS *2632*), were collected at Alcalde, Fresno Co. The holotype of *E. delitescens* Greene ex Fedde was mounted on the same sheet with the syntype of *E. alcicornis* and probably was from the same collection. All were cited by Jepson (1922) as synonyms of *E. lemmonii* but, in my opinion, are morphological extremes of *E. hypecoides.* The holotype of *E. asprella* Green (*Eastwood,* May 1897, CAS *2663*), flowerless and nearly leafless, the basis for *E. lemmonii* var. *asprella* Jepson, probably is *E. hypecoides.*

Bentham's holotypes of *Eschscholzia* also were examined by Jepson who cited (1922) a number of specimens that he considered representative of *E. caespitosa* var. *hypecoides.* Two of these (*Jepson,* May 1892, DS, JEPS, and 28 April 1893, JEPS), which he compared with the holotype of *E. hypecoides,* do not seem to match it very well now. The specimens cited by him as referable to *E. hypecoides* mostly are from outside the geographical range of this species as I have determined it (fig. 1), and probably can be referred more satisfactorily to *E. caespitosa.*

Eschscholzia lemmonii was described by Greene in 1887 from the collections of J. G. Lemmon. The type material was said to be pubescent throughout, the color of the petals orange, and the receptacle about one-quarter the length of the inch long corolla. The location of the gathering of the material was not given until 1905 when Greene mentioned (p. 290)

FIG. 3. Holotypes of *Eschscholzia* (K), both collected in California by David Douglas: left, *E. caespitosa* Benth. (two similar superposed plants) ; right, *E. tenuifolia* Benth.

that "The type of this remarkable species, obtained by Mr. Lemmon at Cholame, San Luis Obispo, Co., Calif., as long ago as 1887, has not yet been rediscovered." At the same time he described two varieties (*laxa* and *cuspidata*) which now seem too indistinct to be maintained.

A specimen of *E. lemmonii* collected by Lemmon cannot be located. An illustration (fig. 4) signed "H. D. House, '04" (US), conforms to the description of *E. lemmonii*. The drawing was inscribed "Eschscholtzia lemmonii Greene / San Luis Co., / Collected by J. G. Lemmon / 1887. Drawn from type / in Greene herb." The specimen from which the drawing was made does not seem now to be in the Greene-Nieuwland Herbarium. This illustration did not exist when the description of the species was published and no other illustration of the whole plant is known; the one labeled *E. lemmonii* in Abrams (1944) is *E. hypecoides* .

A solitary bud at the California Academy of Sciences (CAS *2506*) may be a fragment of the missing holotype. On the same sheet are three small plants of *E. lemmonii* (*Brandegee,* Alcalde, CAS *2505*) bearing the annotation "??? / E. L. G." Another specimen on this sheet (*Jared*, May 1893, CAS *2507*) was annotated by Greene as "Eschscholtzia lemmonii, Green type ! var. cuspidata Greene." On another sheet (*Eastwood*, 10 May 1893, CAS *2510*), Greene wrote "Eschscholtzia lemmonii, Greene not typical; var. laxa Greene." None of these annotations was dated and the varieties now do not seem distinct. All conform to my conception of *E. lemmonii* but none appears to me a suitable candidate for lectotype or neotype.

In general aspect *E. lemmonii* is very similar to *E. hypecoides*. The cotyledons are linear spatulate and entire. The plants are annual, usually glaucous, the pubescence conspicuous (although some plants glabrate), and the flowers frequently on branched, leafy shoots with reduced, often opposite leaves on short petioles. Sometimes the plants are acaulescent with flowers on simple leafless peduncles. The buds mostly are fewer in number, larger in size, but almost always nodding when young. The petals usually are dark orange or red orange but sometimes yellow. Often there is a black spot at the base of the staminal filaments. The pollen have five or six colpae. The differences from *E. hypecoides* are the much larger buds and the proportionately greater size of the receptacles at all stages of development (table 1). At anthesis, the receptacles are opaque and glaucous but frequently become scarious or translucent.

Flowering plants have been collected from February to May on adobe, calcareous sand, gravel, gypsum, heavy soil, loam, white clay, white shale, and sand at altitudes of 700–2900 ft. The habitat usually is open grassland slopes in the eastern portion of the South Coast Ranges and the adjacent margin of the Central Valley from western Merced Co. in the north to Ventura Co. in the south (fig. 1). The gametic chromosome number is six (Ernst, 1959; reconfirmed in *Ernst 751,* DS). This species mostly is distributed at somewhat lower altitude and further east than *E. hypecoides*. Near Alcalde, Fresno, Co., *E. lemmonii* and *E. hypecoides*

FIG. 4. Drawing of *E. lemmonii* Greene (US).

are found within a short distance and some flowers of the latter are unusually large with orange rather than yellow petals but the difference in sizes of receptacles is maintained.

