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**SOME REMARKS ON THE VEGETATION OF
SOUTHERN CALIFORNIA**

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It is just a trifle less than a half century ago that I was working at the Gray Herbarium, at which time I gave a talk to the New England Botanical Club on the flora of southern California. I spoke of the great range of topography in this area of perhaps 30,000 square miles, with its offshore islands, its coastal or cismontane slopes, its mountains to more than 11,000 ft elevation, and its deserts (one with Great Basin affinity, the other with Sonoran Desert affinity). I said that I doubted whether another area of similar size could be found in this country with so great a physiographic range and consequently so many plant species. I mentioned the fact that our aridity often meant not nearly so many individual plants as in a region with greater precipitation, but the tremendous range in climatic conditions here made for many taxa. My talk was received by at least some of my listeners as typical Californian braggadocio, which I admit was rather rampant at that time and not always well received by eastern listeners. I believe it was on that very trip that I was told of the Californian who attended a funeral in the Boston area. After his eulogy of the deceased the clergyman asked if anyone would like to say something about the gentleman. The Californian arose and said that he had nothing to say about him, but would like to tell them something about Los Angeles. Well, I hope that by now we Californians have passed on this bragging privilege to the Texans and have become a bit milder and our culture a bit more mature. One more thing though about my talk; I noticed that for some days after it, two of the gentlemen at the Herbarium, namely Professor Fernald and Mr. Weatherby, had their heads together in very earnest conference and finally came to me very pleased and said that if they took an area beginning at Long Island Sound and went north along the Connecticut River to the higher mountains in northern New Hampshire and Vermont, they could lay out an area of the same size and with just as many species as we had. Now we were all satisfied and pleased.

However, the fact still remains that our region is a most interesting one botanically. I have recently been working over the manuscript of a *Flora of Southern California*, which will be published in mid-1973 by the University of California Press, and have been making an analysis of our local plants:

TABLE 1. Number of plant taxa for California as a whole.

<i>Larger groups:</i>	<i>Genera:</i>	<i>Species:</i>	<i>Varieties:</i>	<i>Indefinite taxa mentioned but not accepted:</i>	<i>Introduced species:</i>
CALIFORNIA AS A WHOLE					
Lycopsida	3	18	1		
Sphenopsida	1	6	1		
Pteropsida					
Filices	24	61	10		
Coniferae	14	54	2		
Gnetae	1	7	1		
Angiospermae					
Dicotyledones	1015	5133	1456		
Monocotyledones	237	1196	134		
<i>Total:</i>	1295	6475	1605	460	846
SOUTHERN CALIFORNIA					
Lycopsida	3	9	0		
Sphenopsida	1	4			
Pteropsida					
Filices	23	57			
Coniferae	6	24			
Gnetae	1	7	1		
Angiospermae					
Dicotyledones	773	2780	650	151	
Monocotyledones	157	570	58	20	
<i>Total:</i>	964	3451	709	171	555

the number of taxa, their range and geographic affinity, the number of naturalized introductions, etc. It is rather interesting to compare these data with corresponding ones worked out for the whole state from Munz and Keck, *A California Flora*, by Gladys L. Smith and Anita M. Noldeke (Leaflets of Western Botany 9: 117-123. 1961), as can be shown in TABLE 1. Each book mentions about the same number of hybrids—in the twenties.

ENDEMISM

In an area in which topography is so broken up as in ours, a most interesting feature is the endemism. And while this was discussed in the introduction to my *Manual of Southern California* of 1935, it seems to me not amiss to consider it again. In the introduction to my forthcoming new book the geographic boundaries and the vegetation are discussed with something about climates, plant communities, distribution patterns, and geological history, but almost nothing about endemism. Naturally, endemism is quite marked in isolated areas such as islands.

INSULAR ENDEMISM

The most recent discussion of the flora of the California islands is that by R. F. Thorne (*The California Islands*, Ann. Missouri Bot. Gard. 56:

391-408. 1969). He divides our southern islands into two groups: the Northern Channel Islands (Anacapa, Santa Cruz, Santa Rosa, and San Miguel) and the Southern Channel Islands (San Nicolas, Santa Barbara, Santa Catalina, and San Clemente). The four northern islands are disjunct segments of the Santa Monica Mountains and much of their biota could have crossed to them by land. The southern islands have a different geological history, with probably total submergence in late Pleistocene; and the present plant inhabitants probably reached the islands by chance over-water dispersal, hence do not constitute so rich a flora as has the northern group. Thorne lists 13 endemics restricted to San Clemente, 9 to Santa Cruz, 7 to Santa Catalina, 5 to Santa Rosa, 2 to San Nicolas, and 2 to Santa Barbara. Among these endemics, along with others restricted to two or three islands are:

- Eriogonum arborescens*—Santa Rosa, Santa Cruz, Anacapa
E. grande ssp. *rubescens*—Santa Cruz, San Miguel
Galium californicum ssp. *miguelyense*—Santa Rosa, San Miguel
G. catalinense var. *buxifolium*—Santa Cruz, San Miguel
Haplopappus detonsus—Santa Rosa, Santa Cruz, Anacapa
Lyonothamnus floribundus ssp. *asplenifolius*—Santa Rosa, Santa Cruz, San Clemente
Salvia brandegei—Santa Rosa
Solanum clokeyi—Santa Rosa, Santa Cruz
Thysanocarpus laciniatus var. *ramosus*—Santa Rosa, Santa Cruz
- Astragalus traskiae*—San Nicolas, Santa Barbara
Cryptantha traskiae—San Nicolas, San Clemente
Eriogonum grande ssp. *timorum*—San Nicolas
Lycium verrucosum—San Nicolas
- Cercocarpus traskiae*—Santa Catalina
Eriogonum giganteum var. *giganteum*—Santa Catalina
Lyonothamnus floribundus ssp. *floribundus*—Santa Catalina
Solanum wallacei—Santa Catalina
- Artemisia nesiotica*—San Clemente, San Nicolas, Santa Barbara
Astragalus nevinii—San Clemente
Eriogonum giganteum var. *formosum*—San Clemente
Eriophyllum nevinii—San Clemente, Santa Barbara, Santa Catalina
Galium catalinense var. *catalinense*—San Clemente, Santa Catalina
Lotus scoparius ssp. *traskiae*—San Clemente
Malacothamnus clementinus—San Clemente
Munzothamnus blairii—San Clemente

Other species more generally distributed:

- Ceanothus arboreus*—Santa Cruz, Santa Rosa, Santa Catalina
C. megacarpus ssp. *insularis*—Santa Rosa, Santa Cruz, Santa Catalina, San Clemente

Eriogonum grande ssp. *grande*—Santa Cruz, Santa Catalina, Anacapa, San Clemente

Mimulus flemingii—Santa Rosa, Santa Cruz, Anacapa, San Clemente

Some of the southern islands have species in common with Guadalupe Island and its islets:

Haplopappus canus—San Clemente, Guadalupe

Lomatium insulare—San Clemente, San Nicolas, Guadalupe

Lupinus guadalupensis—San Clemente, Guadalupe

Phacelia floribunda—Santa Barbara, San Clemente, Guadalupe

Scrophularia villosa—Santa Catalina, San Clemente, Guadalupe

Many species of limited distribution occur on islands and on the adjacent mainland:

Chaetopappa lyonii—Santa Catalina, coastal Los Angeles County

Coreopsis gigantea—Santa Catalina and more northerly islands, mainland from Los Angeles County to San Luis Obispo County

C. maritima—southern San Diego County, northern Lower California, adjacent islands

MONTANE ENDEMISM

In general the southern California mountains are noteworthy for the large number of northern species still remaining in southern California despite the warming process that has gone on since the Pleistocene. Some of these species occur as rare relicts: *Populus tremuloides* (one canyon in the San Bernardino Mts.), *Phyllodoce breweri* (San Bernardino Mts.), *Woodisia scopulina* (San Bernardino Mts.). Others are much more general and make up the bulk of the vegetation of our pine belt. Most of these show affinity to the Sierran flora; others to the Rocky Mountain flora: *Carex occidentalis* (San Bernardino Mts., Arizona to Wyoming), *Lilium parryi* (to Arizona), *Gentiana humilis* (San Bernardino Mts. and Rocky Mts.), *Lewisia brachycalyx* (Cuyamaca and San Bernardino mts. to New Mexico and Utah), *Bahia dissecta* (San Bernardino and Santa Rosa mts. to Wyoming, New Mexico), *Oxytropis oreophila* (San Bernardino Mts. to Utah), *Malaxis brachypoda* (San Jacinto and San Bernardino mts. to Rocky Mts. and east). Some montane species are interesting for their discontinuous distribution: *Rhododendron occidentale* (central California and San Jacinto to Cuyamaca mts.), *Carex hoodii* (San Bernardino to San Jacinto mts., Sierra Nevada), *Poa bolanderi* (San Gabriel and San Jacinto mts., Sierra Nevada north), *Salvia sonomensis* (San Diego County, central California), *Ceanothus foliosus* (Cuyamaca Mts., Santa Cruz County north), *Viola lobata* (Cuyamaca Mts., central California north).