The common occurrence of pubescence (plants infrequently glabrate), the nodding buds on shoots frequently with opposite leaves (or flowers sometimes on simple leafless scapes), the unusually large receptacles without conspicuous rim beneath the insertion of the calyx, and the darker petals will distinguish *E. lemmonii* from all other species in the South Coast Ranges. The southeastern limit of distribution extends eastward along the northern slopes of the Transverse Ranges in Kern Co. (*Twisselmann 8037, 8060, 8079,* US) and thus beyond the intended geographical coverage of this paper. In the latter region a problem may arise in distinguishing depauperate and glabrate plants of *E. lemmonii* from depauperate plants of *E. caespitosa* subsp. *kernensis* Munz.

Our knowledge of *E. rhombipetala* Greene rests on eleven collections, many without flowers. Neither the range nor the type materials were clearly set forth in the original description in 1885. Later, Greene (1905, p. 289) gave the distribution as "inconspicuous grain-field species, common from Colusa Co. far southward along the foothills of the inner Coast Range and plains adjacent." No specimens now are known from north of San Francisco Bay. The distribution (fig. 1), from north to south, seems to be Contra Costa Co.: *Brandegee,* April 1889 (DS); *Curran,* June 1889 (CAS, DS); *Greene,* 25 March 1888 (UC, US); San Joaquin Co.: *Hoover 1737* (UC); Alameda Co.: *Eastwood* & *Howell 1949* (CAS); *McClintock,* 26 March 1950 (RSA); Stanislaus Co.: *Hoover 4345* (DS, UC, US); and San Luis Obispo Co.: *Hoover 7775* and *7861* (OBI); Lemmon Herbarium, in 1887–1888 (UC). Another specimen (CAS *2541*) was collected by Greene from the locality "Lower San Joaquin Valley." This one, not dated, was annotated "Part of my original material!" by Greene. The plants are annual and distinctive in this region for their small size, cespitose habit, erect buds, small petals, and rather conspicuous mature receptacles and fruits (table 1). The receptacles recall those of *E. lemmonii* but the petals are smaller and the plants glabrous.

The new combination *E. caespitosa* var. *rhombipetala* was made by Jepson but others have considered *E. rhombipetala* merely a synonym of *E. caespitosa.* It differs from *E. caespitosa* in the smallness of the flowers, the shortness of the peduncles (mostly not exceeding the leaves), and the texture of the herbage (not easily described). The chromosome number is unknown. The pollen appears to have five to eleven colpae (5 and 6 in Lemmon Herbarium, 1887–1888, and *Hoover 1737,* both UC; 8 and 9 in *McClintock,* 26 March 1950, RSA; 10 and 11 in *Greene,* 25 March 1888, UC). The pollen of *E. californica, E. caespitosa, E. hypecoides,* and *E. lemmonii* usually have five or six colpae.

The similarity of *E. rhombipetala* and some forms of *E. minutiflora,* a common and quite variable species in the desert regions of the Southwest, occurring in Utah, Arizona, Nevada, California, and Baja Cali-

fornia, creates a problem. This species was described by Watson in 1876 without citation of holotype or type locality; however, his material probably was *Watson 51* (US), collected at Truckee Pass, Nevada. Whether this species also occurs in the South Coast Ranges to the extent suggested by Munz (1959) and by Mosquin (1961, pp. 93–96) remains debatable. I have found only four collections from this region which might be referable to *E. minutiflora* (fig. 1). Two of these are from San Luis Obispo Co. (*Armstrong 1112,* alt. 1750 ft near Pozo, UC, and *Axelrod 260,* alt. 2300 ft near Cuyama, RSA, UC) and two from Ventura Co. (*Hoffmann,* 5 June 1930, Lockwood Valley, SBN, and *Schreiber 1045,* road to Ozena UC). The nearest station of *E. minutiflora* to the east, toward the extensive desert distribution, perhaps is less than 40 miles distant.

It is difficult to make a distinction between *E. rhombipetala* and *E. minutiflora* in the South Coast Ranges because there is so little material available for comparison. Both species appear to have unusual disjunct localities in San Luis Obispo Co. (fig. 1). Normally, *E. minutiflora* (on the deserts) is annual, has upright, diffusely branched inflorescence shoots above a rosette of leaves, and the many flowers (except for the first few) are on relatively short pedicels. *Eschscholzia rhombipetala* also forms a rosette of leaves but there only are a few flowers, these on relatively long peduncles which do not seem to exceed the leaves. I find the pollen of the tentative *E. minutiflora* in the South Coast Ranges have nine to eleven colpae (9 to 11 in *Armstrong 1112,* UC, and 9 and 10 in *Axelrod 260,* UC). The mean numbers of colpae for 10 pollen grains from each of 27 plants of *E. minutiflora* (for which the chromosome number was determined) were given by Mosquin (1961, p. 95) as 8.2 to 10.4. The numbers of colpae alone seem insufficient to distinguish this species from *E. rhombipetala.* Since *E. minutiflora* of the California deserts is hexaploid with 18 pairs of chromosomes (Ernst, 1958, 1959; Mosquin, 1961), its presence and distribution in the South Coast Ranges presumably could be verified on the basis of a few appropriate chromosome number determinations. If it does occur in this area, it would seem to be very local and rarely collected.

The most common species of *Eschscholzia* in the South Coast Ranges, occurring in each county, is *E. californica,* distributed from the coastal strand through the mountains to the Central Valley of California and beyond. The original material, the type for the genus, was desribed from San Francisco by Chamisso and published with a plate in 1820. The hallmarks are the broad receptacle rim below the insertion of the calyx and the bifid cotyledons (only example in family). The receptacle rim, in this case, is a somewhat fleshy structure that is vasculated by a number of discreet, radiating, folded traces which differentiate in the receptacle, pass outward into the fleshy rim, then turn sharply back toward the receptacle and finally enter the sepals (Ernst, 1962). The plants rarely are pubescent and sometimes persist for longer than a year. Their appearance during the hot and dry summer (with sparse foliage, small yellowish

flowers) often contrasts markedly with the vernal appearance of the same plants (lush dense foliage, large orange flowers) (Jepson, 1922). A rather distinctive maritime phase is developed in some instances.

Many of the biotypes of this species have been described as separate species, especially by Greene. Accepting the lack of experimental evidence, one readily could believe from the complex patterns of morphological variation that this species hybridizes with others. If true, it would be helpful taxonomically to know how the distinctive receptacle rim and the bifid cotyledons are inherited in hybrids. Some plants much resembling *E. californica* but lacking well developed receptable rim present a taxonomic problem. Whether these are *E. californica* or *E. caespitosa* is diffcult to decide since the cotyledons seldom are available.

Current practice has created of *E. caespitosa* a kind of taxonomic dumping ground. As popularly conceived this species equally is as variable as *E. californica* (taken in the broad sense) but somewhat less common and less widely distributed. In the South Coast Ranges *E. caespitosa* occurs at least in western Stanislaus, Monterey, San Luis Obispo, and Santa Barbara counties, usually at somewhat higher altitude than the lowest limits of *E. californica*. The plants are annual, the receptacle moderate in size and without conspicuous rim beneath the calyx, and the cotyledons are undivided. The buds mostly are not clustered and nodding and the plants usually are glabrous (but ± pubescent in other areas). Some of the plants seem obligately acaulescent while others produce elongated inflorescence shoots. One of the more distinctive holotypes of the several binomials proposed for this complex is that of *E. dolichocarpa* (*Plaskett 84,* CAS *2490*), collected in Monterey Co. and described by Eastwood in 1903.

Even after one has become accustomed to the spectrum of morphological variation included in the popular conception of *E. caespitosa,* the features of the holotype are surprising (Greene, 1905, p. 285). The holotype (fig. 3), actually two similar superposed plants, to me is startlingly similar to *E. californica* and less like the plants usually identified as *E. caespitosa*. This especially is evident in the margins of the ultimate divisions of the foliage and the size and shape of the buds even though they lack a conspicuous rim. The cotyledons, of course, forever are missing. The peduncles of the earlier flowers are quite long but examination of the central portion of the plants suggests that later flowers probably would have been on shorter pedicels inserted on somewhat elongated shoots.

An apparently similar biotype occasionally turns up in the South Coast Ranges (and infrequently from mountain systems further south) and although the match never seems to be quite perfect, it does seem possible that the holotype of *E. caespitosa* was collected along Douglas's path in this region. Biologically, it may be just as sound to call these exceptional plants (and the holotype of *E. caespitosa*) extremes of *E. californica*. Since there seems no way to refute or to prove this hypothesis, the

same specimens are just as likely extremes of the popular conception of *E. caespitosa*.