But our mountains also exhibit a high degree of endemism: (1) San Gabriel and San Bernardino mts.—*Allium parishii*, *Linanthus concinnus* ssp. *decorus*, *Draba corrugata* var. *corrugata*, *Monardella linifolia* ssp. *stricta*. (2) San Gabriel Mts.—*Oreonana vestita*, *Aster greatai*, *Corethrogyne filaginifolia* var. *pinetorum*, *Calystegia peirsonii*, *Dudleya densiflora*, *Silene parishii* var. *latifolia*, *Monardella cinerea*, *M. viridis* var. *saxicola*, *Lupinus*

excubitus var. *johnstonii*. (3) San Bernardino Mts.—*Chrysothamnus parryi* ssp. *imulus*, *Erigeron parishii*, *Sidalcea pedata*, *Astragalus albens*, *Senecio bernardinus*, *Taraxacum californicum*, *Arabis parishii*, *Arenaria ursina*, *Silene parishii* var. *parishii*. (4) San Jacinto Mts.—*Arabis johnstonii*, *Ivesia callida*, *Oxytheca marginata*, *Mammillaria dioica* (San Jacinto Mts to Lower California), *Leptodactylon jaegeri*, *Monardella nana* var. *arida* (San Jacinto and Santa Rosa mts.), *Draba corrugata* var. *saxosa* (San Jacinto and Santa Rosa mts.), *Euonymus occidentalis* var. *parishii* (San Jacinto and Cuyamaca mts.), *Dudleya saxosa* ssp. *aloides* (San Jacinto and Laguna mts.). (5) More widely ranging—*Frasera neglecta* (San Bernardino and San Gabriel mts., Mt. Pinos), *Monardella odoratissima* ssp. *australis* (San Gabriel to San Jacinto mts.), *Lupinus elatus* (San Gabriel Mts. to Mt. Pinos), *Lupinus peirsonii* (San Gabriel and Tehachapi mts.), *Chaenactis parishii* (San Gabriel, San Bernardino, and San Jacinto mts.). (6) Mountains of San Diego County—*Grindelia hallii* (Cuyamaca Mts.), *Monardella nana* ssp. *nana* (Cuyamaca and Laguna mts., northern Lower California), *Arctostaphylos otoyensis*, *Limnanthes gracilis* var. *parishii* (Laguna and Cuyamaca mts.). (7) Santa Ana Mts.—*Allium parishii* var. *keckii*, *Phacelia suaveolens* var. *keckii*, *Lepechinia cardiophylla*, *Satureja chandleri* (Santa Ana Mts. to Jamul Mt., San Diego County).

CISMONTANE ENDEMISM

(1) More or less general—*Baccharis plummerae* (Santa Barbara, Ventura, Los Angeles counties), *Dudleya stolonifera* (Laguna Beach), *Dudleya viscida* (San Juan Capistrano to Oceanside), *Opuntia oricola* (Santa Barbara to northern Lower California), *Hemizonia minthornii* (Santa Susanna Mts.), *Atriplex serenana* var. *davidsonii* (Los Angeles region to Laguna Beach), *Dudleya cymosa* ssp. *marcescens* (Santa Monica Mts.), *Astragalus brauntonii* (hills bordering Los Angeles plain), *Malacothamnus davidsonii* (San Fernando Valley) (2) San Diego County—a good many species found only in the San Diego region—*Corethrogyne filaginifolia* var. *incana*, *C. filaginifolia* var. *linifolia*, *Hemizonia conjugens*, *Dudleya blochmanae* ssp. *brevifolia* (Del Mar, La Jolla), *Astragalus deanei*, *A. oocarpus*, *Pogogyne abramsii* (San Diego to Miramar), *Lepechinia ganderi*, *Arctostaphylos glandulosa* ssp. *crassifolia*. (3) Another group of species is found in San Diego County and adjacent Lower California—*Geraea viscida*, *Selaginella cinerascens*, *Haplopappus junceus*, *H. palmeri* ssp. *palmeri*, *Hemizonia floribunda*, *Hulsea californica*, *H. mexicana*, *Iva hayesiana*, *Dudleya attenuata*, *D. variegata*, *Lathyrus splendens*, *Viguiera laciniata*, *Caulanthus stenocarpus*, *Salvia clevelandii*, *Salvia munzii*, *Acanthomintha ilicifolia*.