The name of *E. tenuifolia* historically has been submerged under that of *E. caespitosa* even though the holotype seems more distinctive. An apparently similar but frequently branching (sometimes pubescent) biotype occurs along the western base of the Sierra Nevada and in the North Coast Ranges, especially in Mendocino and Lake counties, probably all beyond the limits of Douglas's itinerary in California. In the South Coast Ranges, while none matches it very closely, here and there is a specimen that seems almost too similar to rule out the possibility that, as an exceptional plant, the holotype of *E. tenuifolia* also was collected in this region.

More than a century of botanical collecting in the South Coast Ranges has not shown *E. caespitosa* and *E. tenuifolia* to be well defined species. Ironically, the two holotypes taken together provide a sort of range of morphological variation which seems to cover the popular conception of *E. caespitosa*. A biological understanding of this uneasy situation should follow a detailed comparison of *E. californica* and *E. caespitosa* throughout their respective geographical ranges. A taxonomic solution, however, which must be made in the South Coast Ranges, is not now in sight and only the following improvement in current practice is proposed. It seems sufficiently clear that neither *E. rhombipetala* nor *E. hypecoides* is conspecific with either *E. caespitosa* or *E. tenuifolia*.

Summary

Six species of *Eschscholzia* occur in the South Coast Ranges, the type locality for all except *E. minutiflora*. The identity of *E. hypecoides*, obscurred since 1887, is clarified, an argument for its recognition as a species is advanced, and its similarity to *E. lemmonii* is pointed out. The similarity between *E. rhombipetala* and *E. minutiflora* in this region is mentioned and the difficulties attending an interpretation of the holotypes of *E. caespitosa* and of *E. tenuifolia* are discussed.

After this manuscript was accepted for publication I had the opportunity to visit the herbaria of the Royal Botanc Garden, Edinburgh (E), the British Museum (Natural History), London (BM), and the Royal Gardens, Kew (K). Now I am aware of additional specimens that probably are isotypes for Bentham's *E. caespitosa, E. hypecoides,* and *E. tenuifolia*. Those shown in the accompanying illustrations are stamped "Herbarium Benthamianum" and bear Bentham's own annotations. I presumed these specimens to be holotypes but, in strict adherence to the Code (Art. 7), they should be lectotypes since they were not specifically singled out in the original descriptions.

Department of Botany, Smithsonian Institution, Washington, D.C.

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NOTES AND NEWS

ECHINOCHLOA ORYZICOLA IN CALIFORNIA.—For some years a singular species of *Echinochloa* has been persisting in the rice fields at the Rice Experiment Station near Biggs, Butte Co., California. It closely resembles the rice plant in gross vegetative appearance but is readily distinguished by the densely hairy collar and sheath margins and in the absence of the ligule. The character and position of the hairs separate it from any forms of the common watergrass, *Echinochloa crus-galli*. The spikelets are 5–6 mm long, quite shiny and less hispid than those of watergrass. The lemma of the sterile floret is largely smooth and shiny, this smooth portion with a texture similar to that of the fertile one. It matures at the same time as rice.

The grass was first collected at the Biggs station by the author on September 17, 1957 (*Crampton 4626*, AHUC). A specimen of the first collection was identified by N. L. Bor, Royal Botanic Gardens, Kew, as *E. oryzicola* var. *mutica*. It is native in the Far East but more recently has been imported with rice into middle Asia and the Caucasus (Fl. USSR 2:33. 1934). It is regarded as a noxious rice weed by the Russians. Vasinger-Alektorova (Bull. Appl. Bot. Genet. Pl. Breeding 25:109–152. 1931) clearly emphasized the weedy character of the grass and the problems of its management in his studies on rice weeds of the maritime Far East.

It is not known how long the grass has been growing at the Biggs station though it is quite likely that it was introduced as an impurity in oriental rice varieties. P. B. Kennedy during his research on rice weeds in California and subsequent publication (Calif. Agric. Exper. Sta. Bull. 356:467–494. 1928), had collected this *Echinochloa* at a temporary rice station at Cortena, Colusa Co. (*Kennedy*, in 1922, 1925, 1928, AHUC). Kennedy recognized the plants as "a new form of watergrass," however, did not publish a specific or varietal name nor allude to it in his publication on rice weeds.

The author visited Cortena in September, 1963, and collected in the rice there an *Echinochloa* (*Crampton 6892*, AHUC) which may be called *E. oryzicola* f. *glabra* (Fl. USSR 2:33. 1934). It is similar in habit, inflorescence and spikelet characters to those previously collected by Kennedy and to those collected at the Biggs station. The sheaths and collar, however, lack the characteristic pubescence, though a band of short appressed hairs was present around the base of the lowermost sheaths. Considerable search did not reveal var. *mutica* as having persisted at Cortena.