DESERT ENDEMISM

Although the Mojave Desert is essentially a part of the Great Basin and many of its species range to Utah, and the Colorado Desert is an arm of the Sonoran Desert with many species running to Sonora and Lower California, both our deserts have regions of endemism within themselves or into adjacent out-of-state areas.

Mojave Desert.

In general, the central Mojave Desert has many of its own species such as *Eriophyllum mohavense*, *Lomatium deserticola*, *Astragalus jaegerianus*, *Dalea arborescens*, *Tetradymia stenolepis* (Antelope Valley to New York Mts.). Other species are confined to the western Mojave: *Monardella exilis*, *Mentzelia mojavensis*, *Hemizonia arida*, *Phacelia novemmillensis*, *P. nashiana*. But the impressive area of local distribution is the eastern Mojave: (1) Some plants are more or less extensive in their range—*Selaginella leucobryoides* (Panamint and Providence mts.), *Erigeron pumilus* ssp. *concinoides* (eastern San Bernardino County to southern Inyo County), *Erigeron uncialis* (Clark, Tin, and Inyo mts.), *Haplopappus gilmanii* (Inyo and Panamint regions), *Perityle inyoensis* (Inyo Mts.), *Forsellesia pungens* var. *glabra* (Clark Mts.), *Haplopappus racemosus* ssp. *sessiliflorus* (Death Valley, Deep Springs), *Phacelia amabilis* (Saline Valley), *Sibara rosulata* (Saline Valley, Death Valley, Kelso). (2) Other species are practically confined to the Death Valley region—*Nitrophila mohavensis* (Amargosa Desert), *Sphaeralcea rusbyi* ssp. *eremicola* (Panamint Mts.), *Ephedra funerea*, *Enceliopsis covillei* (Panamint Mts.), *Perityle villosa* (Panamint Mts.), *Dudleya saxosa* ssp. *saxosa* (Panamints), *Tetracoccus ilicifolius* (Grapevine and Panamint mts.), *Astragalus funereus*, *Salvia funerea*, *Mentzelia reflexa*, *Phacelia mustelina*. (3) Still other species are found also in adjacent Nevada and Arizona—*Cymopterus aboriginum* (Inyo-White to Panamint and Grapevine mts., western Nevada), *Cymopterus gilmanii* (Last Chance Mts. to Death Valley, western Nevada), *Acamptopappus shockleyi* (White Mts. to Clark Mt., southern Nevada), *Cirsium nidulum* (Inyo-White mts., Arizona), *Hecastocleis shockleyi* (Death Valley, Inyo Mts., western Nevada), *Hulsea vestita* ssp. *inyoensis* (Coso Mts. to Death Valley, western Nevada), *Lupinus holmgrenianus* (Last Chance Mts., western Nevada), *Phacelia barnebyana* (Clark Mt. to Inyo Mts., western Nevada), *Petradoria discoidea* (Inyo and Panamint mts., western Nevada), *Chenopodium nevadense* (Inyo-White mts., western Nevada), *Haplopappus brickellioides* (Last Chance, Saline Valley, Death Valley, western Nevada), *Cuscuta nevadensis* (Panamint Mts., western Nevada), *Lathyrus hitchcockianus* (Grapevine Mts., western Nevada), *Phacelia crenulata* var. *funerea* (Death Valley to White Mts., western Nevada), *Sibara deserti* (Death Valley, Panamint Valley, Saline Valley, western Nevada).

Colorado Desert.

Salvia greatai is a very local endemic in Riverside County. A group of species is confined to the western edge of the Colorado Desert and many range into Lower California: *Pinus quadrifolia*, *Opuntia echinocarpa* var. *wolfii*, *Salvia eremostachya*, *S. vaseyi*, *Lotus haydonii*, *Petalonyx linearis*, *Lyrocarpa coulteri* var. *palmeri*. Other species from somewhat farther east also run into Lower California: *Malperia tenuis*, *Atriplex canescens* ssp. *linearis*